

Health Impacts of Environmental Noise in Toronto

Date: 29 May 2017

To: Board of Health

From: Medical Officer of Health

Wards: All

SUMMARY

There is increasing concern about the impacts of environmental noise on health, especially in urban areas. The growing body of evidence indicates that exposure to excessive environmental noise not only impacts quality of life and causes hearing loss, it also has other health impacts, such as cardiovascular effects, cognitive impacts, sleep disturbance and mental health effects.

Non-auditory health impacts of environmental noise were reviewed by the World Health Organization (WHO) in 2009 and 2011. The WHO found that cognitive impacts, sleep disturbance, mental health and cardiovascular effects could occur at levels commonly experienced in urban environments. Toronto Public Health has reviewed the evidence that has accumulated since the WHO evaluation. This review confirms that health impacts can occur at levels between 42 and 60 dBA outdoors, which is below the 70 dBA benchmark that was previously considered protective of health. The available evidence suggests that environmental noise in Toronto occurs at levels that could be detrimental to health.

To get up-to-date data on exposure to environmental noise in the city, Toronto Public Health (TPH) conducted a noise monitoring study in the early fall of 2016. The levels of noise in Toronto are similar to those in other cities such as Montreal and Vancouver. The overall average noise levels in Toronto were 63 dBA (24-hour average), with a low of 50 to a high of 78 dBA at specific sites. Nearly 60 percent of noise in Toronto can be attributed to traffic noise and it is estimated that dissemination areas in the lowest income group are almost 11 times more likely to have 50 percent of their residents exposed to night noise levels above 55 dBA compared to residents in the highest income group.

Reducing the exposure to environmental noise requires a multi-pronged strategy. Recommended approaches include periodic assessment of the noise environment through monitoring and modelling, policy interventions (for example, building code standards, equipment performance standards, and noise bylaws), and education and engagement of the public. The Medical Officer of Health recommends that the City

develop a noise management action plan that identifies measures the City can take to reduce adverse health impacts from exposure to environmental noise in Toronto.

RECOMMENDATIONS

The Medical Officer of Health recommends that:

1. The Board of Health request the Medical Officer of Health develop a noise management action plan, in consultation with appropriate stakeholders, aimed at reducing exposure to ambient environmental noise over time, and report back to the Board;
2. The Board of Health forward this report to the Executive Director, Municipal Licensing and Standards for consideration in the review of Municipal Code Chapter 591, Noise;
3. The Board of Health request the Ontario Minister of Environment and Climate Change to adopt the World Health Organization's recommended noise guidelines of 40 dBA nighttime in the Ontario Environmental Noise Guidelines (NPC-300) to ensure the guidelines are health protective;
4. The Board of Health request the Federal Minister of Innovation, Science and Economic Development to require the mandatory labelling of sound ratings on garden equipment and other small machinery; and
5. The Board of Health forward this report to:
 - a. The Director, Energy and Environment Division, the General Manager, Transportation Services, the Executive Director, Municipal Licensing and Standards, the Chief Planner and Executive Director, City Planning, the General Manager, Parks, Forestry and Recreation, the Chief Engineer and Executive Director, Engineering and Construction Services, the General Manager, Economic Development and Culture, the Chief Building Official and Executive Director, Toronto Building, and the Chief Executive Officer, Toronto Transit Commission, President and Chief Executive Officer of Metrolinx, Chief of Police of Toronto Police Services;
 - b. The Ontario Ministers of Municipal Affairs, Housing, Environment and Climate Change, Infrastructure, Transportation and Health and Long-term Care; and
 - c. The Federal Ministers of Innovation, Science and Economic Development, Health, Environment and Climate Change, Infrastructure and Communities, and Transport.

FINANCIAL IMPACT

There is no financial impact resulting from the adoption of this report beyond what is in TPH's 2017 budget.

