TORONTO

STAFF REPORT
ACTION REQUIRED

Criteria for Selection of Areas for Future Air Quality Modelling and Health Assessment

Date:	June 6, 2012
To:	Board of Health
From:	Medical Officer of Health
Wards:	All
Reference Number:	

SUMMARY

In 2012 Toronto Public Health (TPH) and the Toronto Environment Office (TEO) reported on a comprehensive study of air quality in Wards 30 and 32 (South Riverdale and The Beaches) assessing the cumulative impact from multiple pollution sources and the related health effects . Based on the results of this study, the BOH has requested TEO and TPH to develop selection criteria to choose other Wards and parts of the city for future study of air quality and health assessment. This report contains recommendations for the selection criteria to be used.

RECOMMENDATIONS

The Medical Officer of Health recommends that:

1. The Director of the Toronto Environment Office, in collaboration with the Medical Officer of Health, set priorities for selecting Wards for air emission modeling and health impact assessment studies based on the following criteria:

   (a) Cumulative toxicity of air emissions from point sources;
   (b) Impact of major transportation sources as contributors of air pollutants; and
   (c) Population vulnerability based on socioeconomic status.

Financial Impact

There are no financial impacts from the adoption of this report.

DECISION HISTORY

On January 27, 2012, the Parks and Environment Committee considered the report from the Deputy City Manager, Cluster B, *Local Air Quality Study of Ward 30 and Ward 32* (http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.PE10.2), and referred it to the Deputy City Manager, Cluster B, and the Medical Officer of Health, to report to the Board of Health, and include the history of previous studies and local issues which led to this Air Quality study for this area; and requested that the Board of Health forward the report and any further recommendations to the Parks and Environment Committee.

At its meeting of February 27, 2012, the Board of Health considered the report from the Medical Officer of Health on the *Cumulative Health Impact Assessment of Air Quality in Wards 30 and 32* and requested the Medical Officer of Health to report back to the Board of Health as to the process on prioritizing which Wards will be selected for the Health Impact Assessment of Air Quality (http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.HL11.2).

On April 10 and 11, 2012 City Council considered and adopted the report and recommendations on *Cumulative Health Impact Assessment of Air Quality in s 30 and 32* (http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2012.HL11.2).

ISSUE BACKGROUND

In 2012 the Toronto Environment Office (TEO) reported on a comprehensive modelling study of air quality in Wards 30 and 32 that assessed the cumulative impact from multiple pollution sources (industrial, residential, commercial, transportation and biogenic) . This study determined that the overall air quality issues in these two Wards are principally caused by numerous small sources (such as vehicles, smaller industrial sources, commercial sources and residential furnaces), some localized poor air quality 'hot spots' related to large industrial sources, and pollution sources in the United Sates and Ontario (outside of Toronto). Toronto Public Health used the estimates from TEO's modelling to conduct a health assessment of the findings to respond to the community's interest in understanding cumulative impacts on health from multiple pollutants. Details on the methodology and results from this study can be found in the report *Cumulative Health Impact Assessment of Air Quality in Wards 30 and 32*[(1).]

Based on the results of air modelling and health impact assessment studies, the BOH has requested that the MOH in consultation with TEO develop selection criteria to choose other Wards for future study of air quality and health impacts.

COMMENTS

Conducting air modelling and health impact assessment studies involves significant resources such as staff time and complex computational power and therefore cannot be done all at once. TEO undertakes air modelling and TPH undertakes health impact

assessment based on the results of TEO's air modelling work. This report outlines a recommended approach and criteria to determine which Wards should be studied next.

It is recommended that the Director of the Toronto Environment Office and the Medical Officer of Health collaboratively set priorities for Wards in the City for which to conduct air studies based on the three criteria outlined in this report. This approach allows for the proactive selection of areas for study as well as aids in responding to requests to address new areas of concern that may arise.

There is considerable spatial variation across the City regarding the location of industrial or commercial facilities and major transportation sources. Neighbourhoods also vary based on socioeconomic status and the size of vulnerable subpopulations such as residents living on a low income or belonging to racialized groups. These factors are considered to be the most important in developing the selection criteria because they take into account the greatest potential for exposure to air pollutants and their adverse health effect on populations already most at risk.

It is recommended that the following criteria be used to select Wards for future study:

a) Cumulative toxicity of air emissions from point sources;
b) Impact of major transportation sources as contributors of air pollutants; and
c) Population vulnerability based on socioeconomic status.

