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Extreme Heat and COVID-19: Considerations for heat health programming in the context of COVID-19

Advice for Public Health Officials

Canada 

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Please note that this document was prepared at the height of the covid-19 pandemic. Thus, some information may be outdated.

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Considerations	Key Messages	Key Resources
<p>The COVID-19 pandemic may result in unique risks and novel heat exposures</p>	<p>Some measures that reduce the risk of COVID-19 may increase the risk of extreme heat events and those that reduce the risk of extreme heat may increase the risk of COVID-19. Ensure that heat health adaptation measures align with COVID-19 public health measures and are appropriate in the local and provincial / territorial context. Consider measures to address new sources of exposures to ambient heat due to changes associated with COVID-19, such as waiting outside in line-ups and increased activity outdoors.</p>	<p>Global Heat Health Information Network (GHHIN). 2020. <i>Checklist: Managing Heat Risk during the COVID-19 Pandemic</i>. https://ghhin.org/wp-content/uploads/Checklist-COVID-HEAT-final.pdf</p> <p>Public Health Agency of Canada (PHAC). 2021 <i>Coronavirus disease (COVID-19): Prevention and risks</i>. https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks.html</p>
<p>Consider overlapping populations at higher risk of extreme heat and COVID-19 in planning for and responding to extreme heat.</p>	<p>Populations at higher risk of health impacts (becoming ill or worse outcomes) due to extreme heat and/or COVID-19 may include:</p> <p>Extreme Heat and COVID-19</p> <ul style="list-style-type: none"> • Older people • People with underlying health conditions, including cardiovascular disease, pulmonary disease, kidney disease, diabetes , obesity, mental health issues (psychiatric disorders, depression) • Essential workers • Health workers and auxiliaries wearing personal protective equipment; • People who are pregnant • Indigenous populations • Racialized populations • People living in nursing homes or long-term care facilities, especially without adequate cooling and ventilation • People who are marginalized and isolated (experiencing homelessness, migrants with language barriers, living alone) and those with low income or inadequate housing, including informal settlements • People in prison, or residential institutions especially if cooling measures are not in place • People who have, or are recovering from, COVID-19 (which can be associated with acute kidney injury). <p>Extreme Heat</p> <ul style="list-style-type: none"> • Infants and young children • Outdoor workers • Physically active people including those engaged in sports activities 	<p>GHHIN. 2020. <i>Which people are the most vulnerable to both heat stress and COVID-19</i>. https://ghhin.org/heat-and-covid-19/</p> <p>PHAC. 2020. <i>People who are at risk of more severe disease or outcomes from COVID-19</i>. https://www.canada.ca/en/public-health/services/publications/diseases-conditions/people-high-risk-for-severe-illness-covid-19.html</p> <p>Health Canada (HC). 2011. <i>Extreme Heat Events Guidelines: Technical Guide for Health Care Workers</i>. https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/extreme-heat-events-guidelines-technical-guide-health-care-workers.html</p>
<p>Other climate change hazards (e.g., wildfires, floods, droughts) can happen during an extreme heat event and pose additional challenges during the pandemic that need additional consideration.</p>	<p>Consider that people may need cool, clean, and safe shelter or other services due to other hazards such as wildfires, floods, droughts and power outages and plan to minimize the risk of COVID-19 transmission.</p> <p>Follow specific cooling and ventilation requirements when setting up and operating a clean air shelter in the context of COVID-19.</p>	<p>HC. 2020. <i>Wildfire smoke and your health</i>. https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index/wildfire-smoke/wildfire-smoke-health.html</p> <p>HC. 2020. <i>Guidance for Cleaner Air Spaces during Wildfire Smoke Events</i>. https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-cleaner-air-spaces-during-wildfire-smoke-events.html</p> <p>United States Centers for Disease Control (CDC). 2021. <i>COVID-19 Considerations for Cleaner Air Shelters and Cleaner Air Spaces to Protect the Public from Wildfire Smoke</i>.</p>
<p>Appropriate ways to keep cool to reduce</p>	<p>Some operational adjustments to central air conditioning systems can help reduce the number of potentially infectious particles in the air, and thus minimize the risk</p>	<p>Government of Canada (GoC). 2021. <i>COVID-19: Guidance on indoor ventilation during the pandemic</i>. https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks.html</p>

