PRIVILEGED AND CONFIDENTIAL October 24, 2025

BY EMAIL

Gina Ang
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boh@toronto.ca

Re: Canadian Partnership for Children's Health and Environment – Healthy Schools Must Tackle Climate Change, Indoor Air Quality and Other Environmental Health Issues (Item HL28.1)

Dear Ms. Ang,

These materials were developed as part of the Canadian Partnership for Children's Health and Environment's 2024 and 2025 Healthy Environments for Learning Day campaigns. They demonstrate the health harms and key policy recommendations for better protecting children from poor indoor air quality and extreme heat in schools and childcare facilities. We urge the Board of Health to consider these harms and incorporate indoor air quality and heat harms in schools in its plan for supporting health in schools, item HL28.1.

We are attaching the following documents for your consideration:

- The Healthy Environments for Learning Day Calls to Action for 2024 (2024 Call for Action - Canadian Partnership for Children's Health and Environment (CPCHE)) and 2025 (2025 Call for Action - Canadian Partnership for Children's Health and Environment)

- "Wildfire smoke and portable air cleaners – Improving air quality in schools and child care facilities, National Collaborating Centre for Environmental Health in collaboration with the Canadian Partnership for Children's Health and Environment

- FAQs – Climate-related indoor air quality concerns in learning settings, Canadian Partnership for Children's Health and Environment

- Infographic – Traffic-related Air Pollution in Learning Settings, Canadian Partnership for Children's Health and Environment

Sincerely,

Jacqueline Wilson
Counsel

canadian partnership for children's health & environment
partenariat canadien pour la santé des enfants et l'environnement

A Collective Call for Action to Ensure Healthy Indoor Air Quality In Schools and Child Care Settings

Indoor air quality (IAQ) in schools and child care settings has become an increasing concern in Canada

with elevated wildfire smoke exposure and knowledge about airborne virus transmission, including COVID-19. Factors that affect indoor air quality include radon, toxic chemicals from products and furnishings, infiltration of outdoor air pollution, inadequate ventilation and filtration, and the effects of climate change.[1-3] With children spending 6 or more hours per day in schools or child care, it is crucial that the air they are breathing in such settings is healthy.[4,5]

Children are more vulnerable to harm from air pollutants

A well-established body of evidence confirms the risks to child health and well-being of air pollution exposures.[2,6-8] Compared to adults, children are more exposed to air pollutants, because they inhale more air per kilogram of body weight and their higher levels of physical activity lead to deeper and more frequent breathing. They are also more vulnerable to the health effects of poor indoor air quality because their bodies, brains and respiratory systems are still developing.[2,9] Children spend a significant portion of their time indoors in educational settings where prolonged exposure to pollutants in these environments heightens their risk of experiencing adverse effects on their health and ability to learn.[6,7,10,11] Asthma, which can be exacerbated by poor air quality, is the leading cause of school absenteeism in Canada.[12]

Unhealthy indoor air quality in schools and child care settings can exacerbate inequitable health risks. Children who experience poverty, racialization and other forms of marginalization often face compounding air pollution risks, which can include mould and other adverse conditions in substandard housing as well as disproportionate exposure to traffic-related air pollution, industrial emissions and other environmental injustices.[13-18] Poor air quality in educational settings adds to this unjust burden. The ongoing effects of colonialism, including chronic underfunding that can lead to unhealthy indoor air quality in on-reserve educational settings, exacerbates disproportionate health risks borne by Indigenous students.[i]

Indoor air quality interventions can reduce multiple health effects

Poor IAQ can lead to a range of health issues, including respiratory problems, allergies, and reduced cognitive function.[2,6,7,19,20] Under-resourced communities and individuals, as well as children with respiratory conditions, are at a higher risk of experiencing IAQ-related health issues.[9,19,20] IAQ interventions, such as ventilation, filtration and source reduction, are beneficial to children's health by reducing concentrations of air pollutants and exposure to toxic chemicals and pathogens. These interventions have been associated with decreased illness-related absences and improved cognitive function.[21-24]

Climate change is exacerbating harmful exposures and impacts on health and learning

The escalating impacts of climate change have intensified the urgency of maintaining healthy IAQ. In 2023, Canada witnessed its most severe wildfire season to date, prompting school boards nationwide to limit outdoor activities.[25] Wildfires emit harmful pollutants such as particulate matter and volatile organic compounds, which can infiltrate indoor spaces.[26,27] Similarly, climate change-induced flooding can cause water damage and mould growth in schools and child care settings, further

[i] Shannen's Dream is a child and youth-led movement named in loving memory of Shannen Koostachin from Attawapiskat First Nation, and her dream for "safe and comfy schools" for all First Nations children and youth.

See; First Nations Child & Family Caring Society of Canada. *Shannen's Dream: Safe and Comfy Schools*. fncaringsociety.com/sites/default/files/shannens_dream_-_safe_comfy_schools_0.pdf; Status of TRC Calls to Action fncaringsociety.com/sites/default/files/2023-03/Status%20of%20TRC%20Calls%20to%20Action_0.pdf

compromising IAQ.[28] In addition, extreme heat events are becoming more frequent and intense and are especially dangerous for infants and young children, in part due to their limited ability to acclimatize and to respond appropriately to heat stress. Experts warn that similar problems will only become more common in the coming years, highlighting the need for adequate IAQ support and infrastructure across all schools and child care settings.[29]

Legislative mechanisms exist, it's time to leverage them

CPCHE's "Environmental Scan of Indoor Air Quality Support Programs for Schools and Child Care Settings in Canada" highlights legislative tools across federal, provincial and territorial jurisdictions that could be used to support healthy IAQ in educational settings. The scan points to significant gaps and challenges in addressing IAQ concerns in schools and child care settings across Canada.

The environmental scan found the following:

- Underutilization of legislative policy levers including potentially relevant provisions in occupational health and safety, human rights and public health laws.
- Available resources for IAQ guidance and guidelines lack specificity for schools and child care settings, with a particular lack of guidance for home-based child care settings.
- Notable absence of specific funding streams as well as technical support, training, and outreach programs for IAQ improvements in schools and child care settings.
- A dearth of equity-focused programs to prioritize IAQ improvements in schools and child care programs that serve communities facing disproportionate pollution exposures and environmental injustice, including low-income, racialized and on-reserve communities.

A commitment to indoor air quality in learning environments is fundamental to health equity and every child's right to a healthy environment

The impacts of unhealthy air quality in schools and child care settings pose an escalating threat to the health and well-being of all children, and further exacerbate health inequity. Given the amount of time children spend in learning settings, it is imperative that these environments protect their health and do not increase their exposure to toxic chemicals and air pollution. Optimizing the health and learning potential of children in Canada will require dedicated investments across all educational settings to ensure reliably healthy indoor air quality and mitigate the risks of a changing climate. Schools and child care settings must be spaces that promote well-being and – especially in disproportionately polluted regions and at times of crisis – offer children reprieve from vehicle emissions, industrial pollution, wildfire smoke and extreme heat events.

A comprehensive approach to ensuring healthy indoor air quality for children supports the many benefits of climate action and pollution prevention. Through interventions such as adequate ventilation, filtration and source reduction, IAQ investments will help communities adapt to climate change and minimize the risks of toxic exposures. However, such measures are not enough. Bold action is needed to curb greenhouse gas emissions and prevent air pollution.

A Collective Call for Action to Ensure Healthy Indoor Air Quality In Schools and Child Care Settings

Calls for Action

The Canadian Partnership for Children's Health and Environment (CPCHE), with our partners, affiliates and collaborators, urgently calls upon all levels of government to take immediate and decisive action to attain and sustain healthy indoor air quality in all educational settings.

1

Develop indoor air quality guidance and guidelines specific to educational settings, coupled with sustained funding, technical assistance and training, to support schools and child care programs in reducing sources of pollution, ensuring adequate ventilation and filtration, and undertaking routine assessment, monitoring and maintenance.

2

Ensure transparent, timely communications and effective outreach so that all schools and child care settings have equitable access to funding opportunities and capacity to act on indoor air quality guidelines and guidance.

3

Prioritize investment in healthy indoor air quality in schools and child care settings in communities facing environmental injustice as a targeted and tangible strategy to improve health equity and recognize every child's right to a healthy environment.

4

Take decisive action to reduce exposure to toxic chemicals in educational settings, prevent air pollution, both indoors and out, and embrace bold action to mitigate climate change that directly contributes to wildfire smoke, extreme heat and flood-related health risks.

