

## Best Practice: Demonstrating Air Quality and Climate Change Impacts on Public Health

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**CITY: TORONTO**

**POLICY AREAS: CLIMATE CHANGE; ENVIRONMENT; PUBLIC HEALTH**

### BEST PRACTICE

The City of Toronto (Toronto Public Health) has effectively used air quality research to demonstrate that poor air quality and climate change negatively impact human health and should be addressed simultaneously. This data has built support for policies that mitigate climate change and improve air quality.

### ISSUE

It has long been recognized that poor air quality adversely affects public health. Within the last decade, data and methods have become available which allow for the quantification of adverse health effects associated with exposure to air pollution, as well as the effects of climate change. Climate change is already felt around the world through rising temperatures, changing precipitation levels and patterns, extreme weather events and rising sea levels. It is widely recognized that the world's climate will continue to change as a result of the greenhouse gases in our atmosphere. The Intergovernmental Panel on Climate Change predicts that climate change may create as many as 150 million new climate refugees by 2050.

Local public health data on the impacts of air quality was not widely publicized until 2000, when the City of Toronto published the first study of the burden of illness associated with air pollution. The use of this data and subsequent research has led to widespread support for significant public policy programs to reduce air pollution and mitigate the effects of climate change.

### GOALS AND OBJECTIVES

The goals of the program are as follows:

- To research and document the local public health impacts of air quality and climate change to build public support for mitigation strategies.
- To provide a scientific and publicly accessible rationale for incorporating clean air and climate change adaptation into City of Toronto policies, programs and activities.
- To use research and data to build on existing partnerships to engage the City urban area, comprising small and large businesses, residents and other stakeholders, in actions to provide protection from air pollution and climate change.

### IMPLEMENTATION

Poor air quality is a cause of ill health for many of Toronto's residents. The City first began to quantify this in 2000 when it published the first study of the burden of illness associated with air pollution. The study characterized the number of premature deaths and hospitalizations that occur as a result of poor air quality. This Toronto-specific burden of illness information has been critical to supporting local air improvement initiatives and understanding the public policy significance of air pollution as a determinant of health for Toronto's residents. This study led to subsequent research that furthered the City's efforts to mitigate the effects of climate change.

Toronto Public Health received new data on fine particles to create an improved model in 2004 that led to the first comprehensive study of both the acute and chronic health impacts of exposures to fine particles and several other major

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criteria pollutants. This research found that air pollution in Toronto contributes to 1,700 premature deaths every year and about 6,000 admissions to hospitals. The study also estimated that exposure to fine particles in the air contributes to about 6,000 emergency room visits, 12,000 cases of childhood bronchitis and 72,000 days of asthma symptoms each year. After this information was made public, it generated a great deal of public and media attention, and reinforced to both the decision-makers and the public that air quality was having a significant impact on the community's health. The study made the case that air pollution reduction measures were necessary.

Another focus of local research and advocacy has been the contribution of coal-fired power plants to Toronto's air quality. This work shows that coal-fired power plants, both in Ontario and also upwind of Toronto in the Midwestern United States, are very important sources of air emissions for Toronto. The City used this information to advocate for action both internationally and locally. In an example of international collaboration, the City of Toronto participated as a *Friend of the Court* to support legal action by New York State and a number of environmental groups to curb air pollution from a group of coal-fired power plants in the Midwestern United States. The City contributed briefs and information describing the impact on the health of Toronto citizens of this long-range transport of air pollution from the United States. Court settlements in this case required 16 coal-fired power plants to reduce their air emissions by improving their technology.

The City also collaborated with the Canadian federal government to assess the combined impact of air pollution and weather on human health, utilizing historical data on air pollution, weather patterns and mortality over a 45 year period between 1954 and 2000. The relationships in these past trends were projected into the future to indicate that with the onset of hotter summers due to climate change, heat-related mortality is expected to double by 2050 and triple by 2080, and pollution related deaths are expected to increase by roughly 20 percent by the year 2050 and 25 percent by 2080, even if there are no changes in levels of air emissions.

In 2007, Toronto Public Health conducted research focused on the burden of illness specifically from traffic in Toronto. An air quality model was used to account for the dispersion, transport, and transformation of compounds emitted from motor vehicles. The modeled pollutant levels were then entered into an air quality benefits assessment tool, a computer based tool developed by the Canadian government, to calculate the estimates of health and economic impacts. Researchers discovered that 440 of the 1,700 premature deaths in Toronto associated with pollution were specifically related to motor vehicle emissions. Through isolating the health impacts and the costs of vehicle emissions, researchers were able to demonstrate potential health benefits of a more sustainable transportation system. A 30 percent reduction in motor vehicle emissions in Toronto could save nearly 200 hundred lives a year and significantly reduce hospitalization, illness, and their associated economic costs. This information adds a strong health rationale for sustainable transportation solutions that give priority to pedestrians, cycling, transit users and other forms of active transportation.

