

A new concern for municipalities

Public health implications of climate change

Dominique Charron and David Noble

As true today as it has been for more than 2000 years, local governments influence people's health. In this article, we explore the critical role of municipalities in maintaining and promoting public health in the face of climate change.

Health – a Municipal Jurisdiction?

The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity.”¹ A wide range of determinants influence health, including genetics, behaviour, environment, occupation and infectious agents. Some determinants are more easily measured at the population level and reflect population health (i.e. average health status of a group, rather than of an individual):

- ▶ social and economic factors, eg. income and social status, social support networks, and employment and working conditions;
- ▶ environmental factors, eg. clean air, water and food safety; and
- ▶ built-environment factors, eg. housing, indoor air quality, and the

design of communities and transportation systems.

Municipalities either control or significantly influence many of these health determinants.

Health Impacts and Preparedness

Climate change is already having noticeable health effects. The WHO estimated that, by the year 2000, climate change was causing approximately 150,000 deaths worldwide and an additional five million disability-adjusted life years (a measure of non-fatal illness)² per year. This situation is likely to worsen as our climate continues to change. Certain populations, including children and the elderly, will face greater risks.

Poor air quality, which is associated with asthma, chronic respiratory disease and cardiovascular disease, is a serious public health issue across Canada and is expected to worsen. Smog and air pollution cause at least 5,900 premature deaths per year in eight Canadian cities³ (and 1,700 premature deaths per year in Toronto alone).⁴ Toronto Public Health recently projected a 20 percent increase

in air pollution-related mortality in Toronto by 2050, due to climate change.⁵

Climate change could increase in the number, intensity and duration of extreme heat events, like the 2003 heat wave that killed 50,000 Europeans.⁶ Not only does extreme heat kill people, it also exacerbates many other health conditions, particularly in children and the elderly. Projected impacts of climate change include a doubling of heat-related mortality by 2050.

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- 1 World Health Organization (1946). Constitution of the World Health Organization. Off. Rec. World Health Org., 2:100.
- 2 McMichael, T. et al. (2004). Chapter 20 in Ezzati M. et al (eds): Comparative Quantification of Health Risks: Global and Regional Burden of Diseases due to Selected Major Risk Factors. Geneva: World Health Organization.
- 3 Based on air pollution and mortality data from Quebec City, Montreal, Ottawa, Toronto, Hamilton, Windsor, Calgary and Vancouver. Health Canada (2004). Estimated number of excess deaths in Canada due to air pollution.
- 4 Toronto Public Health (2005). Influence of weather and air pollution on mortality in Toronto. Accessed online at <www.toronto.ca/health>.
- 5 Toronto Public Health (2005). Differential and combined impacts of winter and summer weather and air pollution due to global warming on human mortality in south-central Canada. Accessed online at <www.toronto.ca/health>.
- 6 Brucker G. (2005). Vulnerable populations: lessons learnt from the summer 2003 heat waves in Europe. Euro Surveill.10(7):147.

In the short term, heat warning systems and air conditioning are important for protecting public health (although energy demands from air conditioning contribute to air pollution and its health impacts). Over the longer term, urban planning and architectural elements may reduce the negative effects of heat waves – for example, planting trees and increasing green spaces provide shade and local cooling, and reflective roofs reduce thermal absorption, the heat island effect, indoor air temperatures and air conditioning requirements.

Extreme weather events (severe rainstorms, hurricanes and droughts) could become more frequent or intense in parts of Canada, contributing to direct injuries and deaths, outbreaks of waterborne and other infectious diseases, and mental health effects (eg. stress, suicides, etc.). Canada's increasingly urban and aging population,^{7,8} combined with deteriorating infrastructure, make us more vulnerable to health and other impacts from extreme weather.

Heavy rains and warm temperatures tend to increase risks of various waterborne illnesses.⁹ Heavy rains were implicated in the May 2000 outbreak in Walkerton, Ontario, flushing bacteria-laden manure from a farmer's field into a nearby shallow well, contaminating the town's drinking water system. More than

2,300 people became ill and seven people died.¹⁰ Source water protection and built-in redundancies (i.e. "source to tap" initiatives¹¹) are integral to effectively controlling drinking water contamination. This has direct implications for land-use planning, drinking water treatment and wastewater management – three municipal functions that influence public health.

Warmer year-round temperatures and longer summers favour increased population size and biting activity of disease vectors like the mosquitoes and ticks. Climate change could facilitate northward and westward range expansion of the Lyme disease tick from its current localized distribution only along the northern shores of Lake Erie and Lake Ontario, and on the southeast coast of Nova Scotia.¹² West Nile virus activity appears to coincide with very hot weather and other conditions that favour the mosquito.¹³

Climate change will affect many non-health related sectors, but with rather insidious effects on community health and well-being, via the effects on various health determinants. For example:

- ▶ In southern Canada, climate change is anticipated to reduce the sustainable harvest of some fish populations. This would be an additional economic and social burden to coastal communities, many of which rely on the fisheries and are also vulnerable to sea-level rise.

- ▶ Forest-based communities face greater risk of insect problems like the mountain pine beetle epidemic that has ravaged BC forests in recent years, increased risks of forest fire in most regions, and reduced winter harvest opportunities and higher logging costs from shorter, warmer winters.
- ▶ Shorter, warmer winters may also impact winter tourism and communities that depend on it. Snowmobile and ski-based tourism in northern Ontario and Quebec will likely decline, as will ecotourism based on vulnerable species, such as polar bear tourism in Churchill, Manitoba.

