



CITY OF HAMILTON
PUBLIC HEALTH SERVICES
Epidemiology and Wellness Division

TO:	Mayor and Members Public Health Committee
COMMITTEE DATE:	November 13, 2023
SUBJECT/REPORT NO:	Monitoring Local Impacts of Air Pollution on Mental and Neurological Health Outcomes (BOH23041) (City Wide) (Outstanding Business List Item)
WARD(S) AFFECTED:	City Wide
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SUBMITTED BY:	Julie Prieto Director, Epidemiology and Wellness Division Public Health Services
SIGNATURE:	

RECOMMENDATION

- (a) That the Public Health Services budgeted complement be increased by 1.0 FTE to hire an Epidemiologist to establish a set of evidence informed indicators to monitor the impact of air pollution on the mental and neurological health of Hamilton residents at an anticipated annualized cost of \$141,831 for salary and benefits, to be referred to the 2024 Tax Operating Budget for Council approval; and,
- (b) That Item #2023-H, respecting Monitoring Local Impacts of Air Pollution on Mental and Neurological Health Outcomes be removed from the Public Health Committee Outstanding Business List.

EXECUTIVE SUMMARY

As directed by Council at its June 21, 2023 meeting, Public Health Services is reporting back to the Public Health Committee on resources required to develop a suite of evidence informed indicators that can be used locally to monitor the impact of air pollution on mental and neurological health outcomes starting in 2025.

The City of Hamilton is mandated to assess health impacts related to air pollution and has a concern about elevated pollutant concentrations' impacts on residents' mental and neurological health. While assessing the direct impacts of air pollutants on mental

and neurological health is an emerging field, there is currently no established approach for ongoing, local monitoring of the impact of air pollution on mental and neurological health of Hamiltonians. Therefore, in order to undertake an initiative that would establish a set of evidence informed indicators to monitor the impact of air pollution on the mental and neurological health of Hamilton residents, it is recommended that the Public Health Services budgeted complement be increased by 1.0 full time equivalent to hire an Epidemiologist. This initiative would build on existing disease burden methods through collaborative research to develop, operationalize and evaluate a monitoring approach of a small set of indicators that measures the impact of air pollution on mental and neurological health of Hamilton residents.

Alternatives for Consideration – See Page 6

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: The recommendation is for a 1.0 FTE Epidemiologist to support a research and development initiative to monitor the local impact of air pollution on mental and neurological health outcomes, at an anticipated annualized cost of \$141,831 for salary and benefits, and for the request to be referred for consideration in the 2024 Tax Operation Budget.

Staffing: The recommendation is that the Public Health Services budgeted complement be increased by 1.0 FTE Epidemiologist to support a research and development initiative to monitor the local impact of air pollution on mental and neurological health outcomes, and for the request to be referred to the 2024 Tax Operation Budget for Council approval. In addition, it is anticipated that this effort will require prioritization of currently budgeted staff resources including 0.1 FTE Librarian for three months, 0.1 FTE Air Quality Co-ordinator for three months, 0.1 FTE Program Evaluation Co-ordinator for six months and 0.1 FTE Health Analyst for ongoing support.

Legal: Not Applicable.

HISTORICAL BACKGROUND

Previous reports prompting discussion about population health assessment and the impact of air pollution on mental and neurological health of Hamiltonians, by Council include:

- BOH18016(a) – March 20, 2023
Modelling Morbidity and Mortality using the Hamilton Airshed Modelling System;

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- BOH23018 – May 1, 2023
Feasibility of Health Check Identifying the Impact of Air Pollution on Mental Health

Staff identified in May 2023, that it was not yet methodologically feasible to assess the mental or neurological health outcomes due to air pollution among Hamiltonians in the population health assessment update. The effects of air pollution on mental health and neurological outcomes is an emerging area of public health importance. Investigating these potential links is an active area of current research that has not yet translated to standard approaches to monitor their impacts at the local level. For example, the Global Burden of Disease Study uses established methodology to estimate the impact of select risk factors on health outcomes however, it does not currently include the health risk of mental or neurological health outcomes due to air pollution. Further, other robust methods, such as Health Canada's Air Quality Benefits Assessment Tool, do not yet include mental or neurological health outcomes.

