

Protecting Vulnerable People from Health Impacts of Extreme Heat

Date:	July 6, 2011
To:	Board of Health
From:	Medical Officer of Health
Wards:	All
Reference Number:	

SUMMARY

Each summer, Toronto Public Health (TPH) co-ordinates a Hot Weather Response (HWR) with the goal of reducing heat-related illness and death in Toronto, especially among vulnerable groups. An evaluation of the program conducted with Health Canada suggests that TPH is effective in communicating with the public and agencies providing hot weather response services to clients. Both groups report high knowledge of times when Heat Alerts or Extreme Heat Alerts are called, the risks associated with hot weather, and key protective actions, such as going to a cool place.

However, recent heat vulnerability mapping and an access to cooling survey by TPH indicate that low-income groups and renters in older high-rise apartment buildings are less likely to have access to in-home cooling and experience more difficulty accessing cool places. Enabling access to cooling for tenants in high-rise apartment buildings is complicated by legislative requirements for safety, aging infrastructure, lack of health-based guidance for adequate cooling, and the energy demands and air pollution emissions of air conditioning. Policy options are needed at the provincial and local levels that could feasibly ensure sustainable access to cooling for all.

Climate change is expected to lead to more hot weather in Toronto, increasing the possibility of an extended heat emergency. The response needed to such an emergency is beyond the scope of the current HWR Plan. Collaboration between City Divisions and provincial agencies is needed to define the risk of experiencing extended heat emergencies in Toronto, specify protocols for a heat emergency to be identified and declared, ensure broad access to heat-related resources and tools prepared by TPH and others, and increase the capacity of local organizations during such an event.

RECOMMENDATIONS

The Medical Officer of Health recommends that the Board of Health:

1. Request that the Medical Office of Health work with the Toronto Environment Office, Office of Emergency Management, and Shelter, Support, and Housing Administration to integrate heat-specific emergency plans into City emergency plans, including identifying the risk of extended heat emergencies in Toronto, specifying protocols for a heat emergency to be identified and declared, ensuring broad access to heat-related resources and tools prepared by TPH and others, and increasing the capacity of local organizations during such an event;
2. Request that the Ontario Agency for Health Protection and Promotion (Public Health Ontario) research and develop evidence-based guidelines for how much cooling is adequate to achieve a health benefit, including recommended temperature and duration of exposure to a cool environment;
3. Request that the Director of Urban Forestry, in consultation with the Medical Officer of Health, utilize heat vulnerability maps when prioritizing tree planting activities in the City;
4. Request that the Ontario Ministry of the Environment and the Ministry of Municipal Affairs and Housing take action as members of the Ontario Regional Adaptation Collaborative to enhance access to cooling for vulnerable people by:
 - (a) exploring provincial legislation and municipal standards, codes, and other by-laws to identify feasible policy options to support sustainable access to cooling for vulnerable groups;
 - (b) exploring incentive and support programs for low-income people to access cooling;
5. Forward this report and the attached report to local and provincial organizations engaged in hot weather preparedness and response, planning for climate change and its impacts on vulnerable populations, and advocating for tenant rights, including the members of the Ontario Regional Adaptation Collaborative, the Clean Air Partnership, Toronto and Region Conservation Authority, the Toronto Drop-in Network, the Ontario Climate Consortium, the Canadian Red Cross, the Ontario Medical Association, the Ontario Public Health Association, the Association of Ontario Municipalities, and The Federation of Metro Tenants' Associations, to encourage their endorsement and action.

Financial Impact

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

DECISION HISTORY

In 1999, City Council directed Toronto Public Health (TPH) to develop a Hot Weather Response (HWR) Plan to protect residents from the health impacts of extreme heat. The HWR Plan is revised periodically based on new research or recommendations from the Board of Health or the HWR Committee, which is composed mainly of key partners who provide direct services under the HWR plan. The Medical Officer of Health provides regular updates to the Board of Health on the HWR Plan, with the most recent being in March 2010 (See <http://www.toronto.ca/health/heatalerts/alertsystem.htm> for previous reports). During 2009-2011 TPH conducted innovative heat-related research, collaborating with Health Canada to evaluate the HWR Plan, developing heat vulnerability maps, and exploring access to cooling in Toronto.

