REPORT FOR ACTION

Update on Toronto Public Health's Wildfire Smoke Response Strategy

Date: June 21, 2024
To: Board of Health
From: Medical Officer of Health
Wards: All

SUMMARY

Due to climate change, wildfires have become an increasingly significant concern worldwide, impacting ecosystems, communities, and public health. The effects of wildfires extend beyond the immediate vicinity of the fire, as wildfire smoke can travel long distances, impacting air quality in distant regions.

In June 2023, Toronto experienced the impacts of wildfire smoke on its air quality for the first time, posing health risks, especially to vulnerable populations disproportionately impacted by poor air quality. In response, Toronto Public Health developed an initial Wildfire Smoke Response Strategy, designed as an iterative document to be reviewed and updated as the wildfire situations in Canada evolve.

This report outlines Toronto Public Health's 2023 Wildfire Smoke Response Strategy, and the changes made for the 2024 wildfire season. The 2024 update incorporates the Ontario Ministry of Health's first Wildfire Smoke and Air Quality Reference Document, released in spring 2024. Developed in collaboration with subject matter experts from Toronto Public Health, organizations across the province, and guidance from Environment and Climate Change Canada, it also integrates lessons learned from the 2023 season and best practices from other regions with more wildfire experience.

For the 2024 season, the City will introduce the Cleaner Air Spaces Network, providing safe spaces for people during smoke events who face barriers accessing clean air or who lack air filtration systems at home. Cleaner Air Spaces Network locations include Toronto Civic Centres (Scarborough, East York, York, and North York), Metro Hall, and City Hall. These locations will operate as cleaner air spaces during their regular operating hours, welcoming residents in need of respite from the smoke.

RECOMMENDATIONS

The Medical Officer of Health recommends that:

1. The Board of Health receive this report for information.

FINANCIAL IMPACT

There is no financial impact resulting from the adoption of the recommendation in this report.

DECISION HISTORY

On July 4, 2023, the Board of Health requested that the Medical Officer of Health assemble the current public health advice and evidence in response to wildfire smoke into a Toronto Public Health Wildfire Smoke Response Strategy.
https://secure.toronto.ca/council/agenda-item.do?item=2023.HL5.1

On November 27, 2023, the Board of Health requested that the Medical Officer of Health develop a surveillance framework for systematically and routinely monitoring climate change health impacts for Toronto.
https://secure.toronto.ca/council/agenda-item.do?item=2023.HL8.3

COMMENTS

Toronto Public Health (TPH) has identified environmental health, which includes exposure to air pollution, as one of the nine key Toronto health indicators in the 2023 Population Health Profile. Climate change is also identified in the Population Health Profile as posing a significant risk to environmental health, with Toronto and Ontario trending towards increased days with extreme heat, prolonged heat waves, more frequent extreme weather events, and deterioration of air quality caused by more wildfires.

Health Impacts of Wildfire Smoke

Wildfire smoke is composed of a complex mixture of gases, particles, and water vapour. Particulate matter smaller than 2.5 micrometers (also known as PM2.5) is of greatest concern to public health as small particles inhaled from the air can penetrate deep into the lungs and enter the blood stream leading to wide ranging respiratory and cardiovascular effects.

Exposure to wildfire smoke can result in various symptoms including irritated eyes, increased mucus production, coughing, and difficulty breathing. More severe symptoms include dizziness, chest pains, difficulty breathing, wheezing, and heart palpitations. Individuals may also experience mental health impacts such as anxiety, depression, and general distress related to natural disasters and climate change.

Certain groups including seniors, pregnant individuals, infants and young children, those with chronic heart or lung conditions, people with lower incomes and people experiencing homelessness are at a higher risk of experiencing health problems during wildfire smoke episodes. Additionally, people who work or exercise outdoors are at increased risk of health effects from exposure to wildfire smoke[1,2]. In Canada, a study using models involving air quality monitoring, wildfire emissions, population health outcomes, and economic valuations showed that wildfire smoke contributes to an estimated 54-240 premature deaths due to short-term exposures and 570-2,500 premature deaths due to long-term exposures, in addition to numerous non-fatal adverse cardiovascular and respiratory health outcomes[3].

