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TO: Ottawa Board of Health

DESTINATAIRE : Conseil de santé d'Ottawa

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SUBJECT: Update on Ottawa Public Health's Work on the Climate Change and Health  
Vulnerability Assessment for Extreme Heat to Improve Community Resilience

OBJET : Mise à jour sur les travaux de Santé publique Ottawa concernant l'évaluation  
du changement climatique et de la vulnérabilité de la santé en cas de chaleur extrême  
afin d'améliorer la résilience de la communauté

## PURPOSE

The purpose of this memorandum is to update the Board of Health on the work to date on the Climate Change Health Vulnerability Assessment (CCHVA) for extreme heat conducted by Ottawa Public Health (OPH).

## BACKGROUND

OPH is committed to carrying out CCHVAs, in line with the Ontario Public Health Standards (OPHS) under the *Health Protection and Promotion Act (HPPA)*. Extreme heat is the first assessment underway, of five. Assessments related to vector-borne diseases, food and water-borne illnesses, and wildfire smoke, will be undertaken in 2024. Stratospheric ozone CCHVAs will follow in 2025.

The Board of Health received an overview of [OPH's activities in support of climate action in 2019](#). In 2021, OPH initiated a CCHVA for extreme heat, as an update to a 2013 community heat health vulnerability assessment, to better characterize the populations that will be disproportionately impacted by heat in the future and improve community resilience. In 2022, an [update](#) was provided to the Board of Health. Due to the COVID-19 pandemic response and the alignment with OPH's Continuity of Operations Plan, some programs and services were paused or reduced, affecting OPH's ability to complete the CCHVA for extreme heat.

The City of Ottawa is in the process of developing a Climate Resiliency Strategy (CRS) in response to the results of a high-level Climate Vulnerability Risk Assessment (CVRA) that was completed in 2022, in which OPH closely collaborated. The CRS will identify a series of actions focused on reducing Ottawa's vulnerability to the effects of climate change by increasing resilience over the next five to 10 years. Many departments are completing deeper assessments to further understand their vulnerabilities and adaptations, with results feeding into the CRS as they become available. For example, Infrastructure and Water Services completed separate risk assessments for the drinking water and wastewater plants, and Public Works has created a new unit focused on emergency planning and response.

OPH is responsible for the Extreme Heat, Cold, and Smog (EHCS) Plan for the City of Ottawa. Since 2004, OPH has chaired a planning committee on extreme heat, cold and smog comprised of City departments and community partners (see Appendix A for a list of members). Updates to the EHCS Plan are reviewed by this committee. This group will use the findings of the CCHVA to scope, advocate for and, where possible,

implement new and enhanced extreme heat adaptive strategies and share protective strategies and resources on how to prevent heat-related illnesses and deaths.

OPH has an employee who is co-located within the City of Ottawa Climate Change and Resiliency team and helps review and/or support the proposed actions related to extreme heat and health. Further, the Medical Officer of Health participates in the City's Climate Change Tiger Team to identify opportunities to address climate issues across departments.

OPH's co-location with the City also led to staff being embedded with the Planning, Real Estate and Economic Development department. This resulted in developing and including healthy and inclusive communities as well as energy and climate change policies into the City of Ottawa's Official Plan, which directs how the City will grow over time through policies to guide development. A section was included in the Plan on building resiliency to the impacts of extreme heat.

This IPD provides an overview of CCHVA work on extreme heat that has been carried out to date.

## DISCUSSION

OPH's work on the CCHVA is aligned with both provincial requirements under the OPHS as well as the health unit's new [Strategic Plan 2023-2027](#). The OPHS Guideline on Healthy Environments and Climate Change includes requirements to address the local needs impacted by climate change and the built and natural environments. OPH's Strategic Plan includes a goal to create conditions to live well and thrive by addressing the impacts of climate change and influencing changes in the built, natural, and social environments that promote health and wellbeing. An update on the details of the Strategic Plan will be provided in December 2023.