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A Collective Call for Action to Ensure Healthy Indoor Air Quality In Schools and Child Care Settings

Signatories

In solidarity and with determination for the health and well-being of our nation's children and future generations, this Call for Action is advanced collectively by:

Canadian Partnership for Children's Health and Environment
Canadian Association of Nurses for the Environment (CANE)
Canadian Association of Physicians for the Environment (CAPE)
Canadian Child Care Federation (CCCF)
Canadian Environmental Law Association (CELA)
Centre for Environmental Health Equity (CEHE)
Canadian Aerosol Transmission Coalition
Safe Air Safe Schools
Women's College Health (WCH)
Learning Disabilities Association of Canada (LDAC)
Ontario Public Health Association (OPHA)
Pollution Probe Foundation
South Riverdale Community Health Centre (SRCHC)
New Brunswick Lung
Women's Healthy Environments Network
Saskatchewan Early Childhood Association
Canadian Public Health Association
EcoSchools
Ecology Ottawa
For Our Kids
The Foundation for Resilient Health
Association of Early Childhood Educators of Newfoundland & Labrador
Drive Electric Atlantic
Prenatal Environmental Health Education Collaboration
Association of Early Childhood Educators of Alberta
Manitoba Child Care Association
Evergreen
Ontario School Safety
Canadian Lung Association
No.9
Raffi Foundation for Child Honouring
Canadian Covid Society
Covid-Stop
Today's Family
The Health and Safety Working Group from Vancouver District Parents Advisory Council
Early Childhood Educators of British Columbia
Protect Our Province BC
David Suzuki Foundation
Safe Schools Coalition British Columbia

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A Collective Call for Action to Ensure Healthy Indoor Air Quality In Schools and Child Care Settings

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A Collective Call for Action to Protect Children from Extreme Heat In Schools and Child Care Settings

APRIL 2025

Extreme heat in educational settings is a growing concern as heat waves get hotter, longer and more common as a result of our changing climate driven primarily by the burning of fossil fuels.[1] There is an urgent need for planning, investment and policy change to ensure that all schools, early learning and child care settings in Canada are climate-ready and equipped to protect children from heat-related health risks, and to mitigate adverse impacts on learning associated with elevated temperatures. Left unaddressed, extreme heat in educational settings will exacerbate systemic inequities in housing, neighbourhood infrastructure and green space, contributing to an unequal burden of risk and impact for children growing up in communities affected by social and economic injustices including the ongoing impacts of colonialism.[2,3] Equipping learning environments for climate resilience can be a tangible and hopeful opportunity for realizing multiple benefits of climate action, including climate justice, health equity and every child's right to a healthy environment.

Extreme heat is a danger to children's health

Extreme heat is a serious health risk for everyone – and especially dangerous for children.[4]

Children are at increased risk of heat-related illness due to a variety of physiological and behavioural factors.[5] Their bodies have limited ability to acclimatize to heat, their higher metabolism increases the risk of dehydration, and their sweating rates are lower than adults which may limit their ability to cool down.[6,7] Children also tend to be more physically active, which generates body heat that further increases their health risk on hot days.[8] Young children are dependent on adults for protection from the heat, they may not perceive the signs of heat stress, and they may not be able to express their feelings of overheating.[9,10]

Physical health effects of extreme heat in children include heat stroke, heat exhaustion, heat rash, heat cramps and swelling of hands, feet and ankles.[11] Children most at risk of heat-related illnesses include those with breathing difficulties (e.g., asthma), heart conditions, kidney problems, mental and physical disabilities, developmental disorders, and those who take certain medications.[12,13]

Heat-related health risks for children are not limited to extreme heat days. A range of warm season temperatures, including those not considered extremely hot, have been associated with higher rates of children's emergency department visits for heat-related illnesses, injuries and other health concerns.[14,15] Humidity combined with high temperatures can contribute significantly to heat stress.[16] Geography is also a factor: children in northern climates, who may have been less exposed to heat and thus less acclimatized, may be more vulnerable.[17] Lack of relief from elevated temperatures at night (e.g., due to lack of cooling in home environments) compounds the threat to children's well-being during extreme heat events.[18,19]

Extreme heat jeopardizes children's learning

Extreme heat also puts children's learning at risk. Extended exposure to heat can lead to slowed cognition as well as impaired information processing, attention and memory.[20] Elevated temperatures are also linked to emotional and behavioural challenges such as increased irritability, frustration, and lack of motivation.[21] Heat's effects on sleep can also lead to learning difficulties and emotional and behavioural challenges in children.[22] Warm days, and in particular hot days, are associated with increased school absences.[23] Research suggests that the preferred indoor temperature for children is lower than that for adults.[24] Outdoor learning and access to nature – which have well-documented benefits for children's learning, physical health and mental well-being[25,26] – may become less accessible or safe due to the impacts of climate change, including extreme heat.[27,28,29]

While data are limited on the impact of extreme heat on student learning, one study from the United States showed a 4.5 percent reduction in student performance on a high school exam taken on a 90°F (32.2°C) day relative to a 72°F (21.1°C) day.[30]

A subsequent study estimated that, without air conditioning, a 1°F (0.56°C) hotter school year reduces that year's learning by one percent.[31] The research, which looked at student performance on standardized testing, found that hot school days disproportionately affected minority students, accounting for roughly five percent of the racial achievement gap.[32]

The flip side of this reality is that improved educational infrastructure can have positive impacts on learning and equity. Researchers found that following a US$1.4 billion investment in heating, ventilation and air conditioning (HVAC) upgrades in a U.S. school serving an under-resourced inner-city community, students' reading scores drastically improved to be comparable to the benefits gained from attending a high-performance charter school.[33] Similarly, investments in outdoor learning spaces through improved tree canopy and other forms of shade can provide protection from heat and improve learning.[34]

Extreme heat exacerbates existing inequities

Children experiencing structural disadvantages and living in socio-economically marginalized communities are at greater risk of excessive heat – often having less access to cooling methods such as air-conditioned homes and schools, and lower availability of green spaces.[35] People who are socially and economically disadvantaged, racialized populations, Indigenous Peoples and people with existing health conditions are at increased risk from climate-related health impacts, including extreme heat, and such communities may lack the means to take adequate protective measures.[36] Extreme heat is a factor in environmental racism and environmental injustice, given its intersection with multiple risks of climate change (e.g., wildfire smoke) and other sources of degraded air quality affecting children.[37]

As the climate crisis and extreme heat events escalate, the ongoing effects of colonialism exacerbate disproportionate climate-related health risks borne by Indigenous students. Such inequities stem from multiple factors including chronic underfunding of on-reserve educational settings as well as inequities associated with poverty, housing, health status, access to health services, and political marginalization affecting Indigenous communities including those in urban settings.[38] Climate-related changes can interfere with traditional land-based practices, interrupting the transmission of cultural knowledge and teachings to the next generation.[39]

Places where children live, learn and play are getting hotter

Communities all across Canada are seeing an increase in the number of extreme heat events.[40] The number of days above 30°C is expected to double or triple in some parts of Canada in the near term (2021 – 2050) as a result of climate change caused primarily by the burning of fossil fuels.[41,42,43]

The increasing frequency, intensity and duration of extreme heat events due to climate change are jeopardizing children's ability to learn, play and grow in safe, healthy settings. These include indoor settings such as schools and homes, and outdoor areas such as playgrounds and natural areas.

Classrooms without air conditioning can exceed safe temperatures during extreme heat events. The recommended upper limit for indoor temperature – which is based on research with adults and not necessarily reflective of children's susceptibilities to heat – is 26°C.[44] During an extreme heat event, indoor temperatures can readily exceed 26°C in settings that are not equipped with mechanical cooling. Data collected during the B.C. heat dome showed a "worst-case scenario" home without air conditioning had steadily increasing temperatures between 30°C and 40°C.[45] Data from a 2023 CBC investigation showed that more than half of the 50 homes monitored across five cities – Vancouver, Winnipeg, Toronto, Montreal and Windsor – had indoor temperatures at or above 26°C.[46] There is limited data available on indoor temperatures in schools and early learning settings during periods of extreme heat. Nor are data available on the impact of overheated classrooms on students' absences, student learning and other indicators associated with exposure to extreme heat.

Playground surfaces, including playground equipment, can become dangerously hot without shade protection.[47] Artificial surface materials, such as pavement and artificial turf, contribute to increased surface and air temperature.[48,49]

One study found that the hottest areas of a city neighbourhood were on playground surfaces.[50] Another study found that the availability of school playground shade was negatively associated with the socioeconomic position of student families.[51]

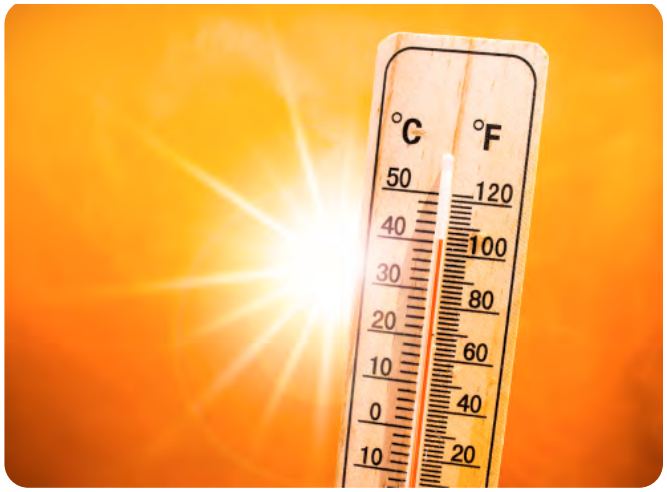
The 2021 B.C. heat dome demonstrated the devastating health impacts of extreme heat, with over 600 heat-related deaths in just one week.[52] Lack of air-conditioned spaces and lack of surrounding green space contribute to elevated temperatures indoors, which is where the vast majority of the heat-related deaths occurred.[53,54]

