

The logo features a stylized graphic of a building or skyline to the left of the word "TORONTO" in a large, bold, sans-serif font. To the right of "TORONTO" is the text "STAFF REPORT" in a smaller, bold, sans-serif font. A horizontal line is positioned below the text.

TORONTO STAFF REPORT

June 29, 2004

To: Board of Health
From: Dr. Barbara Yaffe, Acting Medical Officer of Health
Subject: Air Pollution Burden of Illness in Toronto: 2004 Summary

Purpose:

To report on a new study by Toronto Public Health on outdoor air pollution and human health impacts.

Financial Implications and Impact Statement:

There are no financial implications for Toronto Public Health from this report.

Recommendations:

It is recommended that:

- (1) the Board of Health forward this report for information and appropriate action to the Chief Administrative Officer, the Commissioners of Urban Development Services and Works and Emergency Services, and to City Council for information and follow-up action as warranted; and
- (2) the Board of Health forward this report for information and appropriate action to the Ontario Ministers of the Environment, Energy, and Health and Long-Term Care; Ontario Public Health Association (OPHA); Ontario Medical Association (OMA); Ontario College of Family Physicians (OCFP); the Association of Local Public Health Agencies (alPHa); and every public health unit in Ontario; and
- (3) the appropriate City Officials be authorized and directed to take the necessary action to give effect thereto.

Background:

In May 2000, Toronto Public Health released the report “Air Pollution Burden of Illness in Toronto”. The study estimated that exposure to five common air pollutants contributed to about 1,000 premature deaths and 5,500 hospitalizations of Toronto residents each year. Public health staff, in collaboration with an external air pollution expert, undertook a new study to provide a more up-to-date estimate of the health risk arising from smog in the city. The new study is summarized in the attached report “Air Pollution Burden of Illness in Toronto: 2004 Summary” (see Appendix A).

During this time, public health staff undertook a companion study “Agenda for Action on Air and Health”. This companion study notes the need for accelerated action by provincial agencies, given that the primary responsibility for air quality rests with the province, and acknowledges the opportunities for municipal agencies to implement local air quality improvement initiatives.

Comments:

Over the last decade, a large body of scientific evidence has accumulated that confirms that air pollution, including at the levels experienced in major urban centres such as Toronto, adversely affects the health of children and adults. Effects are wide ranging and include increased incidence and duration of respiratory symptoms, reduced lung function, acute and chronic bronchitis, asthma attacks, emergency room visits, increased hospitalizations for respiratory and cardiac causes, elevated mortality rates, and reduced life expectancy.

More recent studies link air pollution with lung cancer, heart attacks, strokes, and high blood pressure. Many studies identify people with asthma, diabetes and those with congestive heart failure as being at particularly elevated risk from air pollution. Furthermore, although the relationship between increased physical activity and adverse impacts arising from polluted air is not fully understood, numerous studies have shown increased adverse health impacts with strenuous physical activity levels, particularly when smog is at higher levels. These effects tend to be most pronounced in people with underlying health conditions such as asthma. Public health staff currently advise the public to reduce the intensity of physical exertion outdoors during smog alerts, and to pay special attention to any symptoms they may experience. If symptoms such as shortness of breath, wheezing, chest tightness or other symptoms arise, individuals should reduce or stop their activity and, if appropriate, seek medical attention.

The majority of studies in the scientific literature focus on the relationship between differing levels of air pollution in various communities and their associated adverse impacts. The emergence of studies known as ‘intervention studies’ provides unique insights into the health benefits associated with reductions in exposure to air pollutants. For example, research conducted during the Olympic Games in Atlanta, Georgia demonstrated a reduction in ozone levels, and significantly lower childhood asthma events for the period when traffic levels were greatly decreased. These types of research provide confirmatory evidence that policy interventions that improve air quality will contribute to health benefits.

Air pollutants typically increase the severity or frequency of common medical conditions or illnesses. However, because many factors give rise to the same medical condition, it is usually not possible to determine for an individual patient whether the adverse health outcome observed is due to air pollution or some other cause or both. Through population-based studies, however, it is possible to determine that groups of people exposed to higher levels of air pollution experience more adverse effects than those exposed to lower levels. Similarly, when scientists track peak pollution levels over time, they notice that more people experience health problems (such as severe heart and breathing difficulties) right after pollution peaks than on days when pollution levels are much lower.

Public health agencies are relying increasingly on 'burden of illness' studies to determine the health impact of air pollution on the local community. These studies use risk coefficients from the peer-reviewed scientific literature that reliably link exposure to air pollution with health outcomes. Risk coefficients are able to predict that exposure to a given quantity of a pollutant is likely to result in a health outcome of a specific magnitude. This information is then applied to the most current health data (such as actual number of hospitalizations and deaths) and daily air pollution levels for the community under study, so as to calculate the estimated health burden.