DECISION HISTORY

On September 21, 2016, the Licensing and Standards Committee referred the Noise By-law Review to the Executive Director, Municipal Licensing and Standards, to convene a Noise Working Group and report back with proposed amendments to Chapter 591, Noise after the Noise Working Group had completed its review and Toronto Public Health had completed its Noise Monitoring Study (LS13.1). <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.LS13.1>

COMMENTS

Background

Environmental noise refers to outdoor noise from roads, rail, air, as well as construction noise, entertainment systems (amplified sound), small machinery, air conditioners and people. The level of activity in densely populated urban environments makes addressing noise an important issue. Research on environmental noise usually reports on average noise exposure for a specific period (day, night or 24 hrs) and measured in A-weighted decibel levels (dBA). Since the decibel is a logarithmic unit, a sound received by the ear at 60 dBA is perceived as twice as loud as sound at 50 dBA.

The current Noise Bylaw (Municipal Code Chapter 591) was enacted in 2003. Municipal Licensing and Standards (ML&S) began a comprehensive review of this bylaw in March 2015. The Noise Bylaw sets out specific limits for noise depending on the location and time of day. The bylaw covers a variety of noise sources including amplified sound, construction noise and general nuisance noise, which are not addressed by other regulations. The bylaw includes provisions for quiet zones and times.

A number of community and interested parties have participated in consultations as part of the noise bylaw review. An online survey held in the spring of 2015 resulted in approximately 5000 responses. Almost half of the survey respondents (47.2%) indicated that there is a problem with noise in their ward. Construction, amplified sound and motorcycle noise were the types of noise most complained about. In addition to general disturbance, respondents indicated that the most common effects of noise were loss of sleep/insomnia and stress.

In the fall of 2016, TPH undertook a monitoring study for the City of Toronto. The study measured noise levels across a variety of land uses, places of interest and areas where noise complaints had occurred. Noise was measured for a week at each of 220 locations in different neighbourhoods and land uses across the city. The average 24-hour equivalent noise levels (Leq) were measured as 63 dBA; average daytime (7:00

a.m. to 11 p.m.) levels were 64 dBA and nighttime (11 p.m. to 7 a.m.) 58 dBA. Average daily levels at individual sites ranged from a low of 50 to a high of 78 dBA. The sites with the lowest average noise levels were in residential areas and the loudest average noise levels were in employment and industrial areas. Outdoor noise levels in Toronto are comparable to those found in other cities, such as Montreal and Vancouver.

The study also used two modelling techniques to determine the elements of the built environment that influence noise. The modelling found that nearly 60 percent of the noise in the City could be attributed to traffic noise. The study estimated that nearly 90 percent of the residential population is exposed to average daytime levels above 55 dBA. Nighttime noise levels are lower with about 40 percent of the residential population exposed to average nighttime noise levels above 55 dBA. The study also found that dissemination areas in the lowest income group are nearly 11 times more likely to have 50 percent of their residents exposed to nighttime noise above 55 dBA than residents in dissemination areas in the highest income group.

Health Impacts

A growing body of evidence indicates that environmental noise at levels that are common in urban environments have an impact not only on quality of life issues and hearing loss, but also on health. Building on the 2009 and 2011 reports of the World Health Organization, TPH reviewed the current evidence on the health impacts of environmental noise. The health impacts included in this review were:

- Cardiovascular Effects: myocardial infarction, hypertensive heart disease, ischemic heart disease, high blood pressure, cerebrovascular disease (stroke), coronary heart disease
- Cognitive Impacts: impairment (attention, memory adults, errors upon testing in children)
- Sleep Disturbance: increased arousals, changes to sleep structure
- Mental Health: annoyance, depression, quality of life
- Pulmonary Effects: chronic obstructive pulmonary disease, pneumonia
- Other Effects: diabetes, behaviour in children

The TPH review confirmed that adverse health impacts are observed at low levels ranging between 42 and 60 dBA. This is lower than what was concluded in the TPH 2000 review, which identified 70 dBA as protective to health. The recent available evidence therefore suggests that environmental noise in Toronto occurs at levels that could be detrimental to health.

