



The Air Quality Health Index:

a public information and health
protection tool to limit short-term
exposure to air pollution

Frédéric Valcin, Air Quality and Health Specialist
October 12, 2016





Montreal from Street Railway Power House Chimney, 1896
VIEW-2944
Wm. Notman & Son
© Musée McCord

MACLEAN'S

Air quality in Fort McMurray on scale of 1 to 10: 38

Premier says situation could delay recovery work and a return to the northern Alberta city

The Canadian Press
May 10, 2016

01 of 13



A police officer guards the checkpoint on Highway 63 into Fort McMurray. (Chris Bolin for Maclean's)

LA
PRESSE
CA

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Qualité de l'air: quand Montréal est pire que Pékin



Special air quality alert issued for Toronto and GTHA

CP24 GO

Air quality advisory issued for Metro Vancouver and Sunshine Coast

By Justin McElroy

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AA+

Winter Smog in Montreal



Source : Jacques Lavigne, ECCC.

Typical Symptoms (Short-Term)

- Worsening of existing heart and lung conditions
 - Chest tightness, pain, fatigue, etc.
- Irritated eyes
- Increased mucus in the nose or throat
- Sore throat
- Cough
- Difficulty breathing, especially during exercise
- Others...



Burden of Disease from Air Pollution

- In Canada¹ (pop ~ 35 million):
 - 21 000 deaths/year (2 682 acute)
 - 10 966 hospital admissions
 - 92 690 emergency dept. visits
 - 623 369 doctor's office visits
 - 22 542 500 minor illnesses
- Costs (reduced productivity, health care costs, etc.):
 - 8 billion CAD \$ (5.6 billion EUR)



1 : Canadian Medical Association, 2008.

Why Was a New Index Developed?

- To provide an **overall** measure of the **health risk** from local air pollution
- Providing more accurate information is a prerequisite for making better informed choices to reduce health risks



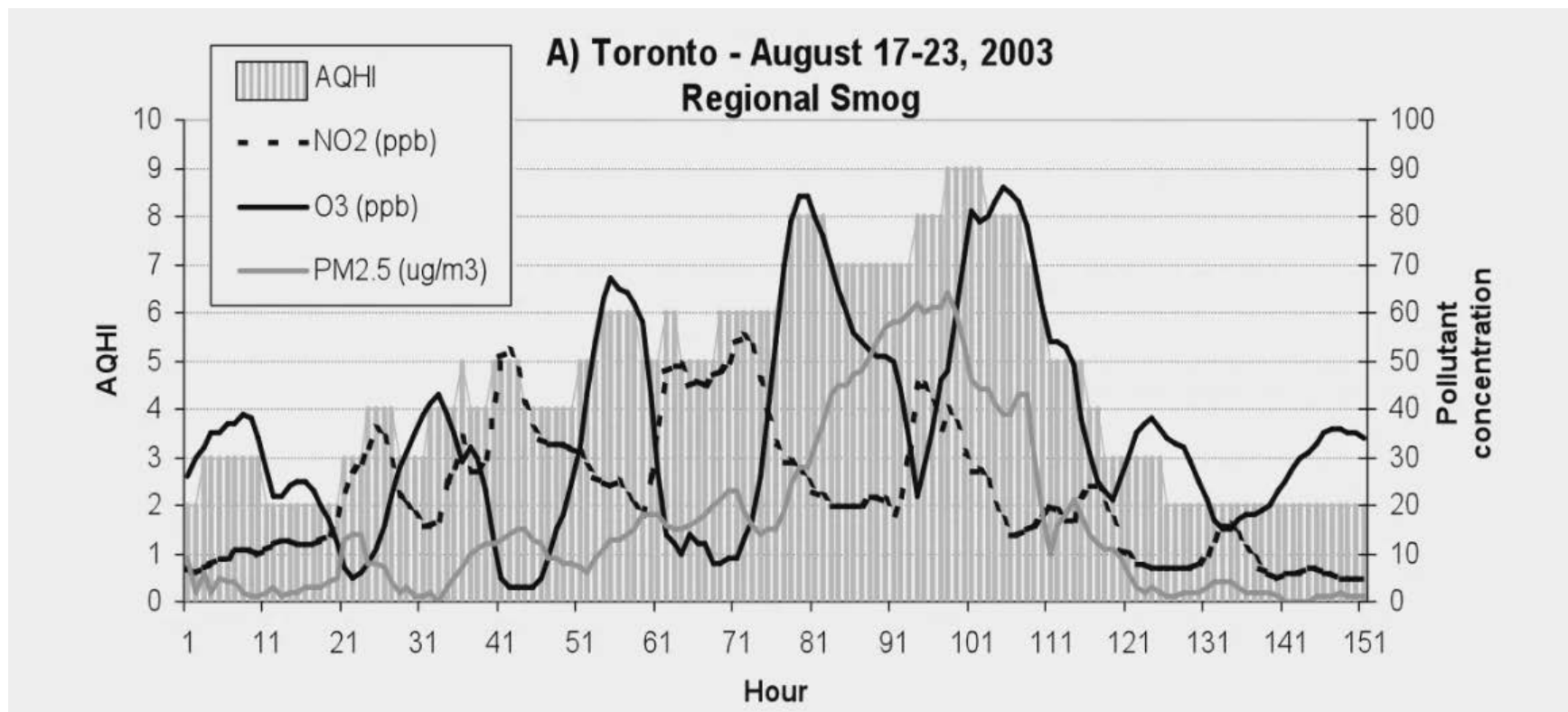
- Most AQIs in use are:
 - Calculated by comparing each pollutant relative to its standard and reporting the index of the worst pollutant
 - Do not take into account the concurrent effects of multiple pollutants
 - Based on the premise that there is a level below which air pollution poses no threat to human health