Researchers predict that by the 2050s—when children born today reach 30 years of age—the number of extreme heat days will increase by 1.5 times in Ontario and Manitoba and more than six times in the Yukon.[55]

Many educational settings across Canada are ill-equipped to protect children from extreme heat

Children typically spend 6-8 hours a day or more in educational settings, many of which are ill-equipped to protect students and staff from extreme heat. Comprehensive data are lacking on the extent to which educational settings in Canada are ill-equipped to deal with rising temperatures as the climate crisis worsens, but evidence suggests the problem is widespread. For example, according to recent media coverage, few schools in Quebec have air-conditioned classrooms,[56] most Nova Scotia schools do not have air conditioning,[57] and fewer than one-third of schools in the Toronto District School Board have central air conditioning.[58] In a 2023 media report, the Winnipeg School Division reported that 27 of their facilities had no air conditioning, 16 were partly air conditioned and 42 were fully air conditioned.[59] Outdoor learning settings are similarly ill-equipped to protect children from extreme heat. They are often not designed to account for extreme weather and thermal comfort.[60] Many lack adequate shade, and the increasing use of artificial materials can lead to higher surface temperatures.[61]

When indoor settings lack adequate cooling, extreme heat can lead to school closures, cancelled classes and programs – resulting in significant



disruptions to learning and related equity concerns. While some students may choose to stay home to escape the heat,[62] not all children have this option. Over one-third of Canadian households reported not being equipped with any type of air conditioner.[63] Missed and cancelled classes have significant impacts on children's academic performance and do little to protect the health of students who lack access to cooling at home. Systemic inequities in housing and green space heighten the disproportionate burden of extreme heat.[64] In the case of inadequate housing, for example, children who live in homes and attend home based child care that both lack air conditioning are at increased risk from extreme heat.

In outdoor settings, the widespread use of pavement and artificial turf contributes to elevated heat and other environmental health concerns. Pavement, especially that which is dark in colour, collects and traps heat leading to hotter ambient temperatures. Artificial turf similarly retains heat, while also increasing children's exposures to toxic chemicals and contributing to microplastic pollution.[65,66,67] These types of surfaces also lead to stormwater run-off that can contribute to flooding and contamination of surface and groundwater sources.[68,69] In a 2022 survey of approximately 2000 child care professionals, nearly 40 percent reported the presence of outdoor artificial turf at the child care setting where they work.[70]

Options exist to protect children and staff from extreme heat

Actions to safeguard children's health and learning from extreme heat include upgrading or installing mechanical cooling and ventilation systems in educational buildings, greening outdoor spaces, and adopting other heat mitigation and exposure reduction measures.[71] These types of upgrades can also help address the existing backlog of needed repairs in educational facilities.[72] The added bonus for many of these actions is increased environmental sustainability, enhanced child-nature connections, and creation of climate-resilient spaces for children and their communities.

A. Measures to address heat in buildings and indoor settings

Clear and measurable targets, investment in mechanical and passive cooling and other mitigation measures can equip educational settings to be health-protective and resilient in the face of escalating extreme heat events.

- **Setting a maximum temperature threshold**

  Current and evolving research supports an indoor temperature threshold of 26°C to prevent heat-related illness and death in residential settings.[73,74,75,76,77,78,79,80,81] Children's higher vulnerability to extreme heat justifies the establishment of 26°C as a maximum temperature threshold in educational facilities. Ongoing monitoring of the air temperature throughout the building is needed to ensure that the threshold is not exceeded.

- **Passive and behavioural measures to help maintain safer indoor temperatures**

  A number of passive building features and behavioural interventions can help keep indoor spaces cool during extreme heat events.[82,83,84,85] These include:

  - using window shading to block direct sunlight (e.g., outdoor sun awnings or reflective film; indoor blinds or curtains)
  - opening windows and doors and using fans (e.g., windows fans) to draw in cooler outdoor air (e.g., during cooler parts of the da y, overnight, whenever there is a cool breeze)
  - keeping windows and doors closed when indoor temperatures are cooler than outdoor temperature
  - turning off heat-generating devices such as appliances, electronics and lights when not needed.

- **Mechanical cooling and ventilation**

  Mechanical cooling and ventilation, such as that provided by well-functioning HVAC systems and heat pumps, are essential for protecting children and staff from extreme heat and other indoor air quality concerns, such as wildfire smoke. Installation and/or retrofitting to ensure mechanical ventilation and cooling is a priority for investment.

  Low-energy space-cooling such as heat pumps, in combination with passive building envelope strategies (e.g., cool envelope material, reflective roofs or walls) and building shading (e.g., trees and vegetation) can help ensure resilient heat protection and have the added benefit of reducing carbon emissions.[86] Compared to conventional air conditioning, heat pumps are more energy efficient and can help reduce strain on electricity grids.[87]

- **Energy efficiency upgrades and other building improvements**

  In addition to mechanical cooling and ventilation, other building retrofits such as upgrading the building envelope (e.g., cool envelope material, improved building insulation, energy efficient windows and doors) and structural repairs (e.g., repairing/replacing roofs, better sealing of windows and doors) can improve occupant health and resilience to extreme weather events such as heat waves, flooding and wildfire smoke.[88] Such climate-relevant retrofits can also help avoid the damage and costs associated with extreme weather events, and significantly reduce energy consumption.[89]

Well-designed outdoor spaces equipped with heat-protective measures can lower air and surface temperature, ensuring children can safely engage in outdoor learning and play, which is vital for their physical health, mental well-being and social development. Strategies such as increasing tree canopy can reduce outdoor air and surface temperatures, and can also reduce the overheating of buildings through tree shading.[90]

- **Natural and constructed seasonal shade**

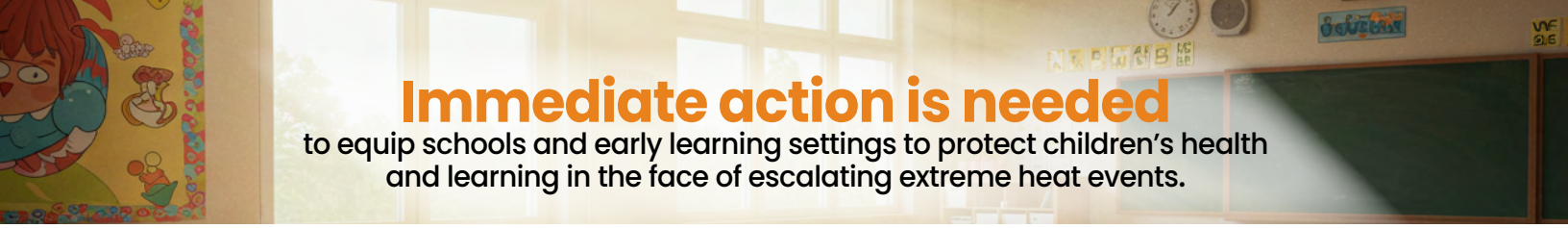
  Maximizing shade, through natural vegetation (e.g., tree canopy) and constructed shade (e.g., shade sails) can help keep outdoor learning settings cool during hot weather and extreme heat events, with the added benefit of protecting children from UV radiation.[91] Trees not only provide shade but can cool ambient air through evapotranspiration.[92] Well-designed outdoor shade can shield the building from incoming solar radiation, helping to keep indoor temperatures cooler.

- **Cooler and natural surfaces**

  Cool roofs (e.g., green roofs, light-coloured roofs), cool pavements (paving surfaces that are light in colour) and natural surfaces (grass, vegetation) have been shown to reduce outdoor temperatures, and can help to keep the building cool inside, as well.[93,94] Health Canada advises that playgrounds and other outdoor settings should include cool features such as trees, vegetation, water fountains, shade structures and lighter-coloured surfaces.[95] Splash pads and misting stations can also offer cooling during extreme heat.

Across all of these actions is the need for adequate planning, training, capacity and communication. School boards' Hot Weather/Heat Response Plans are important tools to protect students and staff from heat-related health impacts during extreme heat events, and to identify how the board is preparing for the increasing frequency, severity and duration of extreme heat that is expected as a result of climate change.[96,97] Effectively communicating the Hot Weather/Heat Response Plans to everyone who may be affected or involved in response actions, including students, parents, caregivers, staff and community partners (public health, municipal services), will help ensure that the plan achieves its goal of protecting the school community from heat-health risks. Multi-sectoral engagement and multi-pronged approaches are key components of hot weather response plans, including involvement of local public health.[98,99,100]

Examples of measures to be considered within a Hot Weather/Heat Response Plan include identification of indoor temperature thresholds that trigger immediate action (e.g., moving students to an identified cool space), regular monitoring of temperatures, and use of passive and behavioural cooling strategies to help keep indoor spaces cool. Hot Weather/Heat Response Plans can also outline additional actions the board has identified and prioritized to address extreme heat, such as upgrades to mechanical cooling and outdoor greening initiatives.



Immediate action is needed

to equip schools and early learning settings to protect children's health and learning in the face of escalating extreme heat events.