Considerations	Key Messages	Key Resources
<p>risks of extreme heat without increasing the risk of COVID-19 transmission depend on the local context and may change over time.</p>	<p>SARS-CoV-2 (the virus that causes COVID-19) transmission indoors. These include:</p> <ul style="list-style-type: none"> ensure HVAC systems are properly installed and maintained (clean or change filters according to the manufacturer's schedule, ensure filters are sealed without a bypass, use filters of the highest Minimum Efficiency Reporting Value (MERV) rating the system can sustain); and increase the rate of exchange with outdoor air, and adjust settings to avoid recirculating indoor air <p>To improve the accessibility of air conditioning, consider providing / subsidizing appropriate air conditioning units or energy utility assistance.</p> <p>Further, whenever possible facilitate and promote the use of other accessible low tech cooling and energy efficient approaches :</p> <ul style="list-style-type: none"> Prevent living spaces from overheating (e.g. closing blinds to reduce indoor heat, reducing use of electrical appliances, etc.); find cooler spaces to spend time at or close to home as permitted by public health orders (e.g. basements; outdoor spaces that allow for physical distancing); and stay cool and hydrated (e.g. cool showers, misting, sponge or assisted baths, avoiding hot meals) <p>If fan or portable air conditioner use is necessary :</p> <ul style="list-style-type: none"> Set fans so that they exchange indoor air with outdoor air (when outdoor temperatures are lower than indoor); Aim the indoor air stream away from people to reduce the spread of potentially infectious droplets or particles from one person to the next; When multiple people are present in a room, only use a fan if all occupants are from the same household and are not infected or suspected of having COVID-19; Do not use fans in the presence of an infected person unless the person is alone in an isolated room that has a consistent source of fresh air from outside; Clean and disinfect fans as often as possible 	<p>health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-indoor-ventilation-covid-19-pandemic.html</p> <p>GoC. 2021. <i>At home: using ventilation and filtration to reduce the risk of aerosol transmission of COVID-19.</i> https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-home-ventilation-covid-19-pandemic.html</p> <p>GoC. 2021. <i>Using Ventilation and filtration to reduce aerosol transmission of COVID-19 in long-term care homes.</i> https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-ltch-ventilation-covid-19-pandemic.html.</p> <p>ASHRAE. 2020. <i>Position Document on Infectious Aerosols.</i> https://www.ashrae.org/file%20library/about/position%20documents/pd_infectiousaerosols_2020.pdf</p> <p>GHHIN. 2020. <i>Checklist: Managing Heat Risk during the COVID-19 Pandemic.</i> https://ghhin.org/wp-content/uploads/Checklist-COVID-HEAT-final.pdf</p> <p>Institut national de santé publique du Québec (INSPQ). 2020. <i>COVID-19 - Utilisation des climatiseurs portables et des ventilateurs électriques en milieux de soins dans un contexte de COVID-19.</i> https://www.inspq.gc.ca/sites/default/files/covid/3011-climatiseurs-mobiles-ventilateurs-milieux-soin-covid19.pdf</p> <p>World Health Organization (WHO). 2020. <i>Home care for patients with suspected or confirmed COVID-19 and management of their contacts.</i> https://apps.who.int/iris/rest/bitstreams/1292529/trieve</p>
<p>Heat-related illness and COVID-19 may present with similar symptoms. People may be uncertain how to and / or be hesitant to seek appropriate health care due to concerns about contracting COVID-19.</p>	<p>Train health care workers and staff to distinguish between heat-related illness and COVID-19.</p> <p>Communicate with the public about available options for obtaining health care for heat-related illness and remind the public that heat stroke is a medical emergency and to call 911.</p>	<p>GHHIN. 2020. <i>How to distinguish between fever caused by infection, and environment and or exercise-induced hyperthermia and heat illness?</i> https://ghhin.org/faq/fever-covid/</p> <p>GoC. 2021. <i>COVID-19 signs, symptoms and severity of disease: A clinician guide.</i> https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/signs-symptoms-severity.html</p>
<p>Cooling centres and cool rooms are important options for ensuring those</p>	<p>When planning for and operating cooling centres always follow applicable public health measures and guidelines, including those on:</p> <ul style="list-style-type: none"> screening for symptoms of COVID-19, potential exposure, and recent travel 	<p>GHHIN. 2020. <i>Q&A: How should cooling centres be managed during the COVID-19 pandemic?</i> http://www.ghhin.org/heat-and-covid-19/cooling-centres</p>