Internationally and in Canada, studies are being conducted to determine if wildfire smoke exposure impacts health differently than other types of urban air pollution (e.g., traffic, power generation, or industrial sources). Since the 2023 wildfire season in Canada was one of the most destructive on record, new information and findings about the health and public health impacts of exposure continue to emerge. As additional scientific information about wildfire smoke and its health impacts becomes available, strategies and responses described in the current strategy will continue to evolve.

2023 Wildfire Smoke Response Strategy

The 2023 Wildfire Smoke Response Strategy was created in response to the unprecedented deterioration in air quality in Toronto in 2023 caused by distant wildfires burning in other regions of Canada. The strategy brought together information on the impacts of wildfires on air quality, the ways they influence health, and actions people could take to reduce potential harms. Additionally, it outlined the approach, roles, and responsibilities for Toronto Public Health when Environment and Climate Change Canada (ECCC) or the Ministry of Environment, Conservation, and Parks (MECP) issues a Special Air Quality Statement and/or an Air Quality Alert for wildfire smoke impacting air quality in Toronto.

The strategy incorporated three streams of activities: 1) pre-season activities, 2) routine activities, and 3) activities designed for responding to air quality events due to wildfire smoke. It was created in consultation with public health experts on air quality and health, using academic literature and resources from health jurisdictions with experience handling the impacts of smoke on air quality, and guidance from Ontario and federal governments.

Experience from the 2023 Wildfire Season

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[1] Government of Ontario. May 2024. Wildfire Smoke and Air Quality Reference Document, 2024. Accessed at: https://www.ontario.ca/files/2024-06/moh-wildfire-smoke-and-air-quality-reference-document-en-2024-06-10.pdf

[2] Health Canada. May 2024. Wildfire smoke, air quality and your health: Health effects of wildfire smoke exposure. Accessed at: https://www.canada.ca/en/services/health/healthy-living/environment/air-quality/wildfire-smoke/health-effects-exposure.html

[3] Matz, CJ, *et al*. July 2020. Health impact analysis of PM2.5 from wildfire smoke in Canada (2013–2015, 2017–2018). *Science of the Total Environment*. Volume 725, 138506. https://doi.org/10.1016/j.scitotenv.2020.138506.

The 2023 wildfire season was the most destructive ever recorded in Canada. Over 15 million hectares burned during the season, representing nearly seven times the average area burned annually (2.5 million hectares) over the previous 35 years. According to NASA's earth observatory, the wildfire that impacted Toronto's air quality occurred in Quebec and was one of the largest wildfires of the 2023 season, with smoke reaching beyond Toronto into the United States and Europe[4].

ECCC and the MECP issued three Special Air Quality Statements related to wildfire smoke impacting Toronto in the summer of 2023 which lasted 12 days in total. During this time, TPH amplified health messages associated with the corresponding Air Quality Health Index (AQHI) level from Health Canada to provide residents with information they could use to reduce the potential harms of exposure to the wildfire smoke drifting across Toronto.

Toronto Public Health used the Ontario Acute Care Enhanced Surveillance (ACES) system to monitor the impacts of wildfire smoke on Toronto emergency room visits for selected signs and symptoms categorized for wildfire smoke. Data from Toronto hospitals during this period, accessed through ACES, did not indicate that wildfire smoke impacted emergency room visits for chronic diseases and respiratory symptoms in a statistically significant way. However, there are significant limitations to using this dataset, including that it does not show the impacts of wildfire smoke on individuals who do not go to an emergency room, and instead visit a primary care provider, walk-in clinic, or manage their symptoms at home. It is important to note that research of the impacts of the 2023 wildfire season on health in Ontario is ongoing. Until such Ontario-specific outcomes are published, data from other jurisdictions is available to describe the health impacts we may also see in Ontario.