The Canadian Partnership for Children's Health and Environment (CPCHE), with our partners, affiliates and collaborators, calls upon all levels of government to ensure that all schools, early learning and child care settings are equipped to protect children and staff from the escalating risks to health and learning posed by climate-related extreme heat events, starting with the following priority actions:

1. **Adopt a maximum indoor temperature standard of 26°C in learning environments** and update, as needed, to ensure continued alignment with health-based guidance and emerging research on temperature thresholds in indoor environments from authoritative sources.[101,102,103,104,105,106]

2. **Leverage education and early child care legislation, occupational health and safety laws, public health standards** and other available regulatory measures[107] to expeditiously implement the maximum indoor temperature standard, coupled with the required resources, technical support and guidance to support schools and early learning and child care programs in meeting the standard.

3. **Invest in building retrofits to support climate resiliency in educational settings**. This must include installation/upgrading of energy-efficient cooling systems, with continuous improvement targets – in the form of incremental percentages of regularly occupied spaces equipped with mechanical cooling – towards the achievement of facility-wide cooling in all educational facilities. All new builds should be equipped with energy efficient, low/zero-carbon cooling to ensure heat health protection.

4. **Immediately equip all educational settings with the means and guidance to implement passive and behavioural cooling measures**, such as window shading (awnings and window coverings) to block incoming solar radiation, keep indoor temperatures low and make buildings more energy efficient. In the case of schools, such measures should be clearly outlined in Hot Weather/Heat Response Plans, with effective communication across the school community, transparent tracking and accountability.

5. **Promote and require, where applicable, measures to ensure that outdoor spaces and learning settings are equipped** to mitigate the effects of extreme heat and other climate-related concerns (e.g., flooding) by:
   a. maximizing natural and constructed seasonal shade
   b. using natural play surfaces
   c. restricting the use of tarmac/pavement and other impervious surfacing options, and opting for lighter coloured heat-reflecting surfaces
   d. prohibiting the installation of artificial turf (with limited exceptions).

6. **Collect the data required to drive extreme heat mitigation measures** in indoor and outdoor educational settings, in order to decrease the risk of heat-related illness and disruptions to children's learning. Data collection should include tracking of existing infrastructure needs (e.g., percentage and geographic distribution of educational facilities without adequate cooling), ongoing tracking of indoor and outdoor temperatures, and measurements to capture impact on student learning (e.g., school closures, student absences, test scores and other measures of student learning).

7. **Prioritize investment in extreme heat mitigation for learning environments in under-resourced communities** to promote health equity, including prioritizing socio-economically marginalized communities for upgrades to, or installation of, mechanical cooling systems. Such efforts must be undertaken with active involvement of community representatives and leadership to ensure that interventions are effective, culturally responsive, and aligned with local needs.

8. **Optimize and coordinate investments across all levels of government** and relevant ministerial mandates (i.e., education, climate change, energy retrofits, infrastructure, health) to realize the multiple benefits of healthy, climate resilient learning settings.

9. **Build strong intersectoral collaboration**, including routine communications and coordinated decision-making, across all relevant domains including education, public health, infrastructure, land use planning, environment, climate change, and occupational health and safety – to protect children's health, advance health equity, mitigate and adapt to climate change, and model action for a resilient, equitable and hopeful future for children across Canada.

Indigenous Learning Environments

This Collective Call for Action does not identify specific policy actions linked to Indigenous education, early learning and child care. We recognize and affirm the rights of Indigenous governments to design and develop educational systems and services that are distinctions-based and self governed, consistent with the vision and principles set out in the Indigenous Early Learning and Child Care Framework and commitments under the United Nations Declaration on the Rights of Indigenous Peoples. We further note the relevant Calls to Action in the report of the Truth and Reconciliation Commission of Canada, including the responsibility of the federal government to eliminate the discrepancy in education funding for First Nations children being educated on reserves and those being educated off reserves.

Signatories

In solidarity and with determination for the health and well-being of our nation's children and future generations, this Call for Action is advanced collectively by:

Canadian Partnership for Children's Health and Environment (CPCHE)
Canadian Environmental Law Association (CELA)*
Canadian Association of Physicians for the Environment (CAPE)*
Canadian Association of Nurses for the Environment (CANE)*
Canadian Child Care Federation (CCCF)*
Center for Environmental Health Equity (CEHE)*
Environmental Health Clinic at Women's College Hospital*
Little Things Matter**
Ontario Public Health Association (OPHA)*
Pollution Probe*
Prenatal Environmental Health Education (PEHE) Collaboration**
Andrew Fleck Children's Services
Association of Early Childhood Educators of Newfoundland and Labrador (AECENL)
Association of Early Childhood Educators of Nova Scotia (AECENS)
BC Society of Transition Houses (BCSTH)
Canadian Health Association for Sustainability and Equity (CHASE)
Canadian Institute of Public Health Inspectors
- Ontario Branch (CIPHI-O)
Canadian Public Health Association (CPHA)
Citizens' Climate Lobby - Toronto (CCL-T)
Clean Air Partnership
Climate Action for Lifelong Learners (CALL)
Climate Emergency Unit
Climate Legacy
EcoSchools
Efficiency Canada
Environmental Defence
Environmental Education Ontario
First Call Child and Youth Advocacy Society
For Our Kids
Green Communities Canada
Health Providers Against Poverty (HPAP)
Just Futures Kingston
Low-Income Energy Network (LIEN)
New Brunswick Lung
Outdoor Play Canada
Prevent Cancer Now
Seniors for Climate Action Now!
Take Me Outside
The CHANGE Research Lab
The Climate Reality Project Canada
Windfall Ecology Centre

*CPCHE Partner organization
**CPCHE Affiliate organization

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Wildfire smoke and portable air cleaners: Improving air quality in schools and child care facilities

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Child Care and School Environments, CPCHE News EN

This blog was written by the National Collaborating Centre for Environmental Health (NCCEH) in partnership with CPCHE.

By: Ryan D. Huff, MSc, PhD, Environmental Health and Knowledge Translation Scientist, National Collaborating Centre for Environmental Health

Wildfires are a growing environmental and public health concern across Canada. So far, approximately 2.5 times more land has burned during the 2025 season than during an average season over the past 10 years. This is close to 7 million hectares, which is about the size of New Brunswick. Frequent, severe and extensive wildfires driven by climate change release tonnes of smoke into the atmosphere, which can degrade air quality across North America and beyond. Wildfire smoke is harmful to the physical and mental health of those exposed, and can have broader impacts, such as negatively affecting education outcomes. This post provides an overview of the health risks of wildfire smoke, particularly for children, and outlines best practices for using portable air cleaners (PACs) as a

protective strategy in school and child care settings.

How can breathing wildfire smoke affect health?

Wildfire smoke is made up of small particles called particulate matter (PM) and many different gases, including volatile organic compounds. Breathing in these pollutants, especially small particles under 2.5µm in diameter ($PM_{2.5}$), or getting them on your skin can cause a range of acute and chronic health effects. Short-term exposure to smoke can induce dizziness, headaches, nausea, and irritation of the eyes, nose, throat and lungs. Less common but more severe symptoms include wheezing, severe cough, asthma attacks, and in adults, chest pains, heart palpitations (i.e., irregular heartbeat), stroke, and heart attack. Long-term exposure to smoke has also been linked to the development of chronic respiratory, cardiovascular, and neurological diseases. People who are at higher risk of experiencing health effects include those with chronic health conditions, seniors, those who are pregnant, infants, and children.

Children are especially susceptible to smoke because they are growing, they breathe more air relative to their body weight than adults and usually breathe faster from being more active. Increased respiratory symptoms in children, such as sore throat, cough, sneezing, and wheezing, as well as increased pediatric asthma emergency room visits have been reported during wildfire smoke events. Smoke exposures can also increase a child's risk of developing respiratory infections, impact their neuropsychological development, and negatively affect growth.

Does wildfire smoke disrupt childhood learning?

Wildfire smoke can negatively affect educational outcomes by causing respiratory symptoms, headaches, and difficulty concentrating in class, affecting their ability to

learn. A recent study of 11,700 US school districts found that wildfire smoke was linked to a drop in annual test scores, particularly for younger children. Wildfire smoke can lead to school closures or restrictions on outdoor activities, disrupting learning opportunities as well as the physical, mental, and social benefits of spending time outdoors. In California, wildfire-related school closures have been associated with lowered academic performance.

Portable Air Cleaners (PACs) and wildfire smoke

PACs can help reduce exposure to wildfire smoke in small indoor spaces (e.g., classrooms), regardless of the heating, ventilation, and air conditioning (HVAC) system. For example, PACs were tested in one room at a public library in Port Macquarie, Australia, which also had an HVAC system with relatively coarse filters (equivalent to MERV 8, see box below) installed. When the PACs were in use on heavy smoke days, the $PM_{2.5}$ concentrations in the room were 72% lower than when the PACs were not in use, highlighting the ability of PACs to complement the existing HVAC. Overall, the indoor $PM_{2.5}$ concentrations with HVAC and PACs running were 76% lower than the outdoor concentrations, with PACs contributing an estimated 40% of the reduction. In other settings, such as homes and public buildings, PACs have reduced levels of $PM_{2.5}$ by an average of 57% during wildfire smoke episodes.