At its meeting on June 21, 2023, Council provided Public Health Services with the following direction:

- (a) That Public Health Staff be directed to identify the resources required to develop, in partnership with the Centre for Addictions and Mental Health (CAMH), McMaster University and other local stakeholders, a suite of evidence informed indicators that can be used locally to monitor the impact of air pollution on mental and neurological health outcomes for future Health Check reports;
- (b) That staff report back to Public Health Committee on the identified resources needed by the start of Q4 2023, so that any staffing and/or financial needs can be identified for consideration in the 2024 Budget; and,
- (c) That staff include this information in future Health Check reports to Public Health Committee by the beginning of 2025 and annually thereafter.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

Public Health Services through the Board of Health is enabled to explore the impact of air pollution on the health of Hamiltonians by three areas of the Ontario Public Health Standards (2021) that speak to the approach to explore the evidence related to an issue, the requirement to monitor the health of the population, and the requirement to specifically assess the health impacts of climate change including air pollution:

1. The Research, Knowledge Exchange, and Communication section of the Effective Public Health Practice Standard identifies that “exploring an issue or investigating a question is accomplished through research”. This standard authorizes Public Health Services through the Board of Health to, “foster relationships with community researchers, academic partners, and other appropriate organizations to support public health research and knowledge exchange activities, which may include those conducted by the Board of Health alone or in partnership or collaboration with other organizations.”;
2. The Population Health Assessment Standard requires that the Board of Health through Public Health Services, “assess current health status, health behaviours, preventive health practices, risk and protective factors, health care utilization relevant to public health, and demographic indicators, including the assessment of trends and changes, in accordance with the Population Health Assessment and Surveillance Protocol, 2018.”; and,
3. The Healthy Environments Standard outlines that Public Health Services through the Board of Health is required to, “assess health impacts related to climate change” which includes air pollution.¹

RELEVANT CONSULTATION

The Institute of Health Metrics and Evaluation, University of Washington, oversees the administration of the Global Burden of Disease Study. Through email correspondence in April 2023, they indicated the next update to the Global Burden of Disease Study is expected to be released publicly later in 2023 and the update is unlikely to expand outcomes of air pollution to mental or neurological health.

Email correspondence in August 2023 with contacts at Health Canada indicated as of the current available evidence, mental and neurological health outcomes are not yet established as having causal or likely causal relationships with air pollutants; a criterion to include health outcomes in Health Canada’s Air Quality Benefits Assessment Tool that estimates the number of premature deaths and other health outcomes associated with specified changes in air pollution concentrations across geographic units in Canada. Rather, the state of evidence on air pollution and these health outcomes is considered as possible causal as opposed to causal at this time.

¹ Ministry of Health (2021). Ontario Public Health Standards: Requirements for Programs, Services and Accountability.

https://www.health.gov.on.ca/en/pro/programs/publichealth/oph_standards/

ANALYSIS AND RATIONALE FOR RECOMMENDATION

Typically, population health assessment uses established indicators and routine processes to report on the health of Hamiltonians to take action and inform practice. However, there is currently no established approach for ongoing, local monitoring of the long-term impact of air pollutants on mental and neurological health of Hamiltonians. Nor is there a clear pathway that identifies public health actions that can be taken based on monitoring results. An initial environmental scan indicated that there is no standard set of evidence informed indicators that are being used by other Public Health Units in Ontario or Public Health Ontario to routinely monitor the impact of air pollution on mental and neurological health.

Therefore, appropriate resources and expertise are required to assess the current state of evidence to develop and implement a suite of evidence informed indicators that can be used locally to monitor the impact of air pollution on mental and neurological health outcomes, as directed by Council through Item 7.3 at its meeting on June 21, 2023.