This report provides an update on the HWR Plan, summarizes key findings from the heat-related research, and outlines implications for heat-related planning and protection in Toronto. A full report provides more details about the recent heat-related research at <http://www.toronto.ca/health/hphe/pubs.htm>.

ISSUE BACKGROUND

Evidence that climate change is occurring is now widely accepted within the scientific community. A key impact expected in many regions of Canada including Toronto is the increasing intensity, duration and frequency of extreme heat events (see Figure 1).

Figure 1: Predicted Number of hot days in Toronto

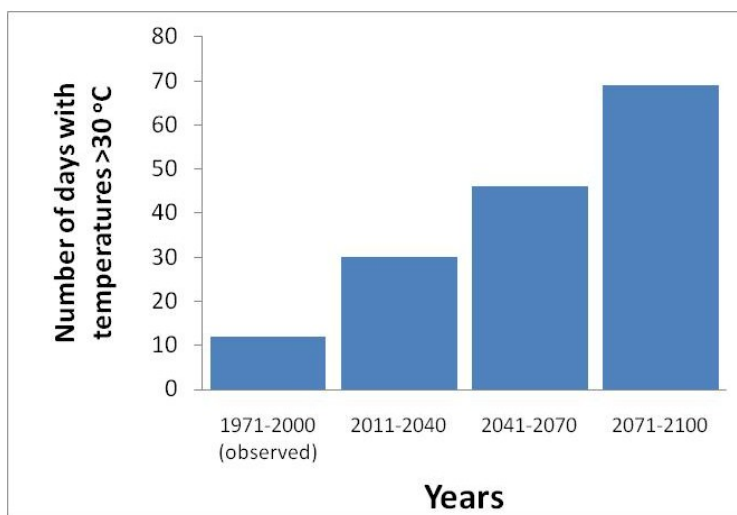


Figure constructed based on data extracted from Environment Canada's Canadian Climate Change Scenarios Network, 2010

TPH and Environment Canada estimate that heat contributes to an average of 120 premature deaths per year in the City, and that the likelihood of mortality increases on each day of a heat episode. As Toronto experiences hotter days and longer heat episodes, the impact of heat on health is expected to increase.

Since 1999, TPH has co-ordinated a Heat Alert and Response Program for the City of Toronto. The goal of the program is to reduce heat-related illness and death in Toronto. The program focuses on people who are especially vulnerable to heat, such as isolated seniors, people with chronic and pre-existing illnesses, children, and people who are marginally housed or homeless. The program is composed of a Heat-Health Alert System, which helps the Medical Officer of Health determine when to call a Heat Alert or an Extreme Heat Alert, proactive outreach activities, and a Hot Weather Response (HWR) Plan, which is set into action when an Alert is called.

Declaration of a Heat Alert or Extreme Heat Alert activates specific responses under the HWR Plan to help prevent heat-related illness and death. Many of the activities are carried out in partnership with community agencies and include providing bottled water, operating a heat information line, and promoting libraries and community centres as places to stay cool. As well, shelters ease their curfew rules to allow people to stay inside during the day and transit tokens are distributed at drop-in centres, so homeless and marginally housed clients can get to an air-conditioned place. In the event of an Extreme Heat Alert, the City opens designated cooling centres at various public locations such as civic centres, and public health inspectors check on vulnerable people in rooming houses and boarding homes in the City.

TPH recently collaborated with Health Canada to evaluate Toronto's Heat Alert and Response System. TPH was also awarded federal funding from Natural Resources Canada to conduct heat vulnerability research as a member of Ontario's Regional Adaptation Collaborative (ORAC). ORAC's objective is to advance adaptation planning and decision-making in Ontario communities by driving coordinated and sustained action to assess risks and reduce vulnerabilities to a changing climate. TPH's project created maps and assessed access to cooling in Toronto to identify the City's most vulnerable people, and is viewed by ORAC as a model for other Ontario jurisdictions. Both projects support efficient and effective targeting of hot weather resources and long-term planning to reduce heat-related impacts in the city.