ChemTRAC is a recent initiative launched by the City of Toronto and led by Toronto Public Health that will collect new data on sources of air pollutants used and released by local businesses, and use these data to engage businesses and the public in reduction activities. The data will complement the national pollutant release inventory for small and medium sized sources which predominate in Toronto. ChemTRAC ([www.toronto.ca/chemtrac](http://www.toronto.ca/chemtrac)) has three main components: 1) a new municipal bylaw that requires thousands of businesses to track and report 25 priority substances (mostly air pollutants) each year; 2) support for businesses, such as grants and education material, to help them reduce these pollutants; and 3) public disclosure of data and information for the community to do their part to reduce pollutants. Over 5,000 businesses are expected to provide data beginning in 2011. ChemTRAC is the first municipal program of its kind in Canada and will help Toronto Public Health, businesses and the community better understand neighbourhood-level pollution and potential health exposures. Toronto Public Health collaborates with other City divisions and levels of government in planning, implementing and evaluating the success of this program.

In 1999, Toronto was one of the first jurisdictions in Canada to adopt a Hot Weather Response Plan, with the goal of reducing heat-related illness and mortality. Since 2009, Toronto Public Health has been collaborating with Health Canada and receiving support from Natural Resources Canada to conduct new research to support adaptation to extreme heat in the City. The research program includes evaluating its Heat Alert and Response System, developing a spatial heat vulnerability

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assessment to support hot weather response and long-term climate change adaptation planning, and identifying how residents typically access cooling when the weather is very hot. The findings of this research will be released in 2011 and are expected to support integration of health equity considerations in future climate change and health adaptation policies.

Toronto Public Health is currently working with partners in the Toronto Environment Office to conduct high-resolution cumulative air quality modeling at the neighborhood level. The models predict average and annual maximum ambient concentrations for 30 substances identified as public health priorities for the City. The origin of each pollutant is identified in terms of both sector and geography, facilitating development of effective pollution reduction strategies that can be implemented at the local level. The findings are expected to be released in 2011 and are expected to support cumulative approaches to regulating emissions sources in urban areas.

Toronto Public Health is currently exploring how equity issues shape the relationships between the urban physical environment, pollution exposures, and health inequalities.

### RESULTS AND EVALUATION

Toronto's public health studies have led to many positive outcomes related to clean air and climate change action, as follows:

- The creation of a series of annual smog summits, in which political leaders from the federal, provincial and local government levels make public commitments for actions to reduce air pollution.
- The establishment of the Greater Toronto Clean Air Council, a group of local municipal leaders from municipalities in southern Ontario who will share best practices and talk about implementing local action to improve air quality.
- The development of smog response programs in a number of municipalities, including the City of Toronto, through which city activities which contribute to air pollution are suspended or curtailed at times when air quality is poor.
- The development of a program called 20/20: The Way to Clean Air, a social marketing campaign developed by Toronto Public Health in collaboration with the provincial and federal governments to help individuals and families take practical steps to improve air quality by reducing both their home energy use and home vehicle use by up to 20%. Evaluation data for participating households indicate they are able to achieve a 20% reduction in home energy use and up to a 15% reduction in vehicle kilometers travelled. The average family gets 1.2 tons of reduction of greenhouse gas emissions per year if they follow the program.
- The contribution of briefs and information based on local health data as a *Friend of the Court* in the U.S. court case brought to enforce the Electric Power Service Corporation's compliance with the U.S. *Clean Air Act*. The brief described the impact on the health of Toronto citizens of this long-range transport of air pollution from the United States. The court settlement required 16 coal-fired power plants to reduce their air emissions by improving the technology that they use, ultimately translating into better air quality for Toronto.
- The support for an advocacy campaign with other health and environmental organizations to end the use of coal as a power source in the province of Ontario. These persistent advocacy efforts bore their first fruit with the closure of the Lakeview generating station, a large coal-fired power plant outside of Toronto and the largest single point source of air pollutants for the city. The Ontario government has subsequently committed to phasing out the use of coal as an energy source at the four remaining coal fired power plants in the province by 2014. This is a major shift in public energy policy which resulted from the research work demonstrating the health impacts caused by coal as a power source.
- Advocating for lower polluting locomotives on a rail corridor that runs through several residential neighborhoods and for which a major service expansion was planned. In approving the planned rail expansion, the provincial

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government required the regional transit authority to use "clean diesel" locomotives for some of the trains. Following this, the regional transit authority evaluated the costs and benefits of electrification compared to "clean diesel", and recommended to the provincial government that two of their rail corridors be electrified. The City continues to advocate for secure funding for the electrification process.