This requires building on Public Health Services' established approach that applies the Global Burden of Disease Study's population attributable risk estimates, the proportion of a disease that could possibly be prevented if a risk factor were eliminated, and can leverage some promising developments including the:

- Emergence of strong scientific evidence that identifies air pollution as one of the twelve potentially modifiable risk factors for dementia;² and,
- Increased interest in the reporting and synthesis of emerging evidence that exposure to air pollutants may affect mental and neurological health.^{3,4}

² Livingston, G et al. Dementia prevention, intervention, and care: 2020 report of the Lancet Commission, The Lancet, Volume 396, Issue 10248, 2020, Pages 413-446, ISSN 0140-6736, [https://doi.org/10.1016/S0140-6736\(20\)30367-6](https://doi.org/10.1016/S0140-6736(20)30367-6)

³ Bhui K et al. Air quality and mental health: evidence, challenges and future directions BJPsycho Open (2023)9, e120, 1–12. doi: 10.1192/bjo.2023.507

⁴ Zhang B, Weuve J, Langa KM, et al. Comparison of Particulate Air Pollution from Different Emission Sources and Incident Dementia in the US. JAMA Intern Med. Published online August 14, 2023. doi:10.1001/jamainternmed.2023.3300

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In order to establish an approach for ongoing, local monitoring of the impacts of air pollutants on the mental and neurological health of Hamiltonians, the addition of 1.0 FTE Epidemiologist would support the following work through a research and development initiative:

- a) A rapid review of the scientific literature that seeks to determine what evidence informed indicators can be used locally to monitor the long-term impact of air pollution on mental and neurological health outcomes at a local level;
- b) Active outreach to foster relationships with community researchers, academic partners, and other appropriate organizations such as Public Health Ontario and Health Canada, to complete a situational assessment and support knowledge exchange on related indicators on the impact of air quality on mental and neurological health;
- c) A summary report of potential approaches and indicators including the feasibility of establishing population attributable risk estimates locally to use in future population health assessment products;
- d) A collaborative prioritization process with key researchers and other appropriate organizations to recommend an assessment approach and establish a small initial set of promising indicators that may be ready to report locally in 2025;
- e) Operationalization and evaluation of the initial set of indicators, including suggested process improvements and evaluation of utility and usefulness;
- f) Support the consideration of an action pathway to respond to assessed levels of air pollution, mental health and neurological health outcomes; and,
- g) Ongoing support, maintenance and broader population health assessment of climate change's local health impact, as climate change continues to be a strategic priority in the City of Hamilton.

This proposal has certain important limitations or risks. First, while fostering relationships with researchers to encourage and engage in appropriate public health research is within the mandate of boards of health, this research would be largely explorative and may not yield a locally relevant and operational set of indicators. Further this approach would require incentives or funding for collaborative partners to participate. Finally, without enabling policies at many jurisdictional levels, it is challenging to link this research effort to local public health action that reduces the impact of air pollution on mental health and neurological health outcomes.

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OUR Mission: To provide high quality cost conscious public services that contribute to a healthy, safe and prosperous community, in a sustainable manner.

OUR Culture: Collective Ownership, Steadfast Integrity, Courageous Change, Sensational Service, Engaged Empowered Employees.

ALTERNATIVES FOR CONSIDERATION

Should Council determine that resources are not available for this research and development initiative and/or that limitations and risks are too great:

- a) Public Health Services could continue to monitor progress on this emerging public health issue (e.g. through Global Burden of Disease Study and Air Quality Benefits Assessment Tool updates and engagement with the Association of Public Health Epidemiologists in Ontario) and continue to seek guidance from Public Health Ontario. As more evidence is gathered, others may work towards establishing standard approaches to assess and monitor the impact of air pollution on mental and neurological health that could be included in future population health assessments for Hamilton residents. There are no financial/staffing/legal implications for this alternative. It is unknown at this time when a standard approach may be developed. If the Global Burden of Disease Study expands to include the impact of air pollution on mental or neurological health outcomes, it would likely occur after 2025. A benefit of this alternative is that Public Health Services would apply evidence vetted by experts in the field and at the guidance from Public Health Ontario at no extra cost to the City of Hamilton.

- b) Public Health Services could divert its epidemiological resources from existing work to prioritize this request with existing full time equivalent. There are no financial/staffing/legal implications for this alternative. A drawback of this alternative is that other mandated work may need to extend timelines or be put on hold.

APPENDICES AND SCHEDULES ATTACHED

Not Applicable.