In British Columbia, data show increases in asthma-related health visits during wildfire seasons, and since 2016, have shown that exposure to wildfire smoke is also associated with increases in dispensation of asthma inhalers, signaling worse control over asthma symptoms during these periods[5]. In New York State, asthma-associated emergency department visits doubled in early June 2023 in the Eastern Lake Ontario and Central regions, when wildfire smoke impacts on air quality were at their highest[6]. This increase was especially pronounced in older children and young adults, among whom asthma-associated emergency department visits tripled. In their analysis, the United States Centres for Disease Control and Prevention noted that non-Hispanic black and African American people disproportionately experienced asthma exacerbations necessitating emergency care, indicating that extreme weather events like these are capable of worsening health inequities.

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[4] NASA Earth Observatory. N.d. Tracking Canada's Extreme 2023 Wildfire Season. Accessed at: https://earthobservatory.nasa.gov/images/151985/tracking-canadas-extreme-2023-fire-season.

[5] Government of British Columbia. April 2024. Asthma Diagnosis, Education, and Management. Accessed at: https://www2.gov.bc.ca/gov/content/health/practitioner-professional-resources/bc-guidelines/asthma

[6] Centre for Disease Control. August 25, 2023. Morbidity and Mortality Weekly Report: Notes from the Field: Asthma-Associated Emergency Department Visits During a Wildfire Smoke Event — New York, June 2023. Accessed at: https://www.cdc.gov/mmwr/volumes/72/wr/mm7234a6.htm

To get a qualitative sense of the impacts of wildfire smoke on residents, Toronto Public Health conducted a media scan in the late fall of 2023 and included news articles published between the end of June 2023 and October 2023 which described peoples' experiences when wildfire smoke impacted air quality. This review found common themes, including:

- People understood that increased wildfire activity is due to climate change, and that reduced air quality during wildfire seasons may become Toronto's new normal.
- People viewed access to cleaner air spaces as a vital service, and that clear public health messaging was needed to help people prepare for the next season and know how to address alerts.

2024 Wildfire Smoke Response Strategy Updates

Toronto Public Health incorporated lessons learned from 2023, guidance from the province's newly published Wildfire Smoke and Air Quality Reference Document (2024), ACES data, media insights, and information from other jurisdictions as the evidence basis to update the Wildfire Smoke Response Strategy for 2024. Based on this evidence, the 2024 update seeks to:

- Include clear, broad public communication about what actions the public should take during alerts and how to maintain air quality at home;
- Include evidence about which groups are disproportionately impacted by this issue and provide them with tailored supports, for example by launching the Cleaner Air Spaces Network; and
- Support health professionals.

In addition, TPH has formed an internal Air Quality Response Committee, which sets TPH direction for the wildfire smoke response and coordinates updates to the strategy. In updating the strategy, the committee reviewed plans from other jurisdictions and consulted with Toronto Emergency Management, the City's Corporate Real Estate Management division, as well as Fraser Health and Vancouver Coastal Health, two health authorities in B.C. that have experience responding to air quality deterioration caused by wildfires.

Enhancement of the Air Quality Health Index (AQHI+)

The Air Quality Health Index is Ontario's system for air quality measurement and recommended health messaging. Earlier this year, Ontario, in collaboration with ECCC, made some important changes to the AQHI to better reflect the impact of wildfire smoke on air quality, resulting in the use of a new index known as AQHI+. Whereas the AQHI measures concentration of PM2.5, nitrous oxides, and ozone, which results in a measurement that is not specific to wildfire smoke pollution, the AQHI+ uses PM2.5 concentrations on their own to identify the level of risk to health during a wildfire smoke event. In addition, the interval between time-based measurements that contribute to the AQHI were shortened, to better reflect how quickly air quality can change during a wildfire smoke event. This new method brings a more responsive relationship between the level of wildfire pollution (PM2.5) and health messaging to give people the information they need to make choices about their activity level and to protect their health. The AQHI and AQHI+ will both be calculated when air quality measurements are

taken, and whichever one is higher will be reported by ECCC and MECP as a single value under the title of AQHI.