HVAC systems, MERV ratings, and wildfire smoke.

HVAC systems in schools and child care facilities can reduce exposure to wildfire smoke indoors by filtering the outside air before it is circulated inside the building. Health Canada and the US EPA recommend using filters with a minimum efficiency reporting value (MERV) of 13 or higher in HVAC systems during smoke events. A MERV 13 rating means that at least 50% of the particles between 0.3 – 1.0 µm in size (the same size range of smoke particles) are removed from the air with each

pass through the filter. However, not all HVAC systems will be capable of running with MERV 13 filters depending on their design specifications. As outlined in ASHRAE Guideline 44, best practice is to work with HVAC professionals to develop a building-specific smoke readiness plan.

What types of PACs are used for indoor spaces?

There are two general types of air cleaners that remove PM indoors — mechanical fibrous media filters that physically block or capture particles, and electrostatic precipitators (ESPs) and ionizers that cause particles to settle out of the air. Most studies that have assessed the use of PACs during wildfire smoke events have focused on mechanical filters.

- Mechanical filters draw air through a material to block or capture particles. Those equipped with high-efficiency particulate air (HEPA) filters are equivalent to a MERV 16 or higher, meaning they can remove 99.97% of particles in the 0.3-µm range.

- ESPs electrically charge particles and then capture them on a charged plate; ionizers electrically charge air molecules that cause pollutant particles to settle onto surfaces more quickly. These devices can create harmful gases such as ozone as a byproduct, so only those independently tested and certified by the Canadian Standards Association (CSA, standard CSA 22.2 187-20) to produce little to no ozone should be used.

Mechanical filters, ESPs, and ionizers can also be combined with sorbent media such as activated charcoal to filter the gases present in wildfire smoke.

Caution: Ozone generators pose risks to health

Ozone generators are PACs that purport to use ozone to clean or disinfect the air. Exposure to ozone in indoor air can be harmful to health. Health Canada advises

against the use of ozone generators indoors.

Considerations for choosing PACs to reduce wildfire smoke indoors

Commercial vs. do-it-yourself (DIY)

- There are many commercial manufacturers, and more being added all the time. Tested by the Association of Home Appliance Manufacturers (AHAM) (pro), proprietary filters (con).
- DIY can be just as effective, noisier (con), can always get filters (pro). More information on DIY in next section.

Capacity of commercial PACs

- Choose a PAC certified by AHAM.
- Find the clean air delivery rates (CADRs) and suggested room size on the AHAM label. CADRs in cubic feet per minute (cfm) are measured for tobacco smoke, dust, and pollen. The suggested room size is based on meeting a standard of 4.8 air changes per hour (ACH). Certified models and CADRs are listed online by AHAM. Note that the CADR is reported for the PAC running on its highest fan setting.
- For wildfire smoke, the minimum CADR required for a room should be based on the tobacco CADR rating and should be approximately two-thirds the room area in square feet (sqft). For example, the minimum CADR for a 1000 sqft room would be 1000 x 0.66 = 660 cfm. These calculations assume a standard 8 ft ceiling height. For different ceiling heights, the minimum CADR can be calculated based on room volume.

- AHAM capacity verification is based on PAC particle removal only. PACs containing activated charcoal filters can help remove gases such as volatile organic compounds (VOCs) present in wildfire smoke, but there is currently no performance rating system to certify effectiveness.

Commercial mechanical filtration PACs

- Use PACs equipped with certified true HEPA filters, indicated to capture 99.97% of 0.3 µm particles in size.
- Avoid using uncertified filters labelled “HEPA-like”, “HEPA-type”, or “99% effective” as these may not filter the smallest particles present in wildfire smoke.
- MERV scale-rated filters should be rated at least MERV 13 or higher to capture smoke particles effectively.
- PACs equipped with activated charcoal filters may help remove wildfire smoke gases and odours from the air.

Placement

- Follow manufacturer instructions for placement of PACs. For example, do not block the outflow by placing the unit too close to furniture or walls.
- Avoid positioning PACs to blow directly on to people using the room.
- The position of a PAC in a classroom does not strongly affect filtration effectiveness. Research in an elementary school classroom found that positioning only changed effectiveness by approximately 10%.
- Consider tripping and electrical hazards due to PAC cords.

- Consider whether moving parts such as fan blades are accessible to clothing, body parts (e.g., fingers or hair), or other objects (e.g., toys, pencils, crayons, etc.) when placing PACs in classrooms and child care settings. Placing PACs on elevated surfaces may help reduce these hazards.

Noise

- Many PACs can be noisy and may disrupt the learning environment — check the manufacturer's specifications for noise levels.
- PACs should not cause classroom noise to exceed 35 dBA (unoccupied) – 50 dBA (occupied). (See Speech-Language and Audiology Canada and the American National Standards Institute).
- To reduce noise disturbance, consider using PACs with a higher CADR value than necessary at a lower setting.

Other considerations

- Keep spare filters available, and replace filters as recommended by the manufacturer or indicators built into the PAC. Overly clogged filters can reduce overall performance. Extended operation of PACs during wildfire smoke episodes may require frequent filter changes. If the amount of air coming out of the device drops or the filter noticeably begins changing color, the filter should be replaced.
- Consider using low cost $PM_{2.5}$ monitors during wildfire smoke episodes to measure indoor concentrations and gauge how well air filtration strategies are working. Some PACs are equipped with monitors that can be used to gauge effectiveness.
- Outer windows and doors must be closed for PACs to be effective, but this

can lead to indoor overheating in spaces without mechanical cooling. In rooms without central mechanical cooling, PACs should be used in combination with portable air conditioning to ensure that indoor temperatures remain <26C. Sustained indoor temperatures of less than 26°C are generally safe for everyone, whereas indoor temperature over 31°C for long periods can be dangerous, especially for infants and young children.

- PACs can also reduce air pollution from other sources such as traffic, which is also linked to lower academic performance.

DIY (Do-It-Yourself) PACs

DIY PACs can be a cost-effective way of reducing indoor air pollution in schools and other learning settings. DIY PACs are constructed by attaching 20 by 20 inch MERV 13 or higher furnace filters to box fans. The US EPA tested several configurations for their effectiveness at filtering wildfire smoke and found them to be comparable with commercially available PACs. Altering the intended use of a fan can put stress on the motor and potentially cause overheating, presenting a fire risk. In light of this, the US EPA supported a study testing five different electric box fan models in a variety of DIY PAC configurations and found that modern fans meeting current electrical standards never exceeded maximum temperature thresholds for electric fans (US UL 507 standard). In this study, exterior surfaces were found to remain below 36°C, which is safe to touch.

Designing and building a DIY PAC can also provide an empowering learning experience for students. By learning about the design of PACs and participating in building them, students can gain a deeper understanding of how the outdoor environment interacts with the indoor spaces we occupy. Specifically, students can learn about air pollutants, air filter materials, engineering considerations, and ways to measure particles in the air. Several resources are available from the BCCDC

and the BC Lung Foundation on methods and considerations for building DIY PACs.

Summary

Wildfire smoke in schools, child care facilities and other educational settings can pose a health risk for children and interfere with learning. Commercial PACs equipped with quality certified, high-efficiency filters and appropriately rated for the room size are an effective way to reduce indoor smoke exposure. DIY PACs offer a practical and cost-effective alternative to commercial PACs, while also providing additional educational value in school settings.

Useful resources on wildfires, PACs, and schools

- Health Canada: Guidance for cleaner air spaces during wildfire smoke events
- BC CDC: Wildfire smoke recommendations for schools
- US EPA: Wildfires and indoor air quality in schools and commercial buildings
- Health Canada: Using a portable air cleaner to improve indoor air
- NCCEH: Indoor air filtration during wildfires: Impacts on air quality and health
- AHAM: FAQ on PAC performance testing
- Canadian Partnership for Children’s Health and Environment: Wildfire smoke
- Canadian Partnership for Children’s Health and Environment: Wildfire smoke FAQ
- Canadian Partnership for Children’s Health and Environment: Wildfire Smoke

and Extreme Heat FAQ

- Canadian Partnership for Children’s Health and Environment: Portable air cleaners
- Canadian Partnership for Children’s Health and Environment: Wildfire smoke and Extreme Heat in Learning Settings Infographic

National Collaborating Centre for Environmental Health

Centre de collaboration nationale en santé environnementale

Blog written by Ryan D. Huff.

Ryan is an interdisciplinary scientist with a strong interest in understanding how environmental exposures impact human health. He has extensive experience in basic science and clinical research related to air pollution, including wood, cigarette, and cannabis smoke, as well as ambient and traffic-related air pollution. At the NCCEH, Ryan’s work is currently focused on the environmental health impacts of wildfires and interventions.

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About

CPCHE is an affiliation of groups with overlapping missions to improve children’s environmental health in Canada.

Land Acknowledgement

CPCHE acknowledges that our work takes place on Indigenous traditional territories that stretch from coast to coast to coast across Turtle Island. As organizations and individuals dedicated to environmental health, we are deeply grateful to Indigenous peoples for their ongoing stewardship of these lands since time immemorial. We recognize that we are on a journey of reconciliation and are committed to listening, learning and working to decolonize our collaborative efforts towards the goal of healthy and sustainable environments for all children.