COMMENTS

Toronto's Heat Alert and Response System

In 2010, TPH called five days of Heat Alerts and eleven days of Extreme Heat Alerts. The City's Shelter, Support and Housing Administration (SS&HA) Division operated seven Cooling Centres during the Extreme Heat Alerts at North York Civic Centre, East York Civic Centre, Centennial Recreation Centre, Driftwood Community Centre, McGregor Park Community Centre, Etobicoke Olympium, and Metro Hall. The Cooling

Centres received a total of 6,675 visitors, including 57 people who stayed overnight at Metro Hall. SS&HA also distributed 3,044 TTC tokens at selected drop-ins during Extreme Heat Alerts to help people get to a cool place.

The Office of the Chief Coroner provides a report to TPH when it identifies deaths in which heat is a major contributing factor. EMS reports cases of heat-related illness and/or death where environmental conditions observed at the pick-up location indicate excessive heat exposure. In 2010, TPH received reports of six possible heat-related deaths from the Coroner and six possible heat-related illnesses from EMS, for a total of twelve critical incidents.

When an Alert is called, TPH notifies the media, City partners, and over 800 community organizations. In addition to providing information on Alert days, TPH promotes heat-health advice year-round through multi-lingual brochures and online fact sheets. During 2010, TPH distributed 20,390 heat-related brochures and provided 642 Hot Weather Protection Plan packages to landlords of boarding homes, rooming houses, and Toronto Community Housing Corporation buildings.

In 2010, the method used to link forecast weather with likelihood of excess mortality from heat was adjusted with updated weather and mortality data for Toronto. As of 2011, new definitions are being used for Alerts. In general, a Heat Alert is called when forecast weather conditions suggest that the likelihood of a high level of mortality is 25 to 50 percent greater than what would be expected on a typical day. An Extreme Heat Alert is called when forecast weather conditions suggest that the likelihood of a high level of mortality is more than 50 percent greater than what would be expected on a typical day. Other improvements to the Heat-Health Alert System include an extension of the forecast period from three to seven days and mortality calculations for all weather conditions.

Recent research conducted in collaboration with Health Canada indicates that TPH is effective at notifying the public and partners about Alerts and communicating with them about the risks of heat to health and protective actions that can be taken. Surveys conducted in 2010 indicate that 92% of heat response partner organizations and 95% of frontline workers received notifications of Alerts. Organizations frequently provide advice and information to clients, often based directly on information provided by TPH. A review of news articles from the years 2007-2009 found that TPH's key messages are being communicated effectively through the media. Furthermore, a survey conducted in August 2010 confirmed that a high proportion of Toronto adults have some awareness of heat-related illness: 77% of respondents correctly named at least one symptom of heat-related illness, and 96% said that they had heard weather warnings or alerts about excessive heat in 2010. As well, most people can identify several actions they can take to help protect themselves from extreme heat.

Vulnerability to Heat in Toronto

Some people are more vulnerable to heat than others – either because they are more likely to be exposed to heat, or because they are more sensitive to the effects of hot

weather. People may be more exposed if they live in a home without air conditioning or live or work in a part of the city that is especially hot. Areas that are hottest are characterized by paved surfaces, buildings that obstruct air movement, and lack of trees or green space. People who are more sensitive to heat include young children, the elderly, and people with some pre-existing illnesses or chronic diseases, because their ability to regulate body temperature or control their environment is limited. Personal circumstances such as isolation or poverty may also increase vulnerability to heat as the ability to access services or other supports is limited.

Heat-related illness can be prevented if appropriate action is taken. Access to a cool environment is key to preventing heat-related illness. Strong evidence also indicates that actions such as increasing hydration, monitoring people who take certain medications, and reducing activity levels can also reduce the risk from hot weather.