Do-it-yourself Air Filters

Toronto Public Health has updated online resources with information about how to construct and use do-it-yourself (DIY) air filters. These low-cost air filtration systems can be made with readily available supplies and used in spaces without built-in systems, such as older apartment buildings. These DIY devices can work as well as or better than commercially available, more expensive air filters.

Masking during smoke events

In the 2024 Wildfire Smoke Response Strategy, Toronto Public Health has also added ECCC, Health Canada, and Ministry of Health guidance about the use of masks. These organizations recommend well-fitted and properly worn respirator masks (such as N95 masks) to reduce risks associated with inhalation of PM2.5. Those donning masks should consider that they do not reduce exposure to the gases in wildfire smoke that may also pose health risks, and to try to move to an area with cleaner air before removing their mask. Masks are not recommended for children under 2 years of age, individuals who have trouble breathing while wearing the respirator, or individuals who have difficulty removing the respirator. Everyone is advised to listen to their bodies and reduce or stop activities if they are experiencing symptoms.

Communications Plan

Toronto Public Health recently implemented a communications plan to raise awareness about how people can prepare for this season, and to prepare channels for alerts and health messaging to be used during smoke events. This communications plan will be instrumental in TPH fulfilling its role in the amplification of health messages. To prepare for the season, residents are reminded to monitor the AQHI through ECCC's WeatherCAN app and be aware of how to reduce exposure to wildfire smoke, including via accessing the Cleaner Air Spaces Network (more information below). Should smoke events occur, messaging highlighting the AQHI health messages, the importance of maintaining indoor air quality, using the Cleaner Air Spaces Network, and other methods to reduce exposure to smoke will all be amplified.

New in 2024: Cleaner Air Spaces Network

In preparation for the 2024 season, TPH worked with the City's Corporate Real Estate Management division and Toronto Emergency Management to launch the City's Cleaner Air Spaces Network pilot, which will provide spaces for people who face barriers accessing cleaner air or who do not have air filtration systems available at home. For locations to begin participating in the Cleaner Air Spaces Network they must have MERV13 filtration systems[7] and adequate physical space to accommodate participants' use of the space during air quality events. The first locations participating in

[7] Minimum Efficiency Reporting Values (MERVs) report a filter's ability to capture particles between 0.3 and 10 microns; the higher the MERV rating, the better the filter is at trapping specific types of particles.

the Cleaner Air Spaces Network include Toronto Civic Centres (Scarborough, East York, York, and North York), Metro Hall, and City Hall. These sites will operate as cleaner air spaces during their regular operating hours, and residents will be encouraged to visit them during smoke events if they need a break from the smoke. Like the Heat Relief Network, the Cleaner Air Spaces Network is intended to grow each year to expand availability and accessibility.

Evaluation Plan and Future Directions

Toronto Public Health will continue to use health system data such as ACES to evaluate the impacts of the wildfire smoke season on health in Toronto, focusing on indicators such as emergency room visits for asthma and other respiratory and chronic diseases. We will also continue to monitor emerging evidence from Ontario and other jurisdictions about the health impacts of wildfire smoke. As TPH and the City's work on climate change and health impact monitoring continues to develop, and more measures become available, these may also be incorporated as appropriate, and will be reported to the Board of Health in the first quarter of 2025.

Earlier this year, the Partnership for Healthy Cities awarded TPH a grant to conduct a survey focused on extreme heat and wildfire smoke to collect information related to residents' experiences during the wildfire smoke episodes of 2023, and the measures taken to reduce their exposure. The results of this study will be reported out in 2025. Toronto Public Health will also continue to leverage partnerships to gain access to more data and evidence, especially with an equity focus. Since Toronto is expecting to encounter more air quality events due to wildfire smoke in the future due to climate change, staff will continue to review, update, and maintain the Wildfire Smoke Response Strategy.

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SIGNATURE

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