Considerations	Key Messages	Key Resources
<p>most at risk are able to avoid heat stress and stay cool and healthy. Extra planning is necessary to keep them accessible and minimize the risk of infection for those hosting and visiting them.</p>	<ul style="list-style-type: none"> • physical distancing and occupancy requirements • mask wearing; • cooling and ventilation cleaning, maintenance and operation • and other infection control and prevention; • Equip and train staff and volunteers to use appropriate personal protective equipment (PPE), when necessary and in accordance with occupational health and safety requirements. • Identify and address: <ul style="list-style-type: none"> ○ potential language, cultural and accessibility barriers to communicating the risk of COVID-19 ○ the protective and preventive measures being taken by and required at the cooling centre. • Consider the level of COVID-19 transmission and vaccination coverage in the local area when planning. • Communicate with the people that access the setting that regardless of their vaccination status, they need to continue to follow local public health recommendations and restrictions (recommendations for personal preventive practices when gathering in a private / social setting may vary based on vaccination status). 	<p>PHAC. 2021. <i>Reducing COVID-19 risk in community settings: A tool for operators.</i> https://health.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/reducing-covid-19-risk-community-settings-tool-operators.html</p> <p>BC CDC. 2020. <i>Guidance for community cooling centres during B.C.'s Restart Plan.</i> http://www.bccdc.ca/Health-Info-Site/Documents/Guidance-for-Cooling-Centres-COVID-19.pdf</p> <p>INSPQ. 2020. <i>Adaptation of Public Health Recommendations for Extreme Heat in Accordance with Physical Distancing Recommendations.</i> https://www.inspq.qc.ca/sites/default/files/publications/3024-extreme-heat-physical-distancing-adaptation-of-PH-recommendations-covid19.pdf</p> <p>Toronto Public Health. 2020. <i>COVID-19 Guidance for Cooling Rooms.</i> https://www.toronto.ca/wp-content/uploads/2020/05/958d-COVID-19_Fact-Sheet_Cooling-Rooms.pdf</p> <p>United States Centers for Disease Control and Prevention. 2020. <i>COVID-19 and Cooling Centers.</i> https://www.cdc.gov/coronavirus/2019-ncov/php/cooling-center.html</p>
<p>Workers, especially those in health care, may experience heat stress which can be exacerbated by use of personal protective equipment use</p>	<p>GHHIN identifies that three ways to reduce heat stress while wearing PPE are:</p> <ul style="list-style-type: none"> • start cool • reduce rises in body core temperature at work • improve thermal tolerance through acclimatization and fitness <p>Under some circumstances it may be possible to supply PPE that is less likely to lead to heat stress.</p> <p>Health Canada provides guidance that health care officials can use to reduce risks from extreme heat events in acute care settings.</p>	<p>GHHIN. 2020. <i>How can health workers and other responders manage heat stress while wearing personal protective equipment (PPE)?</i> https://ghhin.org/faq/how-can-health-workers-and-other-responders-manage-heat-stress-while-wearing-personal-protective-equipment-ppe/</p> <p>Canadian Centre for Occupational Health and Safety. 2021. <i>Coronavirus (COVID-19) – Tips.</i> https://www.ccohs.ca/covid19/faq/index.htm</p> <p>United States Centers for Disease Control. 2020. <i>Employer Information for Heat Stress Prevention during the COVID-19 Pandemic.</i> https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/heat-stress-employers.html</p>

1 Overview

This document provides guidance to health authorities working to protect people in Canada from extreme heat by considering COVID-19 in heat alert and response planning. COVID-19 information evolves rapidly and this document is based on the medical community's current understanding of this issue. The understanding of COVID-19 vulnerability factors continues to evolve as vaccinations increase. It is important to ensure heat health adaptation measures are always aligned with the latest public health advice on COVID-19 and in adherence to local, provincial and/or territorial public health orders. For updated information on COVID-19 see <https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19.html>.

Extreme heat is a major health risk in Canada, resulting in significant preventable morbidity and mortality (1). Communities across Canada have experienced an increased number and intensity of hot days that can affect health. Climate change is projected to further increase the frequency, duration, and intensity of extreme heat events (2). The Meteorological Service of Canada, Environment and Climate Change Canada provides details of the heat warning criteria [here](#). In Canada and globally, the COVID-19 pandemic has led to many illnesses and deaths, as well as significant disruption to communities, economies, and societies (3) (4). The extreme heat hazard and other climate change hazards are increasing Canadians' health risks (5). Public health authorities need to consider how adaptation to hazards like wildfires, severe storms, and flooding may also need to integrate information about extreme heat and COVID-19 risks.

This combination of extreme heat events and the COVID-19 pandemic may increase health risks for some people living in Canada, presenting new considerations and challenges for public health authorities.

“To reduce heat-related illness and loss of life authorities and communities should prepare for hot weather and heatwaves — in addition to managing COVID-19 — before extreme heat strikes.”

Global Heat Health Information Network (GHHIN), 2020 (4)

Fear of contracting COVID-19 may lead to people avoiding using cooling shelters or avoiding seeking treatment for a heat-associated illness. Taking action to reduce heat stress should include consideration of robust public health and infection control measures following the most recent applicable guidance and recommendations of local public health authorities. For example, operating cooling centres without proper physical distancing, hygiene measures, or adequate air circulation or air purification systems could increase [COVID-19 transmission](#). Specific efforts to mitigate COVID-19 transmission (e.g. waiting in outdoor line-ups without shade, or inside places of business and stores without air conditioning and water) could exacerbate heat health risks.

Extreme heat events may also add pressure to health, long-term care, and community services that are already experiencing high usage and stress during the COVID-19 pandemic (4). Conversely, pandemic conditions may reduce risk when people receive additional community support such as temporary housing, or attend fewer mass gatherings, such as concerts, sporting events, and outdoor festivals, that can be dangerous during heat events.

The relative risks from heat and COVID-19 are dependent on the local context and are likely to change over time. Health authorities should consider how COVID-19 affects extreme heat vulnerabilities within their communities, and prepare to revise heat health programming to minimize all risks.

2 Health equity and populations at higher risk to extreme heat and COVID-19

People living in Canada may be at higher risk to health impacts of extreme heat and COVID-19 due to:

- Heightened physiological sensitivity related to age or chronic health conditions
- Greater exposure to heat hazards, such as working outdoors on hot days
- Less access to protective or adaptive measures like health care services or cooling facilities
- Less access to temperature-controlled environments at home, work, or in the community

Although few studies characterize the interaction between comorbidities associated with COVID-19 and passive or exertional heat stress, people who are more vulnerable to extreme heat may be at greater risk for infection with SARS-CoV-2 or at risk of worse outcomes (4).