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Enter key words ...

We had a flooding event in our school/child care setting and are now noticing a musty smell. What should we do?

- Immediate action should be taken after a flood event to reduce the risk of mould growth and exposure to other contaminants present in flood waters. A musty smell may be a sign of mould growth. Mould will begin to grow in areas with excessive moisture within 48 hours.
- Breathing in mould spores and/or mould fragments can pose a health risk. Children, and people with asthma and severe allergies, are more sensitive to the health effects of mould.
- This resource – Mould Expert Report: Health Impact of Indoor Dampness and Mould and Effective Remediation and Prevention Strategies, describes the health evidence and strategies to address indoor mould growth, including guidance on clean-up: https://rentsafe.ca/wp-content/uploads/2022/02/mould-expert-report_health-impactsremediation.pdf (https://rentsafe.ca/wp-content/uploads/2022/02/mould-expert-report_health-impactsremediation.pdf).
- You can generally clean up small amounts of mould with soap and water. Do not use bleach to clean up mould. Health Canada recommends that a qualified professional assess and clean up large areas of mould e.g., a single patch larger than 3 square metres.
- When cleaning up after a flood, ensure you use appropriate personal protective equipment. Discard mouldy or damaged material. Porous material such as fabrics, carpeting and wallboard often cannot be adequately cleaned and should be removed.
- You can help prevent mould growth by drying areas impacted by flooding as quickly as possible (< 48 hours), immediately repairing leaks, ensuring adequate ventilation and air circulation, especially in areas where moisture tends to build up (bathrooms, kitchens), preventing air conditioner condensation, and maintaining the relative humidity levels within the facility between 30% and 50%.

- Additional information on mould including prevention and remediation, can be found at these links:
  - https://www.canada.ca/en/health-canada/services/publications/healthy-living/addressing-moisture-mould-your-home.html (https://www.canada.ca/en/health-canada/services/publications/healthy-living/addressing-moisture-mould-your-home.html)
  - https://ncceh.ca/resources/subject-guides/mould-assessment-remediation-and-building-resilience (https://ncceh.ca/resources/subject-guides/mould-assessment-remediation-and-building-resilience)
  - https://www.canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/reduce-humidity-moisture-mould.html (https://www.canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/reduce-humidity-moisture-mould.html)

How does indoor air quality affect children? Are there signs that parents and educators should watch for?

- Healthy indoor air is vital for all aspects of children's physical and mental health. Indoor air can become unhealthy if outdoor air pollution comes indoors, if there is inadequate ventilation, or if products or furnishings used in the space release harmful chemicals.
- Long-term exposure to air pollutants, such as fine particulate matter, and harmful gases such as volatile organic compounds (VOCs) and ozone, is linked to increased risk of developing chronic diseases later in life such as respiratory and cardiovascular conditions and cancer. Indoor air pollution can trigger asthma attacks in children, and has been linked to decreased cognitive function and learning.
- Children are more susceptible to the impacts of poor indoor air quality. Their bodies, brains and lungs are still developing, and they breathe more for their size compared to adults. They are also more active than adults, and more often have increased respiration rates. Some children are at even greater risks due to inequities that increase their exposure to air pollutants.
- While most of the health impacts of air pollution are due to long-term exposure, short-term exposure can result in immediate effects. Parents and educators should observe children for asthma symptoms, shortness of breath, coughing, headaches, and eye, nose and throat irritation. If children are experiencing symptoms, it is important to take action to minimize exposures to poor air quality and seek medical attention as needed.

- The best way to improve indoor air quality is by removing or reducing the sources of indoor air pollutants, keeping outdoor air pollutants out, and using local air quality information (e.g., the AQHI) to guide action when air quality is poor, as described in these Health Canada resources:
  - Air quality and health (https://www.canada.ca/en/health-canada/services/air-quality.html)
  - Infographic: protecting your indoor air (https://www.canada.ca/en/health-canada/services/publications/healthy-living/infographic-protecting-indoor-air-outdoor-pollutants.html)
  - Local Air Quality Health Index (https://weather.gc.ca/airquality/pages/index_e.html)

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Are there standards, guidelines and regulations to ensure healthy indoor air quality in learning settings?

- Many jurisdictions in Canada lack indoor air quality regulations specific to schools and child care settings. Nevertheless, there are legal mechanisms that can be leveraged to address indoor air quality issues in learning settings. These include: occupational health and safety statutes, public health legislation, building codes, municipal bylaws, educational statutes and human rights legislation. Human rights legislation may apply if indoor air quality issues disproportionately affect groups protected under human rights legislation, such as individuals with disabilities or respiratory conditions. Recently, the right to a healthy environment was established as part of the Canadian Environmental Protection Act (CEPA) which may also have implications for learning settings.
- Health Canada has developed residential indoor air quality guidelines for specific indoor air contaminants such as radon, carbon dioxide and carbon monoxide, and guidance documents for mould and particulate matter. These resources (https://www.canada.ca/en/health-canada/services/air-quality/residential-indoor-air-quality-guidelines.html) can be helpful for assessing and guiding action to address indoor air quality in learning settings.
- Interested in learning more? Check out this recent report published by CPCHE and the Canadian Environmental Law Association: An Environmental Scan of Indoor Air Quality Support Programs for Schools and Child Care Settings in Canada (2024) (https://healthyenvironmentforkids.ca/held/2024-campaign-indoor-air-quality/2024-environmental-scan/)

canadian partnership for children's health & environment
partenariat canadien pour la santé des enfants et l'environnement

Where can I find out if our local air quality is unhealthy?

- Information on your local air quality, and steps to take to reduce exposure to air pollution, can be found using the Air Quality Health Index (AQHI). The AQHI is reported every day as part of local weather forecasts.
- The AQHI is a scale from 1 to 10+ that forecasts local air quality in relation to health risk. For example, an AQHI level of 1 indicates low risk. An AQHI of 7 indicates high risk, recommending that at-risk populations such as children reduce or reschedule strenuous activities.
- Infants and children are at higher risk of health problems when exposed to air pollution. Monitoring the AQHI and adjusting activities based on forecasted air pollution levels and health messages can help keep children healthy and safe.
- This Health Canada resource (https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index.html) provides more details on the AQHI including local conditions, forecasts and wildfire smoke
- This aqmap.ca (http://aqmap.ca) provides information on current levels of fine particulate matter ($PM_{2.5}$) outdoors across Canada.

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Are portable air cleaners an effective way to improve indoor air quality in learning settings?

- Portable air cleaners (either commercial or do-it-yourself/DIY) can be used to reduce exposure to fine particulate matter from wildfire smoke, residential woodsmoke, traffic-related air pollution, road dust, pollen and other sources.
- When selecting a portable air cleaner, look for the clean air delivery rate (CADR). The higher the CADR, the more particles the air cleaner will remove, and the larger area it can serve. Portable air cleaners using a high-efficiency particulate air (HEPA) filter are able to achieve a higher CADR. If you choose to make a DIY air cleaner be sure to use a high efficiency filter with a minimum efficiency reporting value (MERV) of 13 or higher.
- Do not use devices that produce ozone. Ozone is a harmful air pollutant. This resource (https://ww2.arb.ca.gov/list-carb-certified-air-cleaning-devices) from the California Air Resources Board lists air cleaners that have been tested and meet ozone emissions limits.
- In order to be effective, portable air cleaners must be sized appropriately for the space, properly positioned (i.e., not blowing directly at or between people, and not blocked by walls, furniture or other objects) and used following manufacturers' instructions.
- You may need more than one air cleaner depending on the size of the room. Learn more about selecting the appropriate portable air cleaner that is adequately sized for your indoor setting and meets the specifications to filter wildfire smoke at Health Canada's resource, *Using a respirator mask during wildfire smoke events* (https://www.canada.ca/en/public-health/services/publications/healthy-living/using-respirator-mask-during-wildfire-smoke-events.html).
- Portable air cleaners can be part of a comprehensive indoor air quality plan but they do not replace the need for a well-maintained building ventilation system and measures to reduce the source of air pollutants. No air cleaner or filter will remove all pollutants from the air.
    - Instructions for making a DIY air cleaner can be found in this resource (http://www.bccdc.ca/resource-

gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/BCCDC_WildFire_FactSheet_BoxFanAirFilters.pdf)from the BC Centre for Disease Control (BCCDC) (http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/BCCDC_WildFire_FactSheet_BoxFanAirFilters.pdf).

- The National Collaborating Centre for Environmental Health (NCCEH) (https://ncceh.ca/resources/evidence-reviews/do-it-yourself-diy-air-cleaners-evidence-effectiveness-and) has more about DIY air cleaners, including limitations and potential safety issues
- Additional helpful information on portable air cleaners (commercial and DIY) can be found here:
    - Using a respirator mask during wildfire smoke events (https://www.canada.ca/en/public-health/services/publications/healthy-living/using-respirator-mask-during-wildfire-smoke-events.html)
    - DIY air cleaners: (https://ncceh.ca/resources/evidence-reviews/do-it-yourself-diy-air-cleaners-evidence-effectiveness-and)Evidence on effectiveness and considerations for safe operation (https://ncceh.ca/resources/evidence-reviews/do-it-yourself-diy-air-cleaners-evidence-effectiveness-and)

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Additional resources:

canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/choosing-portable-purifier.html (https://www.canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/choosing-portable-purifier.html)

ncceh.ca/resources/evidence-reviews/do-it-yourself-diy-air-cleaners-evidence-effectiveness-and (https://ncceh.ca/resources/evidence-reviews/do-it-yourself-diy-air-cleaners-evidence-effectiveness-and)

Our school/child care setting is next to a busy road. What measures can be taken to minimize the impact of traffic-related air pollution on indoor air quality?