Toronto's hot weather response program and the program partners provide information and support to vulnerable people. However, in the past, it was difficult to know where some vulnerable people were located. During 2009-2011, TPH developed a series of heat vulnerability maps to identify areas where hot weather protection and response activities are most needed.

Hot weather response stakeholders consulted by TPH confirmed that the maps of heat vulnerability enable geographic targeting of resources or investments. Operational uses include supporting appropriate staffing or case load allocation, planning service delivery for heat alert days, supporting targeted door-to-door outreach, confirming known or suspected areas of vulnerability, identifying existing clients in at-risk areas, identifying potential new clients, supporting collaboration between agencies during peak demand, and supporting service delivery and emergency power setup during power outages.

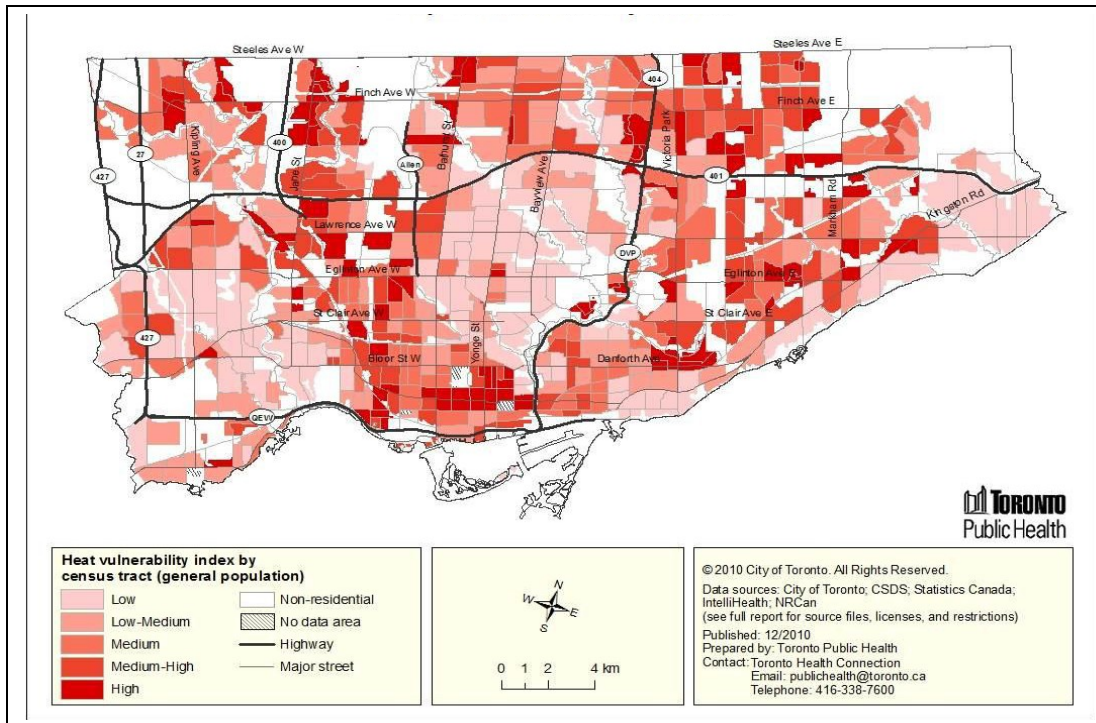
The heat vulnerability maps can also be used more strategically to guide development of heat registries, identify suitable locations for stationary and mobile cooling centres, assist with selection of additional cool spaces and suitable opening hours, study the influence of land use and features of the built environment on surface temperatures across the City, enable targeted greening programs, enable targeted building retrofits, prioritize natural or artificial shading in public spaces, support training of home-care workers, raise awareness of where clients live, support public education, serve as an advocacy tool, bolster grant applications, and support research by community organizations.