The World Health Organization (2009) established health-protective guidelines of 55 dBA (Leq 16 hours) average outdoor levels through the day and evening (Leq 16 hours) and an average outdoor night-noise exposure guidelines of 40 dBA (Leq 8 hours) to keep an indoor average of 30 dBA. This means that the noise levels can vary through the day or night and at times be above these values. Given that 40 dBA is often difficult to achieve in urban centres, the WHO also set an interim average nighttime limit of 55 dBA. The Ontario Ministry of Environment and Climate Change has recommendations for road-related noise thresholds: for sensitive land uses, such as residential uses, mitigation measures are required if average outdoor levels at the centre of a window or

door opening exceed 55 dBA during the day (7:00 a.m. to 11:00 p.m.) or an average of 50 dBA nighttime (11:00 p.m. to 7:00 a.m.).

Opportunities for Improvement

The current average noise levels in the City of Toronto are considerably higher than the levels at which adverse health impacts have been identified as well as the levels recommended by the World Health Organization and the Ministry of Environment and Climate Change. Mitigation methods play a large role in lowering exposure of the general population to noise.

The noise bylaw is an opportunity to manage specific types of noise exposures to noise such as amplified sound, construction noise issues and other nuisance-related noise issues in Toronto. Municipal Licensing and Standards Division is currently reviewing Bylaw provisions and input is continuing to be gathered. The May 19, 2016 proposed amendments to the bylaw include specified decibel limits for amplified sound, the replacement of the general exemption on continuous concrete pouring with a requirement for a permit for this type of work, and the exemption permit process with the inclusion of mitigation plans all of which offer promising strategies that can contribute to decreased exposure to noise in the city.

One good practice is isolating noisier land uses from sensitive ones. This is often a complex consideration in dense urban environments, where the review on existing neighbouring land uses is quite narrow. Other solutions include considering noise impacts in relevant policies. In addition to the noise bylaw this could include complete streets, transportation planning and official plans. Vehicle speeds are an important contributing factor to road noise - noise from vehicles travelling at 50 km/hr sound twice as loud as noise from vehicles travelling at 30 km/hr.

As technology improves and changes, it is expected that noise levels in urban environments could decrease. Traffic noise could be reduced through improvements in paving materials, tire composition and electrification of vehicles. New and innovative materials and mitigation solutions could impact the noise produced in the construction industry and become new standards for building codes. Noise cancelling technology could change noise transmission into vehicles and buildings.

Development of education and guidance materials could help residents and businesses make informed choices while taking noise emissions into consideration. Labelling products, such as garden equipment with a noise rating or sound decibel level, would help consumers select less noisy equipment.

To combat the high noise levels in urban environments, the European Commission has developed a noise directive to develop noise action plans in consultation with the public. This practice has been deemed effective and brings attention to the importance of noise as a public health issue. The Canadian Medical Association has recently recommended the adoption of noise mitigation strategies and development of community noise maps to help guide action to reduce exposure to noise. Toronto could lead the way in the development of a municipal noise action plan.

Given that almost 60 percent of the noise in Toronto can be attributed to traffic noise, implementing measures to reduce exposure to noise from transportation sources should be a priority. Maintaining a quality outdoor noise environment will contribute to better health and wellbeing. Not only will such an environment promote a more active lifestyle (walking, cycling and active recreation), which can reduce noise levels from transportation, it will also contribute to a reduction in the risk of chronic disease, making Toronto a healthier city for all. The development of a noise management action plan would assist the City in identifying strategies that could be used to reduce exposure to excessive noise in Toronto and to monitor progress over time.

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SIGNATURE

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ATTACHMENT

How Loud is Too Loud: Health Impacts of Environmental Noise in Toronto