Constraints on mobility during isolation or quarantine because of COVID-19 may reduce peoples' ability to take health protective measures (e.g. limit ability to travel to a cooling centre) and as a result increase heat health risks. This is particularly significant for:

- Older people
- People with disabilities or mental illness
- People living in congregate settings like shelters, long-term care, or other institutional housing
- People without air conditioning
- People generally unable to interpret and act on public health advice to take protective measures (4).

Table 2-1 below provides examples of vulnerability factors and population characteristics that increase health risks from extreme heat and COVID-19. These are important considerations for planning or adapting public health interventions.

Table 2-1: Examples of overlapping extreme heat and COVID-19 risk factors

COVID-19 (4) (6)	Extreme Heat (4) (7) (8)	Considerations
Older adults (4) (6)	Older adults (7)	Older adults are more likely to have physical (heart disease, lung disease, diabetes) (4) (7) (8) comorbidities and changes in sensory and cognitive functions (9) resulting in increased risk to extreme heat and/or COVID-19. They are more likely to be living in congregate settings or limit their contact with those who may normally do health checks (informally/formally) because of age-related COVID risk factors.
<p>Underlying health conditions (4) (6) including:</p> <ul style="list-style-type: none"> • Cardiovascular disease • Chronic respiratory disease, including asthma • Diabetes • Neurologic diseases, including dementia and stroke • Chronic renal disease • Obesity • Cancer • Atrial fibrillation and arrhythmia • Endocrine disorders • Gastrointestinal disease • Chronic liver disease 	<p>Underlying health conditions (7) including:</p> <ul style="list-style-type: none"> • Heart disease • Hypertension • Pulmonary disease • Diabetes • Mental illness • Renal illness or failure • Malnutrition 	<p>COVID-19 can affect respiratory health and may enhance vulnerability to the health effects of extreme heat events and/or wildfires (10).</p> <p>People with prior long-term exposure to high levels of air pollution may be at greater risk from heat stress and the more severe symptoms of a COVID-19 infection (11; 12).</p> <p>COVID-19 has been associated with acute kidney injury (13). Extreme temperatures can aggravate pre-existing kidney disease in some individuals (14).</p> <p>There is evidence of a higher risk for COVID-19 infection and/or severe clinical outcomes (15) for populations with mental health conditions. There is also evidence of higher risk of excess deaths during heat events in populations with pre-existing psychiatric diagnoses conditions (16) (17). As well, there is emerging evidence that there is a higher risk of receiving a neurological or psychiatric diagnosis after a COVID-19 diagnosis (18) and that extreme heat is associated with a higher rate of hospitalization for psychiatric diagnosis and with other adverse psychiatric outcomes such as suicide (19).</p>
<p>People that have (6):</p> <ul style="list-style-type: none"> • Difficulty reading, speaking, understanding or communicating • Difficulty accessing medical care or health advice • Difficulty adhering to personal preventive measures, like frequent hand washing and covering coughs and sneezes • Ongoing specialized medical care or need specific medical supplies • Ongoing supervision needs or support for maintaining independence 	<p>Socially isolated, marginalized people and those that have difficulty living independently (7).</p>	<p>People who need support from others to live healthy lives are at increased risk to both extreme heat and COVID-19 as they may be unable to take health protective actions (4) (20).</p> <p>Disruption to social support networks due to COVID-19 and restrictions on physical contact may make it more difficult for those who need support (4).</p> <p>People who need specialized medical care or specific medical supplies may be at higher risk of contracting COVID-19 in extreme heat situations, for example, during power outages (20).</p>

