TORONTO

**STAFF REPORT**
**ACTION REQUIRED**

# Adopting the Air Quality Health Index (AQHI) across Ontario

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| **Date:** | May 28, 2013 |
| **To:** | Board of Health |
| **From:** | Medical Officer of Health |
| **Wards:** | All |
| **Reference Number:** | |

## SUMMARY

Air pollution is associated with cardiovascular and respiratory illness and death, and has a significant health impact in Toronto, especially for vulnerable groups.

When the public is made aware of health risks arising from poor air quality, they can adjust their behaviour to reduce exposure, thereby reducing risk. Public health units are required by the Ontario Public Health standards to increase public awareness of health risk factors associated with outdoor air quality. Effective communication to the public about environmental health risks is facilitated by clear, accessible, consistent information.

Air quality indices are the most common tool for providing information to the public about the current risk from outdoor air pollution. Currently, there are two indices available in Toronto that provides information related to air quality. The Air Quality Health Index (AQHI) was developed by Health Canada and Environment Canada in collaboration with provincial, municipal and NGO representatives including Toronto Public Health (TPH). TPH began promoting the AQHI in 2007. The Ontario provincial government also operates and promotes a separate provincial Air Quality Index (AQI) that provides local information about air pollution.

Stakeholders report that having two indices available creates confusion for the public. Recently, Public Health Ontario released a report describing and comparing the two indices. Based on a review of the evidence in the report, TPH believes that the AQHI is a better indicator of health risk than the AQI, and a better communications tool, with health messages tailored for vulnerable populations and the general population. AQHI should be adopted province-wide in place of the AQI.

## RECOMMENDATIONS

**The Medical Officer of Health recommends that:**

1. The Board of Health urge the Ontario Minister of the Environment in collaboration with the Ministry of Health and Long-Term Care to adopt the Air Quality Health Index (AQHI) province-wide in place of the Air Quality Index (AQI);

2. The Board of Health forward this report to Association of Local Public Health Agencies, Council of Ontario Medical Officers of Health, the Ontario College of Family Physicians, the Ontario Public Health Association, the Canadian Institute of Public Health Inspectors, Ontario Branch, the Association of Supervisors of Public Health Inspectors of Ontario, and Public Health Ontario.

### Financial Impact

There are no financial implications arising from the adoption of this report

## DECISION HISTORY

In 2001, TPH's C*ondition Critical: Fixing Our Smog Warning System* report advocated for the province to restructure its Air Quality Index (AQI) messaging system. The report found that the provincial AQI described air quality as “good” or “very good” about 95% of the time, even though air pollution was associated with a significant burden of illness in the City. The report recommended that the province discontinue the practice of describing air quality as “good” or “very good” when the AQI is less than 32 (out of 100); and develop a special messaging system to alert sensitive populations (such as the elderly, children and those with respiratory and cardiac problems) to air quality values that pose increased health risks.

In 2004, TPH's Agenda for Action on Air Quality and Health urged all levels of government to take action to reduce air pollution. This included a recommendation that the Ontario Ministry of the Environment collaborate with ongoing federal efforts to formulate an air quality index reflecting the combined health effects of simultaneous exposure to the key air pollutants.

The above noted reports are available at
http://www.toronto.ca/health/hphe/air_and_health.htm#1.

## ISSUE BACKGROUND

Ambient levels of several key air pollutants decreased in Toronto over the past decade[1]. However, exposure to even low levels of ambient air pollution contributes to morbidity and premature mortality, and some people such as children and the elderly may be especially vulnerable.

Currently, there are two indices available in Toronto that provides information related to air quality, the Ontario Air Quality Index (AQI), and the national Air Quality Health Index (AQHI).

The AQI was originally developed by the province in the 1970s as an environmental protection tool. Development of the AQHI began in 2001, with Environment Canada and Health Canada leading a multi-stakeholder committee process involving the provinces, municipalities and members from the health and environmental non-government organization (NGO) community. TPH and the OMOE were and continue to be on the national multi-stakeholder committee.