Figure 2 is an example heat vulnerability map for Toronto that accounts for exposure and sensitivity to heat. As expected, the map shows areas known to be more affluent and well-treed as having low vulnerability to heat. Heat vulnerability is higher downtown and in the inner suburbs, reflecting previously observed geographic patterns of inequity in income, racialized communities, education status and other factors related to disadvantage in Toronto. People in these areas of the City may face not only vulnerability to heat, but compounded disadvantage from overlapping inequities and multiple stressors.

For example, income affects living conditions such as safe housing and ability to buy

sufficient healthy food, but a person's income may be limited because of racialization, immigration and settlement status, and education. The similar geographic pattern in Toronto for many of these factors indicates that people living in areas of high vulnerability to heat are already likely to be at risk of poor health outcomes because of several related vulnerabilities.

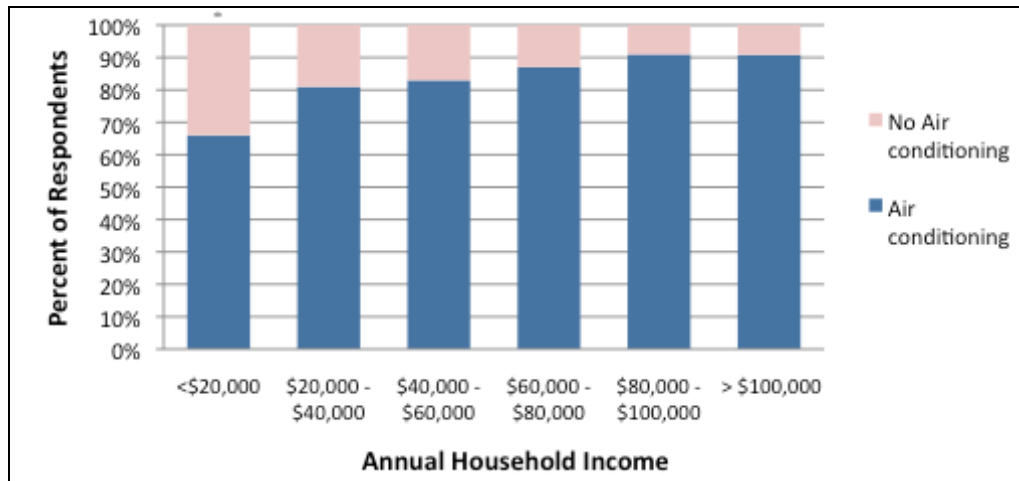
Figure 2: Vulnerability to Heat in Toronto



Being able to cool down is one of the most effective ways of reducing vulnerability to heat and preventing heat-related illness. A 2010 TPH survey found that 85% of Toronto residents have air conditioning in their home.

However, many of the characteristics of the 15% of respondents without in-home air conditioning align with those that increase vulnerability to heat. They are much more likely to be born in another country, to rent their place of residence, and to live in an apartment building. They are also more likely to be classified as low-income and to live in community housing. People with low income are less able to afford to purchase or operate air conditioners. Only 65% of households earning less than \$20,000 per year have air conditioning, while 90% of those earning more than \$80,000 have air conditioning (See Figure 3). In addition, one third of people without air conditioning say they experience barriers in accessing cooling, mainly as a result of transportation difficulties.

Figure 3: Percent of survey respondents with an operational air conditioner in their home by income (TPH, 2010).