COVID-19 (4) (6)	Extreme Heat (4) (7) (8)	Considerations
<p>People that have (4)</p> <ul style="list-style-type: none"> • Difficulty accessing transportation • Economic barriers • Unstable employment or inflexible working conditions • Insecure, inadequate, or nonexistent housing 	<p>People who:</p> <ul style="list-style-type: none"> • Experience low socioeconomic status such as reduced income, lower quality and more crowded housing, or homelessness (4) • Live in long term care facilities (LTCF) without adequate cooling and ventilation; that are crowded; and/or understaffed (5) (7) • Live in an area with less access to green space (21) • Have difficulty accessing transportation (21) 	<p>Low socioeconomic status may make it more difficult for people to protect their health from extreme heat (20) and COVID-19, due to limited access to air conditioning or cooling centres while practicing physical distancing.</p> <p>The COVID-19 pandemic has increased economic hardship for some people that may affect their ability to adopt protective health measures like purchasing medications, healthy food, and/or maintaining and operating air conditioning.</p> <p>Some shelters for homeless people have significantly reduced capacity to ensure physical distancing and as a result, some volunteers have stepped down due the COVID-19 pandemic.</p> <p>Canadians in LTCF have the highest mortality associated with COVID-19 (22). Due to advanced age and a higher-proportion of residents living with pre-existing conditions, residents of LTCFs may be more exposed to extreme heat than the general population (23) (24). As well, staff working in LCTFs may be at increased risk of heat-associated morbidity and mortality during an outbreak due to personal protective equipment, lack of staff, or limited resources. Therefore, it is important to recognize that LTCF residents and staff, especially those without air conditioning, may be at greater risk due to the concurrent hazards and to plan appropriately to minimize this risk.</p>
<p>Social or geographic isolation, remote and isolated communities (6)</p>	<p>Social or geographic isolation, remote and isolated communities (25)</p>	<p>Socially isolated people are at higher risk of heat-related illnesses if they are unable or choose not to access care (4) (8).</p> <p>Remote and isolated communities may have fewer health and community services and cooling centres.</p>
<p>Newcomers to Canada with language barriers (6)</p>	<p>Newcomers to Canada and transient populations (21)</p>	<p>Language barriers can impede comprehension of heat-health-risk messages, which may limit the ability of newcomers to Canada who are not fluent in English or French to practice protective measures (21).</p>
<p>People who are pregnant (4)</p>	<p>People who are pregnant (7)</p>	<p>Heat can affect embryonic and fetal development in pregnancy (7). People who are pregnant are at higher risk of health impacts due to heat exposure, including heat related illness (26).</p>
<p>Indigenous peoples, including First Nations, Métis, and Inuit peoples (27).</p>	<p>Indigenous peoples, including First Nations, Métis and Inuit peoples</p>	<p>First Nations, Inuit, and Métis People frequently participate in culturally important, land-based activities and ceremonies that may put them at greater risk to extreme heat.</p> <p>Many First Nations, Inuit, and Métis peoples live in rural or remote communities with reduced access to health and social supports used to protect those at higher risk from extreme heat, such as cooling centres in urban settings. First Nations, Inuit and Métis peoples living in urban areas may not be able to access resources and services that are culturally safe or in their indigenous language, increasing the risk of adverse health outcomes during EHEs.</p> <p>Indigenous Peoples, including First Nations, Métis, and Inuit, experience worse health outcomes and higher rates of infection during epidemics and pandemics due to socio-economic marginalization and the exacerbation of existing inequalities across the social determinants of health (27).</p> <p>Additionally, some First Nations, Métis, and Inuit populations experience disproportionate rates of crowding, housing in need of repair (28), and/or housing insecurity (29). This may result in additional challenges with quarantining or isolating safely, other public health measures, and taking appropriate actions during extreme heat events (during times of poor air quality such as wildfires, access to air-conditioning, etc.).</p>

COVID-19 (4) (6)	Extreme Heat (4) (7) (8)	Considerations
Racialized populations (30), (31), (32)	Racialized populations (33)	<p>Being a racialized person in the US is associated with lower income, poorer physical health, living in an area with less green space and more heat-absorbing surfaces, lower air conditioning ownership, and a greater likelihood of working outside. These factors are distal contributors to the racial and ethnic disparities seen in heat-associated morbidity and mortality (33). It is likely that this is also the case in some parts of Canada, however the lack of race-based data in Canada makes it difficult to confirm.</p> <p>Several Canadian studies in Toronto (30), Montreal (31) and Ottawa (32) have found that racialized and lower income communities in cities have a disproportionately higher risk of COVID-19 infection and more adverse health outcomes. Racialized and low income neighbourhoods are often located near highways, industry and areas with higher particulate matter (34) (35) and there is limited evidence suggesting that higher ambient particulate matter and other air pollutants is associated with higher rates of severe outcomes of SARS-CoV-2 infection (36).</p> <p>The impact of the dual burden of COVID-19 and extreme heat for racialized populations is not well studied or understood and more work is needed to understand these interactions.</p>
	Infants and young children (7)	<p>Infants and children may need to be prompted or offered more breastmilk, water, or fluids to stay hydrated (7).</p> <p>Potentially limited access to cooling if schools, camps, and daycares are closed.</p>
	Physically active people including those engaged in sports activities (21)	<p>Without proper precautions, people who are physically active or engaged in sports activities can be at higher risk of heat illness. Individuals performing physical activity with masks may experience greater heat strain (21).</p>
	People (7) taking medications that affect heat sensitivity by interfering with the body's cooling functions or water/salt retention (e.g., anti-hypertensives, antidepressants, antipsychotics, anti-Parkinson's agents)	<p>The impact of COVID-19 medications on heat-health risks is currently unknown. Ongoing monitoring of this issue is advisable.</p> <p>Some medications with gastrointestinal side effects can lead to dehydration, thereby increasing risks to heat illness.</p>
	Certain occupations including those who work outdoors or in confined spaces without air conditioning (farmers, tree planters, construction workers, miners) (21)	<p>Those who work outdoors during the hottest times of the day or indoors in places that are not temperature-controlled are at increased risk (7). Older workers experience marked elevations in heat strain during prolonged work in the heat that is associated with compromised cardiovascular and respiratory function, which is worse in individuals with diabetes and hypertension. Workers who wear masks may experience greater heat strain.</p> <p>The CDC provides guidance on "Employer Information for Heat Stress Prevention during the COVID-19 Pandemic" here.</p>

Heat illness symptoms can be similar to COVID-19 symptoms. Shared signs and symptoms can include:

- Muscle or body aches
- Headache
- Fatigue/tiredness/weakness
- Nausea, vomiting, and/or diarrhea
- Fever or increased body temperature

- Feeling unwell

It can be challenging to distinguish between SARS-CoV-2 infection and heat illness. Health professionals involved in heat response (ambulatory, emergency, medical, and social services staff) may need training to be able to distinguish between fever caused by SARS-CoV-2 infection and that caused by hyperthermia from extreme heat (4).