Since 2007, TPH along with Durham, Halton, Peel and York health units have promoted the AQHI via the development and distribution of AQHI education resources that are easily adapted for use by health units across the province. A comprehensive electronic toolkit includes multiple resources in a variety of media including an AQHI "wheel", brochures, posters, reference cards, and an educational video. Other community organizations, including La Casa Dona Juana, the Toronto Chinese for Ecological Living, the Clean Air Partnership, the Clean Air Champions, the Ontario Lung Association, and the Asthma Society of Canada, have also been involved in the development and distribution of resources to promote the AQHI.

There is widespread support for provincial adoption of the AQHI among Ontario health organizations. In June 2010, an Air Quality Task Force established by the Government of Ontario recommended that the province should adopt the national AQHI, identifying its ability to communicate about cumulative impacts of air pollution as a particular strength[2]. In the same month, the Association of Local Public Health Agencies (alPHa) adopted a resolution calling on the Province of Ontario to replace the AQI with the AQHI[3]. In June 2012, the Council of Ontario Medical Officers of Health (COMOH) of the Association of Local Public Health Agencies (alPHa) and the Ontario College of Family Physicians (OCFP) formally urged the Ontario government to adopt the AQHI in replacement of the AQI[4]. The letter further cited support for province-wide adoption of the AQHI by the Ontario Public Health Association (OPHA), the Canadian Institute of Public Health Inspectors, Ontario Branch (CIPHI), and the Association of Supervisors of Public Health Inspectors of Ontario (ASPHIO).

The Ontario Ministry of the Environment is currently reviewing the AQHI with a view to assessing whether it is reasonable to have both indices operating in the province.

## COMMENTS

The AQI and the AQHI are different in terms of the information they include, how they communicate it, and the resources available to promote them.

## The AQI and the AQHI

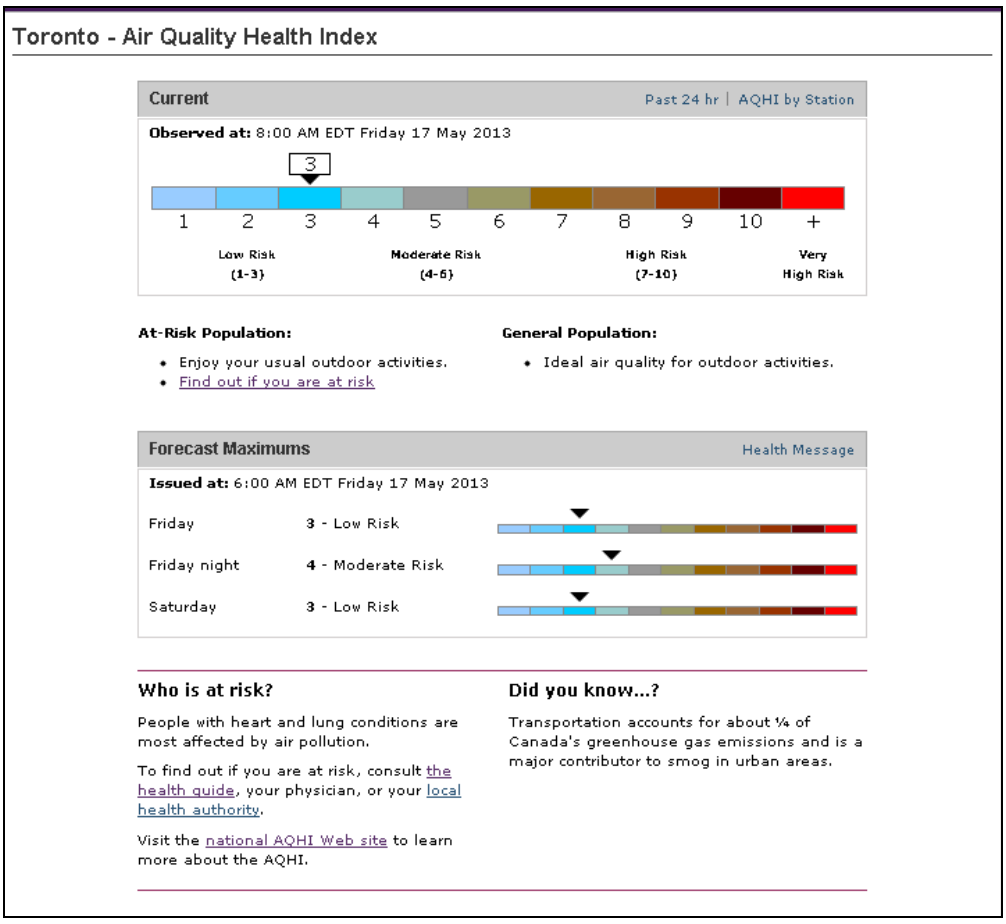
The AQI is operated by the Ontario Ministry of the Environment and is available across Ontario. It uses a scale of 0 -100 with five categories from very good to very poor air quality, and is based on a protocol that was developed to protect the environment. The AQI is based on comparing ambient concentrations of pollutants relative to the regulatory standards. The pollutants in the AQI are particulate matter ($PM_{2.5}$), nitrogen dioxide ($NO_2$), ozone ($O_3$), carbon monoxide (CO), and total reduced sulphur (TRS). The number reported as the AQI value is the single pollutant that is highest relative to its standard.

