

**ADDRESSING PROLONGED HEAT EMERGENCIES:
PREVENTING AND ADAPTING TO CLIMATE CHANGE-INDUCED
HEAT IMPACTS ON HEALTH**

FINAL REPORT

TORONTO PUBLIC HEALTH

REGIONAL ADAPTATION COLLABORATIVE PROGRAM

Adapted for 2011-2012 RAC Projects

July 13, 2012



Natural Resources
Canada

Ressources naturelles
Canada

Canada

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Summary

Funding provided by Natural Resources Canada (NRCan) to Toronto Public Health (TPH) allowed TPH to undertake five research projects. All five projects centred around the challenge that as the climate changes the City of Toronto and other Canadian jurisdictions are likely to experience extreme and prolonged heat events. These events are likely to take a toll on human health should supports not be put into place in advance of these events leading to a heat health emergency. The overall goal of this project was to enhance the capacity of municipal, provincial and federal decision-makers, community partners and the general public to understand, prepare and adapt to climate change-induced heat emergencies so as to minimize heat-related illness and premature mortality anticipated with extended heat waves. Each research project involved the completion of a number of key activities as follows:

1. Syndromic Surveillance of Heat-Related Illness for the City of Toronto

TPH hired Kingston, Frontenac and Lennox & Addington Public Health (KFL&A) Public Health to investigate the use of Emergency Department Syndromic Surveillance (EDSS) for detecting the early signs of increased health burden on the population of the City of Toronto during periods of elevated and extreme heat. The researchers also examined the effectiveness of 911 ambulance dispatch data for near real-time surveillance of heat-related illness. The overall results of this projects included validating this approach as an early warning system for heat emergencies. The researchers determined that both methodologies would be extremely useful in predicting an extreme heat emergency. Implementation of the EDSS system could/should be implemented in the City of Toronto. KFL&A have done similar work in other cities in Ontario, with funding from Health Canada, and as a result have determined that their methodologies could be applied across the country. Jurisdictions who already rely on syndromic surveillance for communicable diseases can implement a heat related illness component into their analysis. TPH plans to further investigate the logistics of implementation of the surveillance within its operations and plans to advocate that other levels of government take a leading role in implementing syndromic surveillance of heat related illness in other jurisdictions.

2. Development of a Trigger to Identify When a Heat Emergency Should be Declared

TPH hired ICF Marbek to review and synthesize the health impacts literature, practices in other jurisdictions, and expert opinion to build the evidence base for TPH's development of a "trigger" to identify when a heat emergency should be declared. The consultant undertook a literature review and consulted with jurisdictions with heat emergency plans. Overall, it was discovered that a single trigger did not exist and the declaration of a heat emergency should include a number of components. These components include a heat trigger, monitoring for evidence of exceptionally severe heat wave, one that warrants cross-agency response, the need to monitor real-time information on mortality and morbidity, and effective inter-agency communication. TPH will use this information to advocate for heat to be considered in emergency planning strategies with government bodies responsible for emergency preparedness within TPH, within the City of Toronto and at the provincial level.

3. Effectiveness of Cooling Interventions during Extreme Heat Weather Events

TPH hired KFL&A to conduct research on cooling interventions and their relevance to adapting to and responding to extreme heat events and heat emergencies. This work was then subcontracted to Public Health Ontario (PHO). Overall this project resulted in further understanding of cooling interventions and the knowledge gaps in our understanding of the amount of cooling required for health benefits. The findings submitted to TPH by the contracts contributed to the research needed for evidence-based health protective policy options to reduce exposure to extreme heat. TPH will consider the evidence collected, with the intent to refine/improve advice to the public on cooling interventions.

In addition, TPH hired Dr. Glen Kenny, a researcher on extreme heat and human health at the University of Ottawa, to provide a summary of the evidence on how vulnerable individuals respond to heat stress.

4. Validation of a Spatial Heat-Related Vulnerability Assessment Index for Toronto

TPH hired 4DM Inc. to validate a Spatial Heat Vulnerability Index (SHVI) that was developed by TPH during a previous phase of the regional Adaptation Collaboratives Program. The validation used independent statistical data on observed health outcomes (morbidity and mortality). Validation of SHVI against reported health outcomes employed three complementary approaches: using gross counts of health outcomes for each census tract, using per capita rates of health outcomes (gross counts of health outcomes divided by census tract population), and using the concept of 'excess health outcomes'.