Climate change is impacting people's ability to prepare for and recover from climate-related risks. While a person's exposure and sensitivity factors can compound their heat health risks, their adaptive capacity (ability to prepare for and cope with the consequences of extreme heat) also determines if and how they will be impacted. The social determinants of health (SDOH) also influence a person's ability to cope and recover from extreme heat events. Heat events make health inequities worse.

### *Populations at-risk to extreme heat in Ottawa*

The CCHVA on extreme heat identified and assessed the most at-risk populations in Ottawa. Circumstances of specific populations, health protective services, and the

quality of the built environment increase or decrease their risk to heat health impacts. Having more than one risk factor further increases an individual's risk to heat. A literature review of Canadian studies and reports shows that there is a broad list of people at higher risk to extreme heat (Appendix B).<sup>1 2 3</sup> OPH's assessment for Ottawa aligns with the risk factors identified in the literature review for Canada. Examples of factors that increase risk are age, isolation, pre-existing chronic diseases, reduced mobility, use of certain medications, and substance use disorders. Also occupation, socio-economic status, and being unhoused or marginally housed impact risk. Some of the risk factors are a result of structural and systemic inequities that underlie poverty, such as racism. OPH's assessment identified additional groups in Ottawa that were at risk. Namely, groups of people:

- with limited access to accessible transportation,
- living in overcrowded or unsafe households or living in upper floors of unairconditioned apartment buildings,
- having inconsistent, accessible, and inclusive access to places to cool off,
- who wear excessive clothing because of age or in response to sexual trauma or psychosis, and
- who are working in precarious environments (e.g., sex-trade workers) and greenhouses.

#### *Daily exposure scenario risk assessment*

The CCHVA on extreme heat explored how access to air conditioning (AC) and the SDOH can impact people's vulnerability to hot weather in different exposure scenarios (i.e., at work, at home, inside institutions, in the community and in transit). It compared existing and future climate change projections using a risk assessment matrix. The literature shows that people with higher incomes have better health and lower rates of disease and disability.<sup>4</sup> Conversely, people with lower incomes have higher rates of chronic diseases, disabilities, substance abuse, social and health inequities, and cultural and language barriers. OPH assumed for this assessment that people with higher incomes have better access to AC and people with lower incomes have poorer access to AC.

People with poor (i.e., unreliable) access to AC are more likely to be at very high risk to extreme heat impacts in the future with climate change, specifically, people who live in rental accommodations, rooming houses, or migrant farm worker accommodations, or

people who are outdoor workers or who attend mass events as a spectator (Appendix C).

Together, the daily exposure scenarios and the at-risk populations within them provide a good indication of who is at risk.

### *Adaptive strategies*

There are many adaptive strategies that can be used to reduce the risk to extreme heat (Appendix D). Based on the feedback from health protection service delivery partners that participated in the CCHVA assessment (Appendix E), the top four individual adaptation strategies that are being used for at-risk populations in Ottawa are:

- using AC or heat pump at home
- cooling off in a designated AC space
- drinking more non-alcoholic fluids
- wearing a hat with ventilation holes and loose clothing

Many of the health protection service delivery partners shared that using an AC or heat pump at home and cooling off in an AC room were not adaptive strategies that were applicable to their clients, which suggests that they might not have access or that there are barriers to accessing them (Appendix F). They also indicated they would like to be able to offer this to their clients in the future.

The evidence-based extreme heat adaptive strategies that health protection service delivery partners felt were the least effective measures that they provide their clients or that their clients used were:

- thermometers to determine indoor temperature
- using an umbrella for personal shade
- soaking hands and feet in cool water
- using kitchen and bathroom fans at night to move hot air out of the home
- decreasing the use of appliances that heat up indoor space
- sleeping with a wet sheet, towel, or shirt

- knowing how to access extreme heat resources and warning systems and knowing how to share them
- asking a health care professional about medications
- belonging to a social outreach program for isolated people or sick individuals

The community features in the built environment that facilitate adaptive strategies (Appendix G) that were considered effective by the health protection service delivery partners were:

- air-conditioned spaces
- shade
- green and low-density neighbourhoods
- splash pads, pools, beaches/rivers
- misting stations
- drinking water fountains

Partners also shared that many of these adaptation strategies are inaccessible to people experiencing homelessness as they encounter challenges and discrimination when trying to use these strategies.