For example, improperly designed and operated clean-air shelters may expose people to COVID-19 infection (37) or dangerous heat stress during a wildfire. Health Canada's "[Wildfire smoke and your health](#)" provides guidance appropriate to wildfire smoke events during the pandemic and extreme heat events. Additionally, Health Canada's [Wildfire smoke 101: Combined wildfire smoke and heat](#) provides advice to individuals during combined events.

Climate change and health vulnerability and adaptation assessments (38), disaster preparedness, and health facility scenario exercises (39), as well as regular planning with partners, can provide venues and implementation approaches for developing and revising programs.

The understanding of COVID-19 vulnerability factors continues to evolve as information about the disease and vaccination impacts increases. For example, more shelters may be needed to ensure individuals who are isolating due to confirmed COVID-19 illness or potential exposure are accommodated separately, as well as to meet physical distancing and capacity limits in all facilities, as per local public health recommendations and restrictions.

3 Heat health programming and COVID-19: Key areas for consideration

Public health measures to reduce health risks from extreme heat can be effective in saving lives (40). Across Canada, health authorities have recognized health risks posed by extreme heat and have taken action to establish heat health programs and warning systems to promote health protective behaviours. Heat Alert and Response Systems (HARS) often include the following key components (21) (41):

- Community engagement to inform HARS activities
- Establishing alert protocols to identify at what heat threshold response measures are implemented
- Developing and implementing response measures such as cooling centres
- Communicating health risks and protective behaviours to the public
- Evaluating HARS effectiveness
- Taking measures to prevent or reduce heat exposure and vulnerability and that combat the urban heat island effect

The COVID-19 outbreak and associated response measures may directly affect the appropriateness or effectiveness of common heat health-adaptation measures adopted by Canadian health authorities. Table 3-1 below provides examples of these potential issues (4) (42).

Table 3-1: Heat adaptation measures - potential issues due to COVID-19

Heat Health Adaptation Measure	COVID-19 Linkage
Use of cooling centres (shopping malls, libraries) and other public spaces (parks, swimming areas).	Cooling centres and other public spaces may increase COVID-19 transmission if not operated with appropriate public health and infection prevention and control measures, such as those recommended or required by the local public health authority. Public health measures may include adequate ventilation, physical distancing, the use of well-constructed, well-fitting and properly worn masks, hand hygiene and respiratory etiquette, and increased environmental cleaning and disinfection. Assessing risk and identifying risk mitigation measures are integral to safe operations within community settings during the COVID-19 pandemic. Understanding the risk factors associated with COVID-19 provides the foundation for conducting risk assessment and identifying mitigation strategies that can be used when determining how a community setting can operate safely during the pandemic. PHAC provides advice on high-level considerations to support conducting risk assessments in community settings , as well as potential risk mitigation strategies.
Regular check-ins by family members, neighbours, or friends of populations with higher vulnerability during very hot days.	Visits may not be allowed depending on local public health orders, which vary by jurisdiction depending on the local context. Depending on the vaccination status and risk and comfort levels of the individuals who are gathering, recommendations for personal preventive practices (e.g., masking and physical distancing) may vary. Visits may increase COVID-19 transmission if appropriate public health and infection control measures are not followed. If allowed, when gathering, it is important to consistently use recommended personal preventive practices, which are most effective when used together in a layered approach.
Use of HVAC systems, portable fans and portable air conditioners to keep cool.	Use of HVAC systems for cooling, in the absence of appropriate maintenance and operation, and with insufficient outdoor fresh air intake, can also increase risk of indoor transmission. Use of fans and portable air conditioners indoors in collective spaces without proper infection prevention practices could increase potential spread of COVID-19 through the air. Adequate ventilation can contribute to reducing the risk of COVID-19 transmission in indoor settings. It's important to remember that good indoor ventilation alone cannot protect people from exposure to the virus, particularly: <ul style="list-style-type: none"> • during close unprotected contact • in the absence of other protective measures
Call 911 and seek urgent medical attention if showing signs of heat stroke.	People suffering from heat exhaustion or stroke may mistake their illness for COVID-19 and follow requirements to immediately isolate, or refrain from seeking medical attention at a hospital or health center due to fear of COVID-19; be unable to access their primary care physician, or refrain out of fear of overburdening the healthcare system.

The nature of the local COVID-19 outbreak, response measures being adopted or planned, and other local

factors determine which aspects of a jurisdiction's heat health programming might require revision. The Global Heat Health Information Network and the Red Cross and Red Crescent Climate Centre have published a Planning checklist for managing heat risk during the COVID-19 pandemic that is very useful for public health authorities (43).