Concept

- Federal (Health Canada and Environment Canada), provincial, health and environment stakeholder collaboration
- 0-10+ simple scale, visual, easy to understand (inspired by UV index)
- Uses results from Canadian studies of short term effects on risk of death
- Considers effects at low pollutant concentrations
- Sum of risk from multiple pollutants (NO₂, O₃, PM_{2.5})
- Rolling 3-hour average concentrations, updated hourly

Environment Canada's UV Index		
UV Index	Description	Sun Protection Actions
0-2	Low	<ul style="list-style-type: none"> • Minimal sun protection required for normal activity. • Wear sunglasses on bright days. If outside for more than one hour, cover up and use sunscreen. • Reflection off snow can nearly double UV strength. Wear sunglasses and apply sunscreen.
3-5	Moderate	<ul style="list-style-type: none"> • Take precautions – cover up, wear a hat, sunglasses and sunscreen – especially if you will be outside for 30 minutes or more. • Look for shade near midday when the sun is strongest.
6-7	High	<ul style="list-style-type: none"> • Protection required – UV damages the skin and can cause sunburn. • Reduce time in the sun between 11 a.m. and 4 p.m., and take full precautions – seek shade, cover up, wear a hat, sunglasses and sunscreen.
8-10	Very High	<ul style="list-style-type: none"> • Extra precautions required – unprotected skin will be damaged and can burn quickly. • Avoid the sun between 11 a.m. and 4 p.m., and take full precautions – seek shade, cover up, wear a hat, sunglasses and sunscreen.
11+	Extreme	<ul style="list-style-type: none"> • Values of 11 or more are very rare in Canada. However, the UV Index can reach 14 or more in the tropics and southern U.S. • Take full precautions. Unprotected skin will be damaged and can burn in minutes. Avoid the sun between 11 a.m. and 4 p.m., cover up, wear a hat, sunglasses and sunscreen. • White sand and other bright surfaces reflect UV and increase UV exposure.

Multi-Pollutant Performance



Association with Health Outcomes

- AQHI values were significantly associated with increased use of asthma health services :
- A 1-unit increase in the AQHI was associated with:
 - a 5.6% increase in asthma outpatient visits
 - a 2.1% increase in the rate of hospitalization on the same day
 - a 1.3% increase in the rate of ED visits after a 2-day lag.