The adaptive strategies of building features (Appendix H) that were considered effective by health protection services delivery partners were adding shade structures and installing air conditioning to home/workplaces.

### *Gaps*

The CCHVA for extreme heat identified gaps to improve community resilience. People experiencing homelessness have significant challenges in accessing cool spaces as they endure stigma, restrictions and discrimination when attempting to use them. They also have limited access to potable water from drinking water fountains and from public bathrooms. Some organizations that represent at-risk groups identified the need for more shade and space with AC for day programs as they become crowded during extreme heat events. Misting stations (night and day) in permanent locations were another adaptive tactic identified that could help reduce the heat health risk. Air conditioning or heat pumps (to pull heat out of indoor air to cool a home) were identified

as upgrades partners would like to see for the buildings that provide services to vulnerable populations.

Based on the literature review, the top effective cooling strategies for reducing heat health impacts are not being widely implemented, which suggests a disconnect. Specifically, thermometers to determine indoor temperature, using an umbrella for personal shade, soaking hands and feet in cool water, using kitchen and bathroom fans at night to move hot air out of the home, decreasing the use of appliances that heat up indoor space, and sleeping with a wet sheet, towel, or shirt. Similarly, it should be added that there is considerable misunderstanding and consequent lack of consensus concerning the pros and cons and effectiveness of [use of fans](#).

Two of the top four adaptation strategies that are being used, namely, AC or heat pumps and cooling off in a designated AC room, are not perfect solutions. AC can be cost-prohibitive and inaccessible to many, and the effectiveness of cooling rooms has been shown to be temporary.<sup>5</sup> Other areas that need further exploration are ways to reduce social isolation, improvements to the building code to address mandatory cooling, and an investigation into opportunities to address extreme indoor heat for vulnerable populations (adequate and suitable cooling).

## **NEXT STEPS**

The gaps identified by the CCHVA for extreme heat will be considered by the City of Ottawa's Extreme Heat, Cold and Smog Planning Committee to help enhance community resiliency to increasing extreme heat events. Resource needs may be brought forward through departmental budget requests or through the City's Climate Resiliency Strategy.

More consultation on extreme heat is planned in 2023/2024 (e.g., with Indigenous partners, landlords, tenants, older adults, mass event organizers). Consultations with outdoor workers is currently out of scope as Ontario is proposing a new heat stress regulation to protect workers. OPH will be exploring ways to address the need for adequate and sustainable cooling for vulnerable populations. Work will begin on vector-borne diseases, food and water-borne illnesses, wildfire smoke and stratospheric ozone assessments in 2024. OPH will provide updates to the Board as more CCHVAs are completed.

OPH will maintain co-location of OPH staff within the City of Ottawa Climate Change and Resiliency team and review and support actions in the CRS related to protecting

health. OPH will also continue to participate in the City's Tiger Team to identify opportunities to address climate issues across departments.

## **PARTNER CONSULTATION**

The Climate Change and Resiliency team and the Planning, Real Estate and Economic Development Department have been consulted and have worked closely with OPH on the CCHVA. They are expecting to use the findings of the CCHVA in their Climate Resiliency Strategy.