A. Cumulative toxicity of air emissions.

A cumulative health assessment approach can help to answer important questions related to the potential health effects of neighbourhood-level air pollution, including:

- Whether air pollution is present in the neighbourhood at levels that are a health concern;
- What the patterns of exposure to air pollution are;
- Which sources contribute most to potential health impacts; and
- Which air pollutants should be priorities for reduction.

Ultimately, the health assessment should facilitate identification of any exposures of concern and support development, implementation and measurement of risk reduction strategies. As people are exposed to a mixture of pollutants, it is important to consider the combined impacts of these pollutants, even when most individual pollutants may occur at levels below health concern. Current air modelling studies have relied on the federal National Pollutant Release Inventory (NPRI) which is helpful in identifying releases from large point sources of polution. The new data being collected through the City's Environmental Reporting and Disclosure Bylaw (ChemTRAC program) will help improve future estimates of the cumulative exposure in Toronto neighbourhoods because it will capture emissions from smaller and more numerous point sources.

To best protect health, it is important to know not only the quantity (mass) of pollutants emitted into the air, but also their relative toxicity so that their impacts on health can be determined. Some pollutants may be emitted in relatively large quantities but have low inherent toxicity. Other pollutants may be emitted in relatively small amounts but have very high inherent toxicity. For example, the release of one kilogram of nitrogen oxides will have a different impact on health than the release of one kilogram of mercury. One way to take into account these differences is to use the Toxic Equivalency Potential scores (TEPs) [(2)]. TEPs indicate the relative human health risk associated with a release of one pound of a chemical, compared to the risk posed by release of a reference chemical. Information about the toxicity of a chemical (how much of it is required to cause harm) and its exposure potential (how much of it people are exposed to) are used to make this comparison. The TEP approach is useful because it enables one to estimate the cumulative health impacts associated with exposure to multiple pollutants.

TPH staff has the capacity to calculate TEP values and hence relative harm to health posed by emissions to the air. Hence we propose to use this criterion in determining where emission sources with relatively high TEP values are clustered and hence most likely to pose a health hazard to people living in the area.

B. Air Pollution from Transportation

The air quality modelling done for Wards 30 and 32 demonstrated that transportation sources can be a significant input of toxic chemicals into neighbourhoods, in addition to industrial sources of air pollutants. The presence of large transportation pollution sources such as highways should be a factor to include in the selection of areas of the city for future air modelling. Use of this criterion will enable the selected air studies to provide important contextual information as to the relative health risk to the community posed by industrial and commercial pollution sources in relation to impacts from significant transportation sources. It is also important in determining what the total cumulative health impact is from industrial sources when they are an additional source to elevated pollutant levels arising from transportation sources such as highways.

C. Air pollution and Socioeconomic Status in Toronto

In 2009, Toronto Public Health carried out a study on the spatial distribution of industrial air pollution sources and the association with socioeconomic status [(3)]. The results from this study showed that the parts of the city with more industries are not always the same areas with releases of pollutants that represent higher toxicity and hence adverse health impact. Through this research, TPH has developed the capacity to map industrial sources of pollution based on relative toxicity and hence health hazard.

The study also explored the relationship between major industrial facilities (NPRI sites) and socioeconomic status (SES). The results showed that low-income groups were more likely to be located within a two-kilometre radius of an NPRI facility compared to those beyond two kilometres. The proportion of rented dwellings, people without a high school

diploma, "visible minorities" (as defined by Statistics Canada), and unemployment were all significantly higher within two kilometres of an NPRI facility, while the percentage of people in managerial occupations was significantly lower. This study identified areas in Toronto that may experience a double burden of toxic emissions and a high proportion of populations facing health inequities. Given this, TPH proposes that criteria based on low SES (such as having low income or being part of a racialized community) be used in selecting new areas for air modelling and health assessment studies.

CONTACT

Monica Campbell
Director, Healthy Public Policy
Toronto Public Health
Phone: 416-338-0661
Fax: 416-392-0713
Email: mcampbe2@toronto.ca

SIGNATURE

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Dr. David McKeown
Medical Officer of Health

References

(1) Toronto Public Health. *Health Assessment for the Cumulative Air Quality Modelling Study: Wards 30 and 32.* Toronto: October 2011. http://www.toronto.ca/health/hphe/pdf/aqhar.pdf

(2) Scorecard – The Pollution Information Site. *Good Guide.* http://scorecard.goodguide.com/env-releases/def/tep_gen.html

(3) Toronto Public Health. 2009. *Geospatial Distribution of Air Pollution and Socioeconomic Status in Toronto*, Toronto Public Health, September 2009.