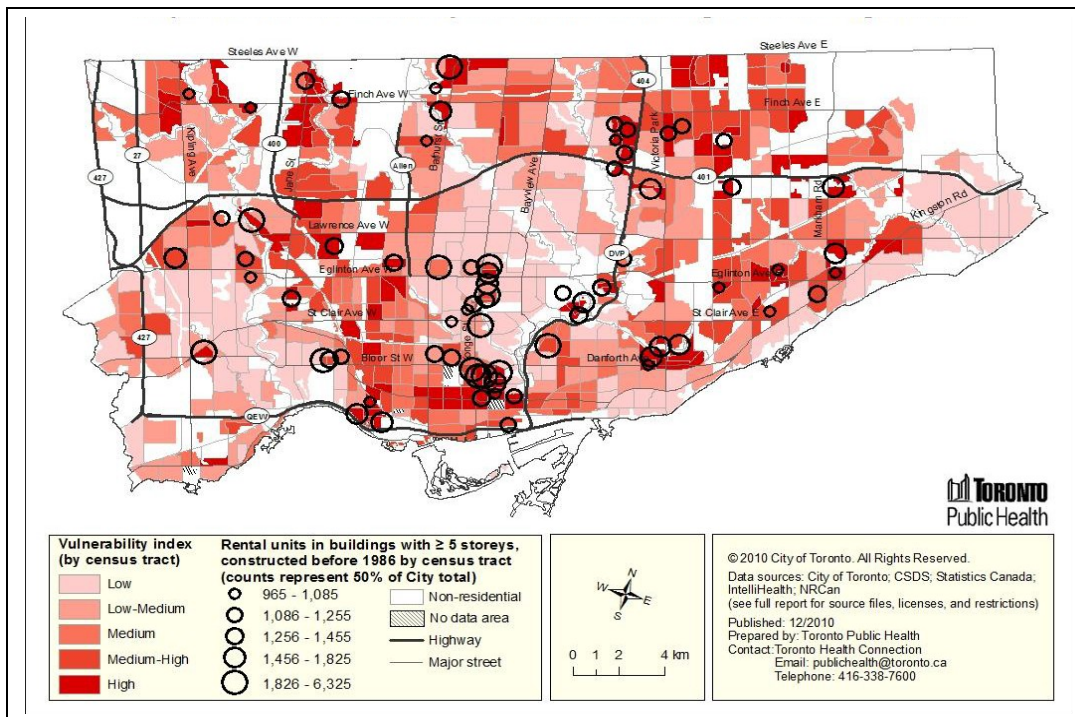


Vulnerability in Multi-Residential High-rises

A key group who are less likely to have access to air conditioning are renters. In Toronto, there are over 1000 residential apartment towers. Many are aging concrete buildings that were built during the 1950s-1980s, and few have central air conditioning.

These buildings also house some of Toronto's most vulnerable groups. Many residents of these buildings are lower income groups and newcomers to Canada. According to the United Way's 2011 *Vertical Poverty* report, Toronto's high-rise apartment buildings have increasingly become sites of concentrated poverty within neighbourhoods. The report also found that people living in Toronto high-rises have experienced uncomfortable levels of summertime heat. Figure 4 shows that the City's older, rented high-rises (circles) appear to coincide with areas of higher overall vulnerability.

Figure 4: Vulnerability to heat and rented dwellings in older high-rises



If multi-residential high-rise buildings have an air conditioning system, Toronto's Municipal Code requires that it be kept in working order, and operated from June until mid-September to keep indoor temperatures at 26 °C or lower.

However, most of the older buildings do not have central air conditioning, and renters in these buildings face a number of challenges in keeping their units cool. It is difficult to achieve much natural ventilation in high-rises, as most windows are restricted from opening more than 10 cm to protect children from falling out. Buying a window air conditioner may place a financial strain on low income tenants. As well, because of concerns that improperly installed units could fall out of windows, landlords can also require that tenants pay for a third-party professional to install, inspect, or certify the safety of an installed window unit. If a landlord is not satisfied that a unit is safely installed, they can request that it be removed.

TPH Actions to Prevent Health Impacts from Heat

In the summer of 2010, TPH worked with staff from Toronto's Tower Renewal (TR) initiative to explore some of the challenges and opportunities of providing a common cool space within a privately owned, high-rise building without central air conditioning. The cool space was available to residents of a two-tower community. Each tower has 268 apartment units with the potential of housing a total of over two thousand people. Most residents are newcomers or immigrants to Toronto.