Dr. Vera Etches, Medical Officer of Health  
Ottawa Public Health

## **SUPPORTING DOCUMENTATION**

- Appendix A: Members of the Extreme Heat, Cold and Smog Planning Committee
- Appendix B: List of populations who have risk factors that increase their risk to heat illness in Canada
- Appendix C: A climate change and health risk assessment of the vulnerability to extreme heat in daily exposure scenarios
- Appendix D: Organizations that participated in the CCHVA for extreme heat
- Appendix E: Individual adaptive strategies for extreme heat
- Appendix F: Evidence-based Individual adaptive strategies – feedback from organizations part of CCHVA for extreme heat
- Appendix G: Built environment – community features that facilitate adaptive strategies for extreme heat
- Appendix H: Building features that are adaptive strategies for extreme heat



## Appendix A: Members of the Extreme Heat, Cold and Smog Committee

Ottawa Public Health	<ul style="list-style-type: none"> <li>• Associate Medical Officer of Health</li> <li>• Public Health Inspection Branch</li> <li>• Public Info and Community Engagement</li> <li>• Emergency Management</li> <li>• Quality, Epidemiology, Strategy and Technology</li> </ul>
City of Ottawa	<ul style="list-style-type: none"> <li>• Recreation Cultural and Facility Services</li> <li>• Innovative Client Services Department, Safety Consultant</li> <li>• Community and Social Services               <ul style="list-style-type: none"> <li>○ Directly Operated Child Care Services</li> <li>○ Housing</li> </ul> </li> <li>• Emergency and Protective Services               <ul style="list-style-type: none"> <li>○ Office of Emergency Management</li> <li>○ Ottawa Paramedic Service</li> </ul> </li> <li>• By-law and Regulatory Services</li> </ul>
Community Agencies	<ul style="list-style-type: none"> <li>• The Salvation Army, Outreach Services</li> <li>• Canadian Red Cross, Ottawa Branch</li> <li>• Ottawa Community Housing</li> </ul>

Appendix B: A climate change and health risk assessment of the vulnerability to extreme heat in daily exposure scenarios.

HIGH AND VERY HIGH RISK EXPOSURES	Risk Value			
	Access to Cooling			
	Good	Poor	Good	Poor
	Today's heat		Extreme Heat in 2050	
<b>HOUSING (time in housing type defined)</b>				
Rental accommodations, rooming houses, and migrant farmer worker accommodations (12hr/d) with no supervision or care	4	9	6	20
<b>OUTDOOR LEISURE ACTIVITIES (variable time frames)</b>				
Passive Mass Event as Spectator (e.g. concert, parks, Canada Day)	6	9	12	16
<b>OCCUPATION (8h/d)</b>				
Outdoor worker (e.g. farmer, construction worker, landscaper, food vendor, roofer)*	3	12	4	20

Risk	
1 to 4	Low
5 to 9	Medium
10 to 14	Medium-high
15 to 19	High
20 to 25	Very high

Appendix C: List of populations who have factors that increase their risk to heat illness in Canada.<sup>6,7,8</sup> Note that some of the language included in this list comes from peer reviewed literature and may not reflect health equity and diversity language. Aspects related to race are likely related to distribution of determinants like poverty.

Experiencing low socio-economic status
Experiencing homelessness
People who are marginally housed
Living in an equity deserving neighbourhood
Living in equity deserving neighbourhoods with more than 1 chronic disease
Living in an area in an urban heat island (few trees or parks and lots of heat absorbing material) with low housing quality and/or low socio-economic status
Pre-existing chronic diseases e.g., Cardiovascular disease, High blood pressure, Diabetes, Cancer, Lung disease, Kidney problems, Schizophrenia
Use of medications that have additional risks in hot weather e.g., antidepressants, psychotic drugs, diuretics, Parkinson's disease
Substance use disorders
Pregnant
Infants less than 1 year old
Children
Men between 40-69
Older adults > 65
Older adults > 85 persons not living in care facilities
Older adults spending time outdoors
Social isolation
First Nation
Inuit
Métis
Black
Disabled
Reduced mobility
Limited autonomy
Young people and men who work indoors in hot environments
Young people and men that work outdoors
Restaurant workers e.g., bakery, fast food trucks, patio's
Industrial workers

Appendix D: Organizations that participated in the CCHVA for extreme heat.