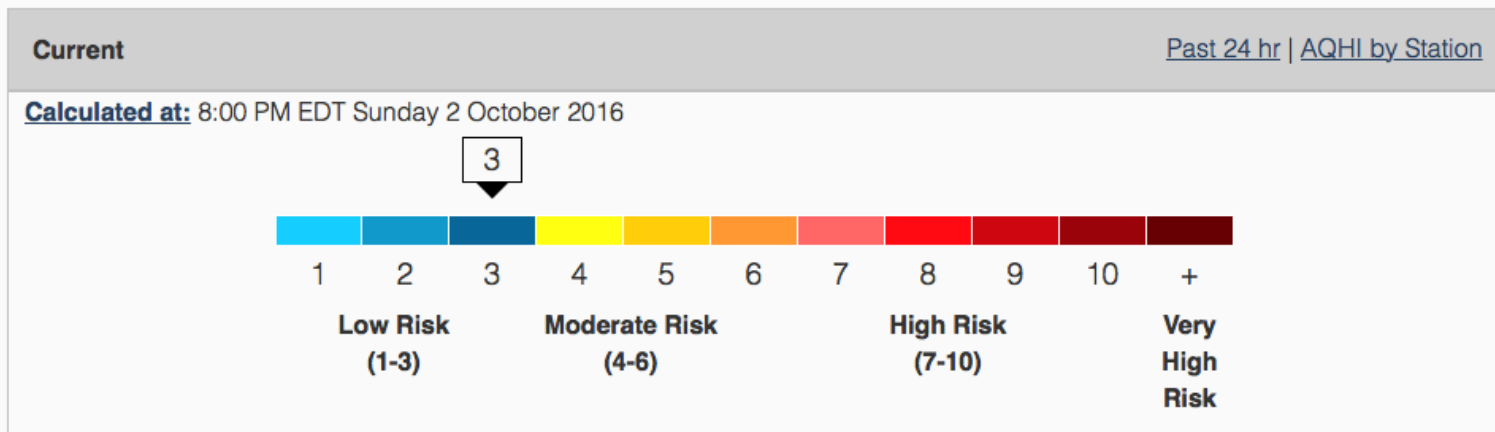
Timely AQHI health risk advisories with integrated risk reduction messages may reduce morbidity associated with air pollution in patients with asthma.

To T, Shen S, Atenafu EG, et al. The Air Quality Health Index and Asthma Morbidity: A Population-Based Study. *Environmental Health Perspectives*. 2013;121(1):46-52. doi:10.1289/ehp.1104816.

Health Messages

AQHI	Health Messages	
	At Risk Population	General Population
1 - 3	Enjoy your usual outdoor activities.	Ideal air quality for outdoor activities.
4 - 6	Consider reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms.	No need to modify your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.
7 - 10	Reduce or reschedule strenuous activities outdoors. Children and the elderly should also take it easy.	Consider reducing or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.
Above 10	Avoid strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	Reduce or reschedule strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation.

Toronto - Air Quality Health Index



At-Risk Population:

- Enjoy your usual outdoor activities.
- [Find out if you are at risk](#)

General Population:

- Ideal air quality for outdoor activities.

Forecast Maximums

[Next 18 hr](#) | [Health Message](#)

Issued at: 5:00 PM EDT Sunday 2 October 2016

Sunday night

3 - Low Risk



Monday

3 - Low Risk



Who is at risk?

People with heart and lung conditions are most affected by air pollution.

To find out if you are at risk, consult [the health guide](#), your physician, or your [local health authority](#).

Visit the [national AQHI Web site](#) to learn more about the AQHI.

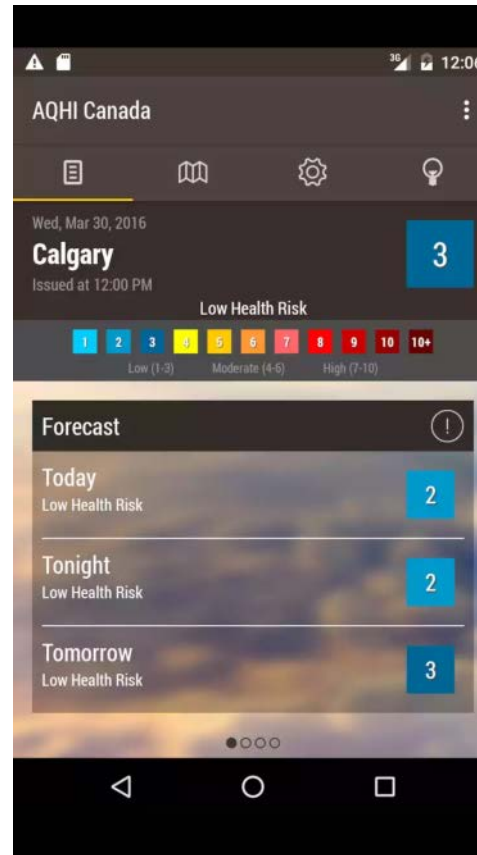
Did you know...?

Children are more vulnerable to air pollution: they spend more active time outdoors, especially in summer when pollution levels are higher.

The AQHI is an initiative between Environment Canada, Health Canada and the Province of Ontario.

Outreach

AQHI now available in over 100 communities across Canada



Conclusion

- AQHI is essentially a public health intervention involving providing timely information to persuade people to change their behaviour.



- **If** people receive and understand the information at the right time, and have flexibility / ability / willingness to change behaviour, **then** following advice will reduce exposure to outdoor pollutants.
- Evaluation:
 - Increased access to and awareness of the AQHI
 - Evaluation of whether Canadians change their behaviour to reduce their exposure to air pollutants as a result of the AQHI is needed

**Thank you for your
attention!**