TPH undertook education and outreach on health effects of heat and precautions to be

taken during heat events, enabled resident access to an on-site "cool room", and facilitated an on-site, volunteer-run hot weather response program. Operational challenges included identifying an appropriate space, staffing the cool room, ensuring security, and creating a comfortable, appealing environment. The project also highlighted a need for guidance about the appropriate temperature for such a cool room and how long people should stay to achieve a benefit.

TPH will continue supporting implementation of the cool room in 2011, and plans to consult with residents about the benefits and feasibility of having a common cool space in their tower community.

Toronto Public Health has been an active partner in the development of national resources by Health Canada to better equip municipalities to respond to heat events. In spring 2011, Health Canada began launching a series of resources, starting with a communications toolkit for Public Health and Emergency Management Officials, and brochures that deliver heat-health messages to the public and specific populations (See <http://www.hc-sc.gc.ca/ewh-semt/pubs/climat/index-eng.php>). Documents to be released over the coming months include vulnerability assessment guidelines, health care worker guidelines for heat events, and a best practises guidebook.

This summer, TPH will provide its hot weather response partners and the public with access to a variety of new heat-related tools and resources that support individual awareness and action, agency planning and outreach, and long-term actions for hot weather preparedness.

New features on TPH's heat alert website include a community agency page and Google map listing of all air conditioned libraries, community centres and cooling centres (<http://www.toronto.ca/health/heatalerts/index.htm>). Heat alerts are now posted under the health alerts section on TPH's new website for local health professionals (<http://www.toronto.ca/health/professionals/index.htm>). The new Health Canada pamphlets will be highlighted as a supplement to the TPH resources for the public and response partners accessing the site. Key heat vulnerability maps are now posted online at the Toronto Community Health Profiles Website (<http://www.torontohealthprofiles.ca/>), along with guidance to community organizations about how they can be used. The complete map series of over 40 maps is available on TPH's website, accompanied by a technical report http://www.toronto.ca/health/hphe/air_quality/climate.htm.

TPH continues to partner with other City divisions and local agencies on actions to mitigate the urban heat island effects and promote cooler, more accessible environments.

- TPH supported the development of the 2010 Shade Guidelines for the City which focus on recommendations and principles for increasing shade at City of Toronto facilities.
- TPH's heat vulnerability maps are a helpful resource that will be used in conjunction with Urban Forestry tree canopy mapping to guide Urban Forestry tree planting projects, where possible prioritizing those areas that are most vulnerable to heat. Toronto's tree canopy provides shade for people seeking relief

from the heat and helps mitigate the urban heat island effect. As part of Parks, Forestry and Recreation's Forestry Service Plan, Urban Forestry plants more than 100,000 trees each year.

- The Toronto Environment Office is conducting climate research to provide detailed information about the average climate and climate extremes expected in Toronto. TPH will work with TEO to determine the risk of severe hot weather emergencies and implications for hot weather programming.
- TPH is currently reviewing the City's Official Plan and will provide recommendations on heat-related issues as appropriate.

Provincial Actions to Ensure Adequate Access to Cooling

As a member of ORAC, TPH has been working in a co-ordinated fashion with provincial partners including the Ministry of the Environment, the Ministry of Municipal Affairs and Housing, and several NGOs and academic groups to disseminate the findings from the heat vulnerability research and explore implications for adaptation planning and decision-making.

Provincial policies, regulations and guidance are needed to ensure all residents can access cooling. Currently, municipalities' regulation of cooling for multi-residential buildings is governed by the provincial *Building Code* and the *Residential Tenancies Act*, as well as municipal property standards by-laws. An exploration of the relationships between provincial legislation and municipal-level standards, codes, and other by-laws is needed to identify feasible policy options that support sustainable access to cooling for vulnerable groups. A provincial approach will also support effective communication with property owners, landlords, and other housing agencies about cooling requirements, and ensure consistency of interpretation and application of related regulations.