City of Ottawa departments: Office of Emergency Management, Ottawa Public Health, Accessibility Office, Housing Services
Canadian Mental Health Association
The Ottawa Mission
Ottawa Community Housing
John Howard Society of Ottawa
Shepherds of Good Hope
United Way East Ontario
Options Bytown
Cornerstone Housing for Women
Salvation Army Ottawa Booth Centre
Somerset West Community Health Centre
New Beginnings and Ottawa Grassroots Ethno-Cultural Seniors Network
Council on Aging of Ottawa
Ottawa Disability Coalition
Home and Community Care Support Services
Operation Come Home
Jewish Family Services: StreetSmarts Outreach Ottawa
Families First - Pinecrest-Queensway Community Health Centre

Appendix E: Evidence-based individual adaptive strategies for extreme heat.<sup>9,10,11</sup>

Using an air conditioner at home
Cooling off in an air-conditioned room
Breastfeed according to your child's cues and drink plenty of water if you are breastfeeding
Using a heat pump (capable of providing cool air)
Staying in coolest part of your residence and modify area to support living/sleeping
Drinking more non-alcoholic fluids
Decreasing the use of certain appliances that heat up the indoor space (e.g., ovens)
Using fans and kitchen and bathroom fans at night to move hot air out of the house
Using fans to move cooler air from outdoors to indoors
Closing windows during the day and open them at night to let cooler air enter the home
Asking health care provider about medications you're on and if they increase your health risk to heat
Going out to a cool, shaded and/or breezier places
Using sunscreen to prevent sunburn
Wearing a hat with ventilation holes, loose clothing, and UV-protective sunglasses
Closing awnings, shutters, blinds, or curtains over windows to keep the sun out
Knowing how to access resources on extreme heat and share them
Decreasing or postponing outdoor activities (e.g., physical)
Sleeping with a wet sheet or towel, in a wet shirt, and/or using a wet face cloth
Taking additional showers or baths
Having awareness of heat warning systems/action plans
Belonging to a social outreach program for isolated people and sick individuals
Staying connected with others e.g., having a heat buddy or being a good neighbour and checking in on them or inviting them to cool off
Soak hands and feet in cool water
Using an umbrella or parasol for personal shade when in the sun
Using digital thermometers to determine indoor temperature (>31°C is dangerous for vulnerable people)

Appendix F: Individual adaptive strategies – feedback from organizations part of CCHVA for extreme heat.



Figure 1 – Housing workshop: How effective are the individual adaptive strategies your clients or the people you represent use to cool off? Rank the effectiveness on a scale of 1 to 5 where 1 is not at all effective. Use N/A if they don't use it. (The numbers in the bars indicate the number of participants that selected that option).



Figure 2 – Ottawa Disability Coalition workshop: How effective are the individual adaptive strategies your clients or the people you represent use to cool off? Rank the effectiveness on a scale of 1 to 5 where 1 is not at all effective. Use N/A if they don't use it. (The numbers in the bars indicate the number of participants that selected that option).



Figure 3 - Unsheltered Task Force: How effective are the individual adaptive strategies your clients or the people you represent use to cool off? Rank the effectiveness on a scale of 1 to 5 where 1 is not at all effective. Use N/A if they don't use it. (The numbers in the bars indicate the number of participants that selected that option).





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Figure 4 - Migrant Farm Workers: How effective are the individual adaptive strategies your clients or the people you represent use to cool off? Rank the effectiveness on a scale of 1 to 5 where 1 is not at all effective. Use N/A if they don't use it. (The numbers in the bars indicate the number of participants that selected that option).