The results indicated that Humidex may be a good proxy to define a heat wave since was well correlated to heat-related health outcomes. Also, the general SHVI appears to be better at predicting absolute vulnerability (i.e. gross counts of outcomes), than relative vulnerability (counts per capita). Furthermore, the results indicate that further study of the heat-related health outcomes may be required. The recommendations from this work include refining the SHVI by modifying the factors used and its weights. Also, the revised index should be validated at a larger scale than Census Tract. TPH is considering the evidence collected, with the intent to refine/improve the index.

5. Creation of Interactive Heat Vulnerability Maps

TPH received valuable feedback and interest about the heat vulnerability maps from stakeholders through pilot sessions, workshops and a webinar. Overall, community partners reacted positively to the Heat Vulnerability Index and the maps, but indicated that they would be much more useful as interactive maps to inform and guide decision-making. For example, interactive maps would allow the general public to choose to see public pools, parks and air-conditioned spaces on the maps so they could beat the heat, and community agencies could identify areas of Toronto to tailor their outreach, such as those with a high number of vulnerable seniors, people living in older homes or rooming houses, and those of lower socioeconomic status.

TPH and its partners in the City of Toronto's Geospatial Competency Centre (GCC) and the Information Technology (IT) section created interactive online maps. The interactive maps depict composite heat vulnerability for the general population and for seniors, and are user-friendly and useful for the general public, community agencies, public health units, and emergency responders. The intent of the maps is to help the City and community-based hot weather partners to effectively deliver heat-related resources where they are most needed. This includes both long-term adaptation activities that offset impacts of hot weather, as well as planning and delivery of short-term response activities that are activated on Alert days.

TPH has posted the maps on the our heat alert [webpages](#)¹ and will promote them to the public and community partners, including community care access centres, community health centres and the City's Emergency Medical Services and Shelter Support and Housing divisions. Users will be able to view the vulnerability index, places to get cool and demographic information that helps community partners identify vulnerable populations.

Knowledge Exchange

All five projects involved ongoing knowledge dissemination and incorporated linkages with major municipal/ regional, provincial and national governments and health groups. The project results were shared primarily through a stakeholder workshop and webinar.

Stakeholder Workshop Exploring the options for Enhancing Our Response to Prolonged and Extreme Heat Events in the City of Toronto

The findings and recommendations from these projects were shared with key stakeholders in the field at a workshop entitled "Enhancing Our Response to Prolonged and Extreme Heat Events in the City of Toronto". The objective of the workshop was to explore how this information can be applied to enhance health protective actions and programs in the City of Toronto and in other regions. The outcomes of this workshop included a rich discussion of how to move forward with the research findings. The main outcomes included advice from stakeholders that across the province/nation there is a need for clear and consistent heat response and messaging, improved public outreach and education to vulnerable populations and to educate decision makers about the importance of addressing extreme heat in order to inform long range planning for heat response.

Webinar: Exploring the options for Enhancing Our Response to Prolonged and Extreme Heat Events in the City of Toronto

Toronto Public Health (TPH) hosted a webinar entitled "Enhancing Our Response to Prolonged and Extreme Heat Events". The purpose of the webinar was to present highlights on the results and recommendations from prolonged and extreme heat event research being led by Toronto Public Health,

¹ Map can be accessed at http://map.toronto.ca/maps/map.jsp?app=TPH_HVMAP

and to explore how this information can be applied to enhance health protective actions and programs in urban areas.

The webinar was attended by participants representing various municipal, regional, provincial/state and federal health agencies, non-government organizations, academic institutions and community groups from across Canada, the United States and the United Kingdom. As part of the webinar, participants had a chance to view presentations on a series of research projects and initiatives, and ask questions regarding the information presented. Presentations focused on the following topics: syndromic surveillance; heat emergency trigger; effectiveness of cooling interventions; interactive maps; and highlights from the TPH stakeholder workshop noted above.

Lessons-Learned

All projects were considered a success as they furthered the overall understanding of how to prepare for an extended heat health emergency. The projects enhanced our understanding of the complexity of preparing for heat emergencies. Consultation and collaboration with key stakeholders was highlighted as being of high importance throughout the policy development process. Collaboration with other public health units and levels of government is needed to provide coordinated programming across the province.

The research undertaken identified some gaps in knowledge such as how long a person should stay in an air conditioned environment and as such, more physiological effects of heat research would be of benefit. The research also revealed that a single trigger was not used in areas with heat emergency plans and the declaration of a heat emergency included a number of components. TPH will use this information to advocate for heat to be considered in emergency planning strategies with government bodies responsible for emergency preparedness within TPH, within the City of Toronto and at the provincial level.