Regulations will need to consider limitations imposed by aging electrical infrastructure in older buildings, costs to tenants and property owners, and environmental concerns. Based on the information in this report, several options for enabling access to cooling should be considered. For all new rental buildings and condominiums, landlords could be required to ensure that a maximum temperature threshold is not exceeded during the heat season. For older buildings, it may be more appropriate to institute a requirement that tenants have access to a common cooled space.

The province should also explore incentive and support programs for low-income people to access cooling. Some of the most vulnerable tenants may not be willing or able to access a common cool room, perhaps because of mobility limitations or mental illness. Currently, limited support for obtaining air conditioning is available to clients of Ontario Works and Ontario Disability Support Programs who can provide evidence of a medical need. However, applying, obtaining and installing the units without help can be a challenge, and eligibility is very limited. In New York City, the community housing authority provided tenants with newer, more energy efficient air conditioners while cutting overall costs, suggesting that it is possible to sustainably provide vulnerable tenants with in-unit cooling.

Recently, TPH provided input on proposed standards for retirement homes under the new *Retirement Homes Act*. TPH recommended that the requirements specify that licences must have procedures that include (i) making residents aware of heat-related risks and signs of heat illness and to provide resources, (ii) monitoring residents for heat-related illness and sufficient hydration on hot days, and (iii) ensuring that all residents have access to a cool location onsite on hot days.

The province should consider similar regulations for landlords of rooming homes and other premises that house vulnerable populations. Such legislation could require them to be aware of the most vulnerable tenants, notify them of Alerts, and develop a plan to prepare for the possibility of a heat emergency.

TPH further calls on the Ontario Agency for Health Protection and Promotion (Public Health Ontario) to develop the health-based guidance needed to support implementation of maximum temperature standards and set requirements for cool rooms. Such guidance could also address how long people need to spend in a cool location for prevention of heat-related illness, whether certain people should spend more time in a cool environment, and what conditions constitute a sufficiently cool environment to offer health protection.

Preparing for Heat-Related Emergencies

Under the Ontario Public Health Standards, the goal of the Emergency Preparedness Protocol is to enable and ensure a consistent and effective response to public health emergencies and emergencies with public health impact.

Toronto's HARS is effective in reaching out to community agencies and the public to help them prevent heat related mortality and illness. However, as the climate warms, the risk of an extended heat emergency increases. The response needed to such an event would be beyond the scope of the current HWR Plan. In 2003, a heat wave affecting large areas of Western Europe was associated with 70,000 deaths, and in 2010, about 56,000 deaths were attributed to 28 consecutive days of temperatures over 30 °C in Western Russia. The survival of those without access to effective cooling and those who are the most vulnerable depends on effective preparedness and response during emergency situations.

If an extended heat emergency were to arise in Toronto, TPH would activate a divisional emergency plan, and potentially request that the City activate its Emergency Operations Centre (EOC) to co-ordinate further activities by municipal and partnering agencies. While there is an understanding within the City and in the provincial health standards that heat-related emergencies may arise, there are currently no specific protocols for a heat emergency to be identified and declared.

There is a need to explore heat-related emergency planning at the Corporate or TPH level. This should include support for external organizations in developing plans for heat

emergencies. Staff at TPH and in the City's Shelter, Support and Housing Administration Division have expressed concern that many individual facilities and organizations such as those that house vulnerable people do not have their own emergency plan in place, and would depend entirely on the City should a heat emergency arise.

Conclusions

While many people are aware of Heat Alerts and Extreme Heat Alerts and take protective actions recommended by TPH, there are people in the city who remain vulnerable to heat. New maps and information resources support response activities on hot days, long-term efforts to create cooler urban environments, and emergency planning. Given the hotter weather and longer and more intense heat waves expected for Toronto, TPH, other City divisions and provincial agencies should identify ways to better support vulnerable groups including low-income tenants of multi-residential buildings. It is also vital to ensure that TPH and the City plan for the possibility of an extended heat emergency.

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ATTACHMENTS

Protecting Vulnerable People from Health Impacts of Extreme Heat. Toronto Public Health. July 2011.