Review existing HARS and hot weather response plans to assess the need for changes (4). Important considerations when assessing and adapting heat health programming to the COVID-19 context include:

- Health equity and populations at higher risk
- Air conditioning, fans, and energy costs
- Cooling centres and facilities
- Communications
- Health care delivery and health care workers and other essential workers
- Built environments and outdoor spaces

3.1 Health equity and populations at higher risk

Outreach to higher risk populations such as people living alone, the socially isolated, or the housing insecure may be difficult when a person is isolating or quarantining because of COVID-19. The suitability of alternative approaches and the relative risk of conducting in-person checks will depend on the local context and individual situations (available resources and technologies) and the status of COVID-19 response measures. Health authorities may wish to consider recommending alternative approaches, such as check-ins by phone or video, in cases where in-person check-ins are not advisable due to COVID-19 restrictions or regulations. Consider providing information to employers and community groups encouraging connecting with people with higher vulnerability in the community. In some cases, in-person visits may still be needed and could be conducted by health authority staff or community stakeholders. If necessary and health orders permit, establish a COVID-19 safety plan and ensure in-person check-ins of higher risk populations following local public health recommendations and restrictions, including those on physical distancing and wearing masks, and other infection control procedures like hand hygiene, and disinfecting surfaces (44).

Patients and residents may experience greater risks from extreme heat as they may have limited access to coping strategies (e.g., inability to visit facility common areas or green spaces, not able to have visitors) (4). Also due to the need for isolation to limit the spread of COVID-19, patients and residents may have less direct contact with staff, family, or other visitors who may recognize heat stress and be able to verify that protective actions are undertaken. Regularly check residents at higher risk where heat is a concern.

It is important that health care workers, residents, family visitors, and volunteers are informed of heat health risks and heat illness prevention strategies at facilities during heat events (4) (7) and plan and ensure appropriate training for all involved (8).

As discussed in Table 2-1 above, many populations with risk factors to adverse outcomes with exposure to heat also are at increased risk of COVID-19 infection and/or worse health outcomes. In order to ensure health equity, it is critical to plan to protect these populations. Public health authorities should actively engage at-risk populations in extreme heat planning, including ensuring involvement of First Nations communities and urban Indigenous, Inuit, and Métis peoples to identify unique exposure risks and ensure suitable and culturally appropriate solutions are identified.

When used in combination with other personal preventive practices, well constructed, well-fitting and properly worn masks can be effective in reducing the transmission of COVID-19 (3) (45). The Public Health Agency of Canada (PHAC) provides [information on the safe and proper use of masks in the community](#). Ideally, masks should be worn when in a shared space (especially indoors) with people from outside of your immediate household or when advised by local public health authorities. Additionally, PHAC recommends that [children](#) under the age of 2 should not wear masks and children between the ages of 2 and 5 may be able to wear a mask if supervised. Children older than 5 should wear a mask in the same situations or settings where they're recommended for adults (3). Masks are also not recommended for anyone who has trouble breathing, or is unconscious, incapacitated, or otherwise unable to remove the mask without assistance.

During extreme heat events, wearing a mask to reduce COVID-19 transmission may affect thermal comfort and contribute to heat stress in some people. During warmer months, health authorities may face challenges with adherence to mask usage, and should consider developing communication strategies to do so.

3.2 Air conditioning, fans and energy costs

Some operational adjustments to central air conditioning systems can help reduce the number of potentially infectious particles in the air, and thus minimize the risk SARS-CoV-2 (the virus that causes COVID-19) transmission indoors. These include:

- ensure HVAC systems are properly installed and maintained (clean or change filters according to the manufacturer's schedule, ensure that filters are well sealed without a bypass, and use filters of the highest Minimum Efficiency Reporting Value (MERV) rating the system can sustain);
- increase the rate of exchange with outdoor air, and adjust settings to avoid recirculating indoor air (46).

However, central air conditioning is not universally accessible and raises energy use and costs (especially when not using recirculation), and therefore may not be an option for everyone. To improve the accessibility of air conditioning, consider providing / subsidizing appropriate air conditioning units or energy utility assistance.

Further, whenever possible, facilitate and promote the use of other accessible low tech cooling and energy efficient approaches:

- Prevent living spaces from overheating (e.g. closing blinds to reduce indoor heat, reducing use of electrical appliances, etc.);
- find cooler spaces to spend time at or close to home as permitted by public health orders (e.g. basements; outdoor spaces that allow for physical distancing);
- and stay cool and hydrated (e.g. cool showers, misting, sponge or assisted baths; avoiding hot meals) (47).

If fan or portable air conditioner use is necessary:

- Set fan to exchange indoor air with outdoor air (when outdoor temperatures are lower than indoor);
- Aim the indoor air stream away from people to reduce the spread of potentially infectious droplets or particles from one person to the next (48);
- When multiple people are present in a room, only use a fan if all occupants are from the same household and are not infected or suspected of having COVID-19;
- Do not use fans in the presence of an infected person unless they are alone in an isolated room that has a consistent source of fresh air from outside (49); and

- Clean and disinfect fans as often as possible.

The Government of Canada provides the following relevant guidance:

- [COVID-19: Guidance on indoor ventilation during the pandemic](#)
- [Using Ventilation and filtration to reduce aerosol transmission of COVID-19 in long-term care homes](#)
- [At home: Using ventilation and filtration to reduce the risk of aerosol transmission of COVID-19](#)

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Position Document on Infectious Aerosols provides extensive advice for health care and non-health care buildings heat, ventilation and cooling (HVAC) systems (50). The World Health Organization (WHO) also provides advice on [ventilation and air conditioning](#).