Appendix G: Built environment – community features that facilitate adaptive strategies for extreme heat.<sup>12,13,14</sup>

Neighbourhoods with many trees and greenspaces
Low density neighbourhoods (e.g., single-family homes or buildings with a small number of units)
Shade from trees and under structures e.g., gazebos, sails, etc.
Splash pads, wading pools, indoor and outdoor swimming pools
Beaches / river swimming
Misting stations
Drinking fountains

Appendix H: Building features that are adaptive strategies for extreme heat.<sup>15,16,17</sup>

Adding air conditioner in your home/workplace
Energy efficient/insulated homes/buildings
Installing a heat pump (capable of providing cool air)
Adding shade structures
Using high-reflective materials on building
Changes to the building code to achieve cooling

- <sup>1</sup> Gosselin, P., Campagna, C., Demers-Bouffard, D., Qutob, S., & Flannigan, M. (2022). In P. Berry & R. Schnitter (Eds.), [Health of Canadians in a Changing Climate: Advancing our Knowledge for Action](#). Ottawa, ON: Government of Canada. Accessed November 2022.
- <sup>2</sup> PreparedBC (2023). [Extreme Heat Preparedness Guide](#). Accessed April 2023.
- <sup>3</sup> Report to the Chief Coroner of British Columbia (2022). [Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021](#). Accessed November 2022.
- <sup>4</sup> Canadian Public Health Association. [What are the social determinants of health](#). Assessed November 2022
- <sup>5</sup> Meade, R. D., Notley, S. R., Akerman, A. P., McCormick, J. J., King, K. E., Sigal, R. J., & Kenny, G. P. (2023). [Efficacy of cooling centers for mitigating physiological strain in older adults during daylong heat exposure: a laboratory-based heat wave simulation](#). *Environmental Health Perspectives*, 131(6), 067003.
- <sup>6</sup> Gosselin, P., Campagna, C., Demers-Bouffard, D., Qutob, S., & Flannigan, M. (2022). In P. Berry & R. Schnitter (Eds.), [Health of Canadians in a Changing Climate: Advancing our Knowledge for Action](#). Ottawa, ON: Government of Canada. Accessed November 2022.
- <sup>7</sup> PreparedBC (2023). [Extreme Heat Preparedness Guide](#). Accessed April 2023.
- <sup>8</sup> Report to the Chief Coroner of British Columbia (2022). [Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021](#)
- <sup>9</sup> Gosselin, P., Campagna, C., Demers-Bouffard, D., Qutob, S., & Flannigan, M. (2022). Natural Hazards. In P. Berry & R. Schnitter (Eds.), [Health of Canadians in a Changing Climate: Advancing our Knowledge for Action](#). Ottawa, ON: Government of Canada
- <sup>10</sup> PreparedBC (2023). [Extreme Heat Preparedness Guide](#). Accessed April 2023.
- <sup>11</sup> Report to the Chief Coroner of British Columbia (2022). [Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021](#)
- <sup>12</sup> Gosselin, P., Campagna, C., Demers-Bouffard, D., Qutob, S., & Flannigan, M. (2022). In P. Berry & R. Schnitter (Eds.), [Health of Canadians in a Changing Climate: Advancing our Knowledge for Action](#). Ottawa, ON: Government of Canada. Accessed November 2022.
- <sup>13</sup> PreparedBC (2023). [Extreme Heat Preparedness Guide](#). Accessed April 2023.
- <sup>14</sup> Report to the Chief Coroner of British Columbia (2022). [Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021](#). Accessed November 2022.
- <sup>15</sup> Gosselin, P., Campagna, C., Demers-Bouffard, D., Qutob, S., & Flannigan, M. (2022). In P. Berry & R. Schnitter (Eds.), [Health of Canadians in a Changing Climate: Advancing our Knowledge for Action](#). Ottawa, ON: Government of Canada. Accessed November 2022.
- <sup>16</sup> PreparedBC (2023). [Extreme Heat Preparedness Guide](#). Accessed April 2023.
- <sup>17</sup> Report to the Chief Coroner of British Columbia (2022). [Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021](#). Accessed November 2022.