Based on the current burden of illness study, Toronto Public Health estimates that air pollution in our city contributes to about 1,700 premature deaths and 6,000 hospitalizations on an annual basis. The current mortality estimate is based on the health risk associated with acute exposures to ozone, nitrogen dioxide, carbon monoxide and sulphur dioxide, as well as the health risk associated with chronic exposure to fine particles (PM_{2.5}). Fine particles are associated with increased mortality due to lung cancer.

In addition to providing reliable estimates for the most serious health effects (hospitalization and premature mortality) associated with air pollution, the current study notes that less serious health outcomes (such as chronic bronchitis, emergency room visits and number of days that people experience asthma symptoms) affect tens of thousands of people in Toronto each year. Air pollution can aggravate pre-existing breathing and heart problems to such an extent that medical treatment is required. Of particular concern are people with asthma, which currently affects about 12% of children and 6% of adults in Canada. Toronto hospitalization data obtained during the current study reveal that children aged 15 and under account for the largest number of asthma-related hospital admissions compared with other age groups, indicating their enhanced vulnerability. Poor air quality reduces the quality of life for Toronto's children and adults, and especially for those who face a lifetime of chronic respiratory problems that are made worse by air pollution.

Given the magnitude of health risk associated with air pollution in Toronto, it is of particular concern that pollution trends reveal little improvement in air quality over the last two decades. This is in contrast to the provincial situation for which pollution reductions across Ontario were larger and more consistent for the key pollutants that impact on health. For example, while nitrogen dioxide levels show a consistent decline across the province, levels have increased steadily in Toronto. Compared with other Ontario communities with air monitoring stations, Toronto had the highest summertime levels of fine particles and highest annual mean levels of nitrogen dioxide, based on data for 2002, the most recent year that data were available from the

Ontario Ministry of the Environment. Toronto's density, large number of residents, commuters and visitors, as well as its projected growth, add up to a very sizeable population exposed to these high levels.

The transportation sector, made up primarily of cars, buses and trucks, is the largest source of nitrogen oxides (NO_x, which includes nitrogen dioxide) in Toronto, and accounts for 65% of all NO_x emission sources in the city. The steady increase in nitrogen dioxide levels in Toronto over the last two decades mirrors the steady increase in vehicle use in the Greater Toronto Area. Furthermore, by 1996 the use of public transit (TTC) fell by 20% relative to the ridership highs in the late 1980s. This was likely due to the loss of significant provincial contributions to transit funding during the 1990s, and the resultant increase in transit fares at the same time that service levels deteriorated.

Overall, Toronto has higher levels of air pollution compared with other cities across Canada, with the exception of Windsor, which is affected by high levels of pollutants originating from coal-fired power plants in the United States. For most air pollutants, levels in Toronto are comparable with those in other large cities around the world. However, when average nitrogen dioxide levels are compared over a 10-year period to 27 major cities worldwide, Toronto's levels were fourth highest, exceeded only by Los Angeles, Hong Kong and New York. Reducing emissions from the transportation sector in Toronto clearly needs to become a priority activity.

For over a decade, staff across the corporation have actively engaged in a broad array of initiatives to improve local air quality. While staff continue to develop programs and policies where the City has the authority, jurisdiction, opportunity or resources to do so, it is recognized that the authority for many crucial remedies rest with the province. In the companion report, "Agenda for Action on Air and Health", public health staff outline some of the key actions to be considered by the province that would result in significant improvements in air quality and a substantial benefit to human health.

Conclusions:

Burden of illness studies provide a reliable and cost-effective mechanism by which a local public health unit can estimate the magnitude of health impact associated with air pollution in their region. These studies provide an important context for developing policies and programs that promote and protect the public's health. Based on the current burden of illness study, Toronto Public Health estimates that air pollution in our city gives rise to 1,700 premature deaths and 6,000 hospitalizations each year. The study also notes that less serious health outcomes attributable to air pollution, such as increased rates of chronic bronchitis, emergency room visits and asthma symptoms, affect tens of thousands of people in Toronto. Poor air quality also reduces the quality of life for Toronto's children and adults, and especially for those who face a lifetime of chronic respiratory problems made worse by air pollution.

Given the size of the health impact associated with Toronto's air pollution, this study reinforces the importance of taking actions at all levels of government to ensure that the public and private sectors intensify air improvement initiatives. The major sources of the pollutants that give rise to

the large burden of illness in Toronto are fossil fuel-based transportation and energy production. This study underscores the need to expand and sustain public transit infrastructure on a priority basis, to enhance energy conservation measures within the city, and to stimulate the shift to cleaner sources of energy to provide Toronto with its electricity needs.

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List of Attachments:

Appendix A: Air Pollution Burden of Illness in Toronto: 2004 Summary. Toronto Public Health. June 2004.