- **Traffic-related air pollution puts our health at risk.** The particles and gases in vehicle exhaust are associated with short term effects (e.g., worsening of asthma symptoms, effects on brain function) and increased risk of chronic disease later in life (e.g., cancer, cardiovascular disease). In addition, traffic pollution is an important source of the greenhouse gases that cause global climate change. Rising temperatures as a result of climate change further add to the health risk by increasing chemical reactions that create additional harmful pollutants from traffic emissions and other sources.
- Every year in Canada, traffic-related air pollution is responsible for approximately 2.7 million acute respiratory symptom days, 210,000 asthma symptom days, and 3,600 child acute bronchitis episodes. Health Canada estimates that 48% of schools in Canada are located within 200 m of high traffic roads and thus have a higher risk of exposure to traffic pollution.
- **Children are more vulnerable to the impacts of traffic pollution because:**
    - their bodies, brains and lungs are still developing
    - they breathe more for their size compared to adults
- **Traffic-related air pollution can infiltrate indoor air**.
    - Classrooms in school settings with windows facing bus loading zones, and closer to other sources of traffic pollution, have been associated with higher levels of fine particulate matter and decreased academic performance for children.

    - Child care centres closer to busy roads have been associated with higher indoor pollutant concentrations compared to centres located in less traffic-dense areas.
- **Reduce traffic pollution at the source:**
    - Encourage parents, teachers and visitors to choose active and sustainable transportation along low-traffic routes where possible, e.g., walking, cycling, public transit, or car-pooling
    - Establish an anti-idling policy
    - Advocate for the health and climate benefits of vehicle electrification, starting with buses
- **Keep traffic pollution from coming indoors:**
    - Move school bus stops away from the building's air intake system
    - Time the operation of the ventilation system to not coincide with rush hour and busy drop-off and pickup times
    - Consider limiting drop-off and pick-up near school buildings
    - Keep windows closed and reduce intake of air during rush hour and during pick-up/drop-off, as well as during wildfire smoke events or when local air quality is poor
- **Use ventilation and filtration to optimize indoor air quality:**
    - Ensure that the building's ventilation and filtration system is operating properly
    - Use air filters with the highest (particle removal) efficiency rating suitable for your building's air handling system. Replace them regularly according to manufacturer's specifications, or more often as needed. A visual inspection can determine if the filter is clogged and should be replaced.
    - Consider portable air cleaners (either commercial or DIY) as an additional measure to remove contaminants from indoor air. See FAQ: Portable Air Cleaners
- **Adjust the timing and location of children's outdoor activities:**
    - Time outdoor activities to avoid peak pollution levels

    - Situate outdoor play areas as far away from the roadway as possible
- **Consider natural or constructed buffers to filter and divert traffic pollutants:**
    - Identify opportunities to install roadside barriers such as sound walls or vegetation (trees or shrubs) along roadways
    - Check out this Vegetation Barrier Toolkit for Schools and Communities (https://chicagorti.org/app/uploads/2023/04/22CRTI_Vegetative-Barrier-Toolkit_0425.pdf)
- More information on traffic-related air pollution including health effects, impacts and exposures can be found at these links to Health Canada resources and reports:
    - Traffic-related air pollution (https://www.canada.ca/en/health-canada/services/air-quality/outdoor-pollution-health/traffic-related.html)
    - Does traffic take your breath away? (https://www.canada.ca/en/health-canada/services/publications/healthy-living/infographic-does-traffic-take-your-breath-away.html)
    - Health impacts of traffic-related air pollution in Canada (https://www.canada.ca/en/health-canada/services/publications/healthy-living/health-impacts-traffic-related-air-pollution.html)
    - Exposure to traffic-related air pollution in Canada (https://publications.gc.ca/collections/collection_2022/sc-hc/H144-99-2022-eng.pdf)
- These helpful resources from the U.S. Environmental Protection Agency provide recommendations to reduce traffic-related air pollution near schools:
    - Best Practices for Reducing Near-Road Pollution Exposure at Schools (https://19january2017snapshot.epa.gov/sites/production/files/2015-10/documents/ochp_2015_near_road_pollution_booklet_v16_508.pdf)
    - School Siting Guidelines (https://www.epa.gov/schools/view-download-or-print-school-siting-guidelines) (https://www.epa.gov/schools/view-download-or-print-school-siting-guidelines)

Our classrooms are not air conditioned and we are experiencing both heat and wildfire smoke. What should we do to reduce the health risks?

- Both wildfire smoke and extreme heat can harm your health. Health risk is amplified when extreme heat occurs at the same time as a wildfire smoke event. Children are more susceptible to the health impacts of both of these climate-related health risks.
    - **Wildfire smoke** poses greater health risks to children because their bodies, brains and lungs are still developing, and they breathe more for their size compared to adults
    - Children are at increased risk of **heat-related illness** because their bodies have limited ability to adjust to heat, they can get dehydrated more easily, and their sweating rates are lower than adults
    - Young children may not be able to notice or communicate when they are feeling unwell.
    - Exposure to extreme heat and to wildfire smoke have been associated with mental health conditions including depression and anxiety in children.
- Without air conditioning, indoor temperatures can get dangerously hot during extreme heat events. Health Canada recommends **prioritizing keeping cool** when an extreme heat event occurs at the same time as a wildfire smoke event. Strive to keep indoor temperatures below 26°C.
- **Make a plan. Before the wildfire and heat season starts, have a climate-readiness plan** in place outlining how you/your staff will prepare and respond to wildfire smoke and heat events. Assess your setting's capacity to maintain safe indoor temperatures and clean indoor air, and check with your local authorities to identify public spaces, such as community centres with air conditioning and air filtration, that you can access if needed. Learn more about measures that schools and child care programs can take to reduce the health risks of wildfire smoke here: *[link to WFS FAQ]*

- **Take action. During a wildfire smoke and heat event, keep smoke and heat out and filter the indoor air.**
    - Keep windows and doors closed (if it is safe to do so without overheating) to keep the indoor environment both cool and protected from wildfire smoke.
    - Block the sun by closing curtains and blinds and using awnings during the day to keep indoor spaces cooler.
    - Limit the use of exhaust fans such as bathroom fans as they can draw smoke indoors through cracks and other small openings in the building's exterior.
    - Reduce sources of indoor heat by avoiding the use of the oven, dryer, dishwasher and other devices that generate heat until after hours.
    - Reduce or avoid the use of appliances and activities that can increase fine particulate matter ($PM_{2.5}$) levels indoors (e.g., gas stoves, vacuuming).
    - Use clean, good quality air filters in your ventilation system or portable air cleaners (commercial or DIY) with the highest particle removal rating based on manufacturer's specifications. Check filters regularly and clean/change when needed.
- **Consider ways to monitor temperature, humidity and indoor air quality**, to ensure that safe conditions are maintained during combined extreme heat and wildfire smoke events. Monitor/measure indoor temperatures in rooms where children spend time (risk increases at indoor temperatures greater than 26°C, and above 31°C can be dangerous, especially for susceptible groups). Consider a device to measure relative humidity levels (between 35% and 50% is recommended). Consider using air sensors that measure $PM_{2.5}$ (the primary pollutant of concern in smoke) to compare indoor and outdoor levels so you can monitor how well the filtration system is working.
- **Know when to vacate the space**. If indoor temperatures are approaching dangerous levels and wildfire smoke is too heavy to open windows for cooling, the safest option is to discontinue the use of the space and seek out cooler and cleaner air spaces.
- These resources from Health Canada and BCCDC provide additional helpful information:
    - Health Canada Wildfire smoke and extreme heat (https://www.canada.ca/en/health-canada/services/publications/healthy-living/combine-wildfire-smoke-heat.html)
    - BC Centre for Disease Control – Wildfire Smoke and Air Quality (http://www.bccdc.ca/resource-

gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/BCCDC_WildFire_FactSheet_HotWeather.pdf)

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Are there practical measures that schools and child care programs can take to reduce the health risks of wildfire smoke?