The AQHI was developed by Health Canada and Environment Canada in collaboration with provincial, municipal and NGO representatives. The purpose of the AQHI is to help people protect themselves from air pollution by telling them when it is safe to be active outdoors or when they should reduce or reschedule activities. The AQHI measures air quality in relation to health on a scale from 1 to 10. The higher the number, the greater the health risk associated with the air quality. Five categories are used to describe the level of health risk associated with the index reading (e.g. Low (1-3), Moderate (4-6), High (7-10) and Very High (10+)). The AQHI provides a special set of messages for people most sensitive to air pollution (i.e. people with heart and lung conditions, children, the elderly, etc.). The AQHI provides readings every hour and provides maximum forecast values for the day, night and following day. Figure 1 provides an example of the appearance and content of the AQHI readings and health messages.

The AQHI is a nationally consistent scale and emphasizes the health risk associated with exposure to a mix of three key pollutants: $NO_2$, $O_3$, and $PM_{2.5}$. The AQHI is based on observed relationships between pollutant concentrations and short-term health risk in Canada. The continuous 1-10+ scale was chosen to reflect evidence that there is no safe level of exposure to air pollutants.

Currently, the AQHI is in use in British Columbia, Alberta, Saskatchewan, Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland and Labrador, with expansion expected to the North Territories. In Ontario, the AQHI is available in the Greater Toronto Area (the City of Toronto plus Peel, Halton, York, and Durham regions), Hamilton, Kingston, London, Ottawa, Peterborough, Sault Ste. Marie and Windsor. The AQHI is available from Environment Canada's website (http://weather.gc.ca/mainmenu/airquality_menu_e.html)

**Figure 1: Example of AQHI readings and messages as displayed on Environment Canada's website (http://weather.gc.ca/airquality/pages/onaq-001_e.html**




## Confusion arising from having two indices

A 2008 evaluation of the AQHI asked stakeholders about the challenges facing the AQHI in the Greater Toronto Area. Most agreed that having the provincial AQI still in operation was the biggest challenge in implementing the AQHI. They concluded that having both indices run simultaneously is confusing to the public and to partners who promote the AQHI. Around the same time, the Ontario Medical Association also identified the challenges created by confusion arising from having two indices[5].

A second challenge identified by AQHI stakeholders was that having the AQI still in operation prevents media uptake of the AQHI. Most media outlets are unwilling to report on two indices because they are concerned reporting both will confuse their audience. The AQHI is currently reported by major media outlets such as The Weather Network and the Globe and Mail, while other outlets such as the Toronto Star still report the AQI. Consequently, public access to the AQHI is limited. Stakeholders indicated that requiring the public to go to a website for an AQHI reading rather than having it readily available from their newspaper, television or radio was a substantial barrier.