The effects of these types of changes include increased unemployment and employment uncertainty, reduced wages, increased perceptions of income disparities and inequities, lost human investments in social support programs, and a range of mental health impacts.

- 7 Statistics Canada (2002). 2001 Census Analysis Series: Profile of the Canadian population: where we live. Catalogue No.: 96F0030XIE2001001. Available at <http://geodepot.statcan.ca/Diss/Highlights/Highlights_c.cfm>. Accessed June 14, 2006.
- 8 Statistics Canada (2002). 2001 Census Analysis Series – Profile of the Canadian population by age and sex: Canada ages. Catalogue No.: 96F0030XIE2001002. Available at <<http://www12.statcan.ca/english/census01/Products/Analytic/companion/age/images/96F0030XIE2001002.pdf>>. Accessed June 14, 2006.
- 9 Charron, D. et al. (2004). Vulnerability of waterborne diseases to climate change in Canada: a review. *Journal of Toxicology and Environmental Health, Part A*, 67: 1667-1677.
- 10 O'Connor DR. 2002. Report of the Walkerton Inquiry. Part One: The events of May 2000 and related issues. Toronto: Queen's Printer for Ontario.
- 11 Canadian Council of Ministers of the Environment website, available at <<http://www.ccome.ca/sourcetotap/>>, accessed June 14, 2006.
- 12 Ogden NH, Maarouf A, Barker IK, Bigras-Poulin M, Lindsay LR, Morshed MG, O'Callaghan CJ, Ramay F, Waltner-Toews D, Charron DF (2006). Climate change and the potential for range expansion of the Lyme disease vector *Ixodes scapularis* in Canada. *Int J Parasitol.* 36(1):63-70.
- 13 Kunkel KE, Novak RJ, Lampman RL, Gu W. "Modeling the impact of variable climatic factors on the crossover of *Culex restuans* and *Culex pipiens* (Diptera: culicidae), vectors of West Nile virus in Illinois." *The American Journal of Tropical Medicine and Hygiene.* 2006 Jan; 74 (1):168-73.

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We need only look at the experience of communities that have gone through comparable environmental changes, to appreciate the seriousness of these effects. For example, the East coast cod moratorium resulted in about 30,000 lost fishery jobs in Newfoundland and many more lost jobs in related employment. In this environment, it is certainly a challenge to achieve “a state of complete physical, mental and social well-being,” and hence, to enjoy good health.

Municipalities Are the Front Line

The formal public health system is entrusted with many responsibilities that protect and promote our health. But, in the case of climate change-related health risks, many public health and related measures fall under municipal jurisdiction (eg. urban planning). Public health authorities inform and advise municipalities on the health implications of their activities, but municipalities make the final decisions.

“Many would be surprised to learn that the greatest contribution to the health of the nation over the past 150 years was made by local government, not by doctors or hospitals.”¹⁴ Although this was based on a health history of Oxford, UK, it is just as true for Canada. Local government’s contribution came from its work to create healthy living and working conditions for its citizens – its efforts were part of the broader economic and social development that accompanied industrialization and urbanization.¹⁵

Climate change is a massive environmental change that compares in scale to industrialization and urbanization. It is now, and will continue to be a major determinant of health in the 21st century. Our public health leaders will provide the information and advice that our municipal leaders need. For the good health of all, they must listen closely. *MW*

14 Parfit, J (1986). The health of a city: Oxford 1770-1974. Oxford, UK: Amate.

15 Hancock, T. “From public health to the healthy city”, in Fowler, EP and Siegel, D (2002) Urban Policy Issues: Canadian perspectives (2nd edition).

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to talk about change, it also depends on continuous communication between all parties – both during implementation and afterward, when management is of paramount importance.

“We need to keep asking the community what they like, what they don’t,” says Gil Peñalosa, leading staff advocate for placemaking in Mississauga. “It always requires political support, staff support, and especially, community support.” Mississauga has risen to the occasion by creating a new initiative called the “City for the 21st Century.”

The director of this division, Bruce Carr, is currently managing the placemaking improvements to the city centre as outlined by the community. This summer the central library and city hall plazas were actively programmed six days a week, hosting an eclectic mix of concerts, ethnic festivals, markets, sports, and other activity.

Managing Outdoor Space

Another way the city has adjusted is by treating public spaces as outdoor community centres. Mississauga

already operates a network of indoor community centres with budgets for management and programming. They are beginning to operate public spaces the same way, as places that need continual management to succeed. In kicking off this summer’s festivities, City Manager Janice Baker announced, “Today is an exciting day for the City of Mississauga. City centre is about to be transformed into a unique ‘outdoor community centre’ where we can all enjoy live concerts, food, activities, and special events.” The city’s 2007 draft budget sets aside funds for a full-time city centre management staff, the first time the city has created a position to manage an outdoor space. If successful, the model could be replicated in other public spaces, including Mississauga’s waterfront park system along Lake Ontario and the Credit River.

Mississauga’s commitment to placemaking bodes well for the future of civic engagement – there and elsewhere. By creating successful public spaces with real community participation, they have taken a very forward-looking and courageous step, one that we’ll see replicated in other Canadian cities before too long. *MW*



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