Public Health Ontario (PHO) provides [information](#) on the use of portable fans and portable air conditioning units during COVID-19 in long-term care and retirement homes (51). Also the INSPQ (Institut national de santé publique du Québec) provides [guidance](#) on portable air conditioner and stand fans during COVID-19 in long-term care and retirement homes.

Electricity costs may be a barrier to air conditioner use for some people. Health authorities or provincial or municipal partners may wish to consider measures to reduce these financial barriers, in order to facilitate air conditioner use and protect people from extreme heat.

Communications should acknowledge that not all people have access to air conditioning. Information should also be provided on how to keep your home and body cool with low tech and/or energy efficient options (e.g., closing blinds to reduce indoor heat, spending time in a basement, staying hydrated, using a fan not in the presence of a person with COVID-19, cool showers, misting, sponge or assisted baths, use of damp wet towels, avoiding hot meals, reducing use of electrical appliances, removing clothing layers) (20). Also, communicate what assistance is available to access these options (e.g. distribution of potable water; utility assistance and retrofitting for energy efficiency; and community-based options to access cool areas; etc.)

Heat acclimatization is an important strategy to mitigate the risk of heat-related injuries. Current evidence suggests that brief, repeated heat exposure throughout the summer can enhance an individual's ability to lose heat (seasonal heat acclimatization), which can reduce rises in body core temperature (52). While the use of air conditioning is recommended during extreme heat events, habituation to air-conditioned homes, workplaces, and motor vehicles may prevent improvements in heat dissipation.

3.3 Cooling centres and facilities

Accessible and culturally safe cooling centres and facilities like the ones listed below are critical services to some community members who need respite from extreme heat:

- Shopping malls
- Movie theatres
- Libraries
- Community centres and gardens
- Swimming pools
- Beaches

- Splash pads
- Cool rooms within communal living facilities

Identifying ways to provide alternative services or to maintain cooling centre and facility services while promoting public health and infection control measures is important during the COVID-19 pandemic (53) (54) (55).

Assessing risk and identifying risk mitigation measures are integral to safe operations within community settings during the COVID-19 pandemic. Understanding the risk factors associated with COVID-19 provides the foundation for conducting risk assessment and identifying mitigation strategies that can be used when determining how a community setting can operate safely during the pandemic. PHAC provides [advice](#) on high-level considerations, based on identified risk factors, to support conducting risk assessments in community settings, potential risk mitigation considerations, as well as [advice](#) on cleaning and disinfecting of public settings, including schools, universities, public libraries, museums, public transit, communal residences, and workplaces. PHAC also developed a risk mitigation [tool](#) for operators of non-health care community settings operating during the COVID-19 pandemic.

Cool rooms in communal living environments like apartment buildings, emergency family shelters, and workspaces should be encouraged to open, ensuring these spaces are well-ventilated. Advise users to self-screen (or for supervised cooling rooms, complete screening), wear well-constructed, well-fitting, and properly worn masks (when recommended or required), use their own washrooms, and to limit the time in the room so others can use it. Revise and post room capacities set by building codes to ensure people are able to maintain at least 2 metres of physical distance, or the greatest physical distance possible, among non-household members, particularly if people who are not fully vaccinated or whose vaccination status is unknown are expected to access the space. Recommendations for physical distancing and masking in private/social settings may vary depending on [individuals' vaccination statuses](#). Toronto Public Health (TPH) provides [guidance](#) for cooling rooms including screening; distancing requirements; cleaning and disinfection; contact logging, etc.

[Measures to reduce the risks](#) of COVID-19 in cooling centres and facilities include assessing physical layout to promote one-way flow, maximizing mitigation efforts by applying a “layered” approach that consists of the implementation of multiple measures such as screening for symptoms, physical distancing, the use of [masks, hand hygiene and respiratory etiquette](#), capacity limits so that occupants can maintain using physical barriers, [ensuring proper operation and maintenance of ventilation](#) and increasing environmental cleaning and disinfection (56). Increased access to hand hygiene and cough etiquette supplies (e.g. alcohol-based hand sanitizer that contains at least 60% alcohol, water, soap, paper towels, tissues, no-touch waste containers) (57) is also recommended. Follow local instructions regarding mask wearing and provide masks to people. Follow the latest [public health guidance](#) about screening for symptoms at the entrance and within cooling centres and facilities. Collect contact information for all volunteers and visitors to cooling centres in case of the need for contact tracing. Ensure adequate washroom facilities for the number of occupants and with consideration to physical distancing needs, bringing in additional facilities if needed.

Physical distancing may be required in cooling centres, long-term care homes, retirement homes, and group homes. These facilities may only have one common air-conditioned room, and alternative or additional approaches to cooling may be needed such as provision of water, avoiding hot foods, cool showers, misting, use of cool damp towels, sponge or assisted baths, removing clothing layers, and use of fans. The United States Centers for Disease Control and Prevention (US CDC) provides [guidance on COVID-19 and cooling centres](#).

In some cases, cooling centres and facilities may not be accessible to groups at higher risk due to reduced public transit operations, cognitive impairment, mobility limitations, safety concerns, or location. Health authorities should consider additional cooling services access options such as opening temporary cooling centres in higher-risk neighbourhoods, working with landlords to provide cooling options for people at higher risk and assessing whether closed buildings