Effective communication to the public about environmental health risks is facilitated by accessible, clear, consistent information. When the public is made aware of health risks arising from poor air quality, they can adjust their behaviour to reduce exposure, thereby reducing risk. However, when people are confused about the meaning of air quality information that they receive, they are less likely to act in a way that protects their health.

## Advantages offered by the AQHI

Public Health Ontario (PHO) recently conducted an extensive review of the AQHI and the AQI[6]. While the report did not endorse one index over another, it outlined the strengths and limitations of each one.

From a public health perspective, effectively representing the health risk from air pollution is a primary determinant of the value of an index. As noted by PHO, the AQHI is based on scientific evidence about the link between exposure to air pollution and mortality. More recent research concluded that use of asthma-related health services increases in correlation with AQHI values[7] – evidence that the AQHI is also relevant for morbidity. As well, the method used to calculate the AQHI reflects current understanding that pollutants may have health effects even at low levels. Finally, the AQHI accounts for the likelihood that exposure to more than one pollutant at a time results in additive health impacts.

In contrast, PHO reports that evidence for a consistent, quantitative relationship between the AQI and human health impacts is lacking. The AQI is based on comparing ambient levels to thresholds. However, there may be no threshold of effect for key air pollutants including $PM_{2.5}$, $NO_2$, and $O_3$[8]. As well, the thresholds used to determine the AQI and categories of air quality are Ontario Air Quality Standards or National Air Quality Objectives, and most have not been updated in 10 years or more. Among these benchmarks, there are clear examples where current standards are not completely protective of human health. Finally, the AQI does not account for potential cumulative impacts of simultaneous exposure to multiple pollutants.

The AQHI is also a superior communications tool compared with the AQI. The AQHI was purposefully designed with input from health agencies and other stakeholders to communicate risk from air pollution and to help individuals understand their own sensitivity to air pollution through a process of self-calibration. More broadly, it functions as a health management tool, incorporating messages encouraging physical activity and healthy living in recognition of their importance for overall good health. The AQHI provides specific health advice tailored to both the general population and at-risk groups.

As well, the AQHI messages were updated to include new health research. In 2012, a review by health professionals including Health Canada, the Ontario Ministry of Health and Long-term Care and health groups such as the Asthma Society of Canada and the Ontario Lung Association defined supplemental messages for the at risk population and added diabetes as an at risk group.

The AQHI includes a forecast, which allows people to plan ahead using information about how health risk arising from air pollution is likely to fluctuate over the next 24 hours. Finally, the AQHI includes information about how people can reduce their contribution to air pollution.

## AQHI as the preferred risk communications tool

The AQHI is widely promoted through federal and local governments and community organizations and provides consistent information across the country using a variety of media, and directed to specific target audiences.

In contrast, the messaging and distribution of the AQI is limited, and while health messaging has been added into the AQI website, the AQI was not developed with a health audience in mind. The same AQI index reading can be associated with different health messages depending on the triggering pollutant, which may be confusing to the public.

The current AQI system conveys the impression to the public that air pollution is without health risk, and therefore not a concern until AQI values reach the “poor” classification. The AQHI informs the public about the overall health impacts of air pollution as well as the probable effects of lower levels of air pollution that are of concern to vulnerable subpopulations.

The AQHI also has the flexibility to include additional information if needed. A strength of the AQI is that it is used to help decide when to call a smog alert. Stakeholders are concerned that if the AQI is eliminated, there will no longer be a mechanism for triggering advisories related to poor air quality. However, other jurisdictions have been able to adapt the AQHI to their own needs by using a feature called a "special air quality statement". It is feasible that Ontario could integrate information about smog alerts using the special air quality statement.

The AQHI is an evidence-based tool that communicates information about the health impacts of air pollution so that vulnerable groups and the general population can take steps to protect themselves. It will be easier to promote and understand if it is adopted provincially in replacement of the AQI. Provincial adoption of the AQHI is supported by leading health organizations across the province.

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## SIGNATURE

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Dr. David McKeown
Medical Officer of Health

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