- Wildfire smoke – a mixture of particles, gases and water vapour – can contribute to a range of symptoms and health effects, from headaches and eye, nose and throat irritation, to shortness of breath and asthma attacks. Children are at increased risk from exposure to wildfire smoke because their bodies, brains and lungs are still developing. They also inhale more smoke because they breathe more for their size and are more physically active than adults.
    - **Prepare a climate readiness plan that includes measures to address wildfire smoke.** Your plan should include measures to keep wildfire smoke from coming indoors, guidance on the use of ventilation and filtration systems, action plans to guide indoor and outdoor activities during a wildfire smoke event, and criteria to determine if the space is no longer safe and should be vacated.
    - **Review Health Canada's *Guidance for Cleaner Air Spaces during Wildfire Smoke Events*** (https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-cleaner-air-spaces-during-wildfire-smoke-events.html) **to assess whether your facility is adequately equipped** to keep children and staff safe during a wildfire smoke event. For example, is it fitted with a heating, ventilation and air conditioning (HVAC) system or additional/portable air filtration and air conditioning systems? Are there ways to prevent infiltration of outdoor air pollutants?
    - **If your facility is not equipped to maintain cleaner air spaces indoors during a wildfire smoke event, check with local authorities to identify possible alternate locations**, such as a community centre.
    - **Especially if moving offsite won't be feasible, designate specific room(s) as cleaner air spaces, suitable to the number of anticipated occupants.** Use portable air

conditioners for cooling and portable air cleaners (commercial or DIY) within these designated spaces.

- **Take action during a wildfire smoke event to keep indoor air healthy and reduce children's exposures**
  - **Activate your plan.** Depending on your facility's capacity, this may mean remaining on site and relying on the building's air filtration system, portable air cleaners and/or other measures as outlined below. Or it might mean moving to an alternate location.
  - **Prioritize keeping cool** if there is a wildfire smoke event and extreme heat event occurring at the same time. Learn more about measures to protect children during combined extreme heat and wildfire smoke events here: *(FAQ – Wildfire Smoke/Extreme Heat)*
  - **Prevent wildfire smoke from coming indoors** by keeping windows and doors closed as much as possible, and limiting the use of bathroom or kitchen exhaust fans (these fans create negative pressure that can pull pollution in from outdoors).
  - **Use a high-quality air filter** in the ventilation system, with the highest particle removal rating, based on manufacturer's specifications. Change the air filter regularly, or more often as needed, during wildfire smoke events.
  - **Use portable air cleaners** (commercial or do-it yourself/DIY) to reduce indoor levels of fine particulate matter (sometimes referred to as $PM_{2.5}$), the primary pollutant of concern in smoke. Learn more about portable air cleaners here: *(FAQ – PAC)*
  - **Use a low-cost $PM_{2.5}$ air sensor** to compare indoor and outdoor pollutant levels. This is a good way to check how well the filtration system is working (e.g., HVAC system or portable air cleaners). Information on current outdoor $PM_{2.5}$ levels across Canada can be accessed at aqmap.ca (http://aqmap.ca). The U.S. Environmental Protection Agency has guidance (https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=365813&Lab=CPHEA) on using air sensors during wildfire events.
  - **Assess the risks of outdoor activities.** Check local air quality conditions (https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index.html), air quality advisories and special air quality statements, to find out if wildfire smoke is affecting your area. Taking into account children's greater vulnerability to the risks posed by air pollution and other factors (e.g., children with asthma or other

respiratory conditions), use the local air quality advisories to help determine whether outdoor activities should take place, be moved to an indoor location or rescheduled. **Consider cancelling outdoor activities** such as recess and sports events when the AQHI is 7 or above. Learn more about the AQHI here: *(FAQ – AQHI).*

- A well-made well-fitting respirator type mask (e.g., N95) can help reduce exposure to fine smoke particles. These should not be used by children under 2 years of age, people who have trouble breathing while wearing the respirator or who need help in removing the respirator. Learn more at Health Canada's resource, *Using a respirator mask during wildfire smoke events* (https://www.canada.ca/en/public-health/services/publications/healthy-living/using-respirator-mask-during-wildfire-smoke-events.html).

- **If wildfire smoke conditions persist or worsen, consider alternate locations**
  - Continue to monitor air quality conditions as they can change rapidly, and consider alternate locations if your setting is unable to maintain cleaner indoor spaces during severe or prolonged wildfire smoke events. Follow advice of local and provincial authorities including advice on accessing cleaner air spaces.
  - In the event of a combined wildfire smoke and heat event, if you do not have air conditioning and indoor temperatures are approaching dangerous levels, and there is too much wildfire smoke to open windows for cooling, the safest option is to discontinue the use of the space and move to a location with air cooling and filtration
- Additional helpful information on protecting children and staff during a wildfire event can be found at these links:
  - Health Canada – Wildfire Smoke, air quality and your health (https://www.canada.ca/en/services/health/healthy-living/environment/air-quality/wildfire-smoke.html)
  - BC Centre for Disease Control – Wildfire Smoke Recommendations for Schools (http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/Wildfire_Smoke_Recommendations_for_Schools.pdf)
  - BC Centre for Disease Control - Wildfire Smoke and Air Quality (http://www.bccdc.ca/resource-

gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/BCCDC_WildFire_FactSheet_SmokeAndAirQuality.pdf)

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FAQs: Climate-related Indoor Air Quality Concerns in Learning Settings

July 30, 2025

CPCHE News EN

Français

Frequently asked questions (FAQs) about extreme heat, wildfire smoke and other climate-related indoor air quality concerns in schools and child care settings that can affect children's health. Learn more about the health risks and practical measures to improve air quality in learning settings.

IAQ Standards, Guidelines and Regulations

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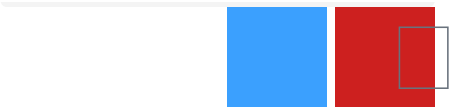


Protecting children from Traffic-Related Air Pollution (TRAP) in schools and child care settings

Learn more

1. Reduce traffic pollution at the source

- Encourage walking, cycling and other non-polluting forms of transportation
- Establish an anti-idling policy
- Advocate for electric vehicles, starting with buses

2. Keep traffic pollution from coming indoors

- Move school bus stops away from the building's air intake system
- Time the operation of the ventilation system to not coincide with rush hour and busy drop-off and pickup times
- Limit drop-off and pick-up near the building
- Keep windows closed during busy traffic times if safe to do so without overheating

3. Ventilate and filter for cleaner indoor air

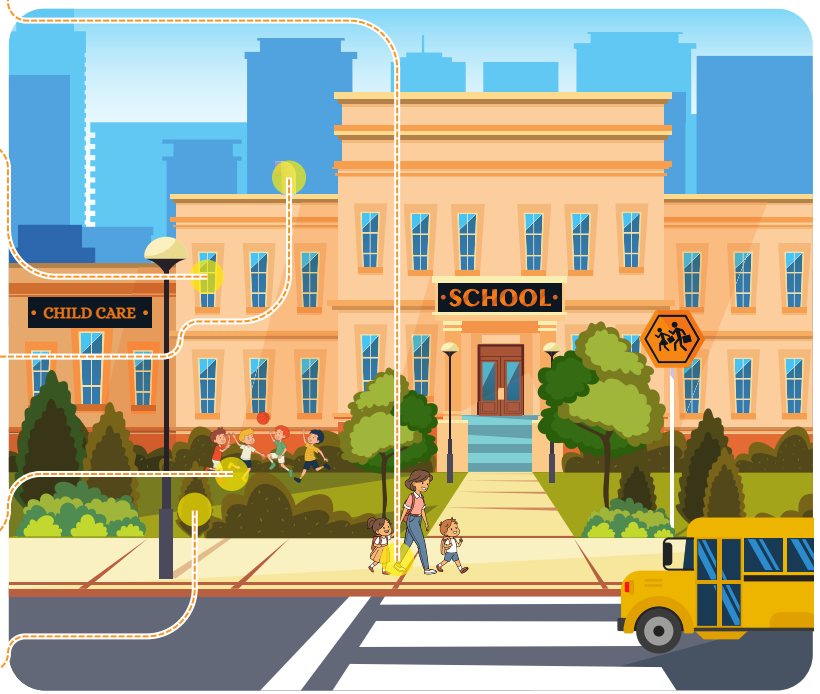
- Ensure that the building's ventilation and filtration system is operating properly, and use the highest efficiency filter suitable for your system
- Consider portable air cleaners (either commercial or DIY) as an additional measure to remove contaminants from indoor air

4. Plan outdoor activities to avoid traffic pollution

- Time outdoor activities to avoid peak pollution levels
- Situate outdoor play areas as far away from the roadway as possible

5. Consider buffers to filter and divert traffic pollutants

- Plant vegetation barriers along roadways where possible



Traffic-related air pollution puts children's health at risk.

TRAP is linked to asthma, reduced lung function, cancer, cardiovascular disease, effects on brain function and other health effects.

Children are more vulnerable to the impacts of traffic pollution because their bodies, brains and lungs are still developing. Compared to adults, children also breathe more for their size.

TRAP is responsible for an estimated 2.7 million acute respiratory symptom days, 210,000 asthma symptom days, and 3,600 child acute bronchitis episodes every year in Canada.

Rising temperatures as a result of climate change add to the health risk by increasing chemical reactions that create ozone and other harmful pollutants from traffic emissions.

Traffic pollution is highest close to busy roads.

About half of schools in Canada are located within 200 metres of high traffic roadways.

Classrooms closer to bus loading zones and other sources of traffic pollution have been associated with reductions in children's academic performance.

Child care centres near busy roads have been found to have higher indoor air pollution compared to those in less traffic-dense areas.

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