The federal government, in cooperation with the City of Toronto, designed a new air quality health index, the AQHI. The AQHI calculates relative health risk when people are exposed to increased levels of three air pollutants simultaneously (Particulate Matter, Nitrogen Dioxide and ground level Ozone). In addition to giving an indicator of health risks on a scale from 1 to 10, the AQHI provides messages for both at-risk individuals as well as the community at large to help plan outdoor activities at times when the risk is low. The AQHI is available throughout Toronto and the Greater Toronto Area.

### Air Quality Health Index

#### Toronto



#### Toronto AQHI Ad Campaign Images



**SEE AIR QUALITY IN A WHOLE NEW LIGHT**

Know if you're at risk. The new Air Quality Health Index relates air quality to your health on a simple scale from 1 to 10. The lower the number, the lower the risk.

Protect your health. Know the numbers. [www.airhealth.ca](http://www.airhealth.ca)

Learn how you can make a difference by reducing home energy and vehicle use by 20%. Visit [toronto.ca/health/2020](http://toronto.ca/health/2020)

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### TIMELINE

Research conducted by Toronto's Department of Public Health since 2000 resulted in several reports on the public health impacts of climate change and poor air quality. These reports continue to support effective implementation of Toronto's Climate Change, Clean Air and Sustainable Energy Action Plan.

#### **Air Pollution Burden of Illness (May 2000)**

[www.toronto.ca/health/hphe/pdf/burden\\_of\\_illness\\_technical\\_5.pdf](http://www.toronto.ca/health/hphe/pdf/burden_of_illness_technical_5.pdf)

#### **Toronto Air Quality Index Health Links Analysis (October 2001)**

[www.toronto.ca/health/hphe/pdf/tax\\_index.pdf](http://www.toronto.ca/health/hphe/pdf/tax_index.pdf)

#### **Air Pollution and Physical Activity (June 2003)**

[www.toronto.ca/health/hphe/air\\_pollution\\_pa.htm](http://www.toronto.ca/health/hphe/air_pollution_pa.htm)

#### **Air Pollution Burden of Illness in Toronto: 2004 Summary; Agenda for Action on Air and Health (July 2004)**

[www.toronto.ca/health/hphe/air\\_and\\_health.htm#1](http://www.toronto.ca/health/hphe/air_and_health.htm#1)

#### **Combined Impact of Extreme Weather and Air Pollution on Mortality (June 2005)**

[www.toronto.ca/health/hphe/weather\\_air\\_pollution\\_research.htm](http://www.toronto.ca/health/hphe/weather_air_pollution_research.htm)

#### **Curbing Transboundary Air Pollution: Protecting Health Through Legal Action (2005)**

[www.toronto.ca/health/hphe/pdf/boh\\_curbing\\_transboundary\\_air\\_pollution\\_full.pdf](http://www.toronto.ca/health/hphe/pdf/boh_curbing_transboundary_air_pollution_full.pdf)

#### **Air Pollution Burden of Illness from Traffic (November 2007)**

[www.toronto.ca/health/hphe/air\\_pollution\\_burden.htm](http://www.toronto.ca/health/hphe/air_pollution_burden.htm)

#### **ChemTRAC (first described as Environmental Reporting, Disclosure and Innovation Program) (October 2008)**

<http://www.toronto.ca/health/hphe/pdf/bohreporterdi.pdf>

#### **Air Quality Health Index and 20/20 The Way to Clean Air (2008)**

[www.toronto.ca/health/airquality/aqhi/index.htm](http://www.toronto.ca/health/airquality/aqhi/index.htm)

#### **Development of a Toronto-Specific, Spatially Explicit Heat Vulnerability Assessment: Phase I (2009)**

[http://www.toronto.ca/health/hphe/air\\_quality/pdf/finalreport.pdf](http://www.toronto.ca/health/hphe/air_quality/pdf/finalreport.pdf)

### LEGISLATION

The Environmental Reporting and Disclosure Bylaw (Municipal Code Chapter 423) was adopted in 2008 and came into effect on January 1, 2010. It requires affected facilities to annually report their use and release of 25 priority substances (chemicals) above specified thresholds. ([http://www.toronto.ca/legdocs/municode/I184\\_423.pdf](http://www.toronto.ca/legdocs/municode/I184_423.pdf))

### LESSONS LEARNED

Effectively incorporating climate change and clean air considerations into City of Toronto policies, programs, and activities depends on:

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- Documenting the effects of climate change and poor air quality to build public support for healthy climate change adaptation and clean air policies and programs;
- Developing and providing credible and evidence-informed advice to decision makers;
- Building partnerships at multiple levels including government, NGO, and private sector actors.

### TRANSFERABILITY

The methodology of the public health research is highly transferrable to other cities seeking to build political and public support for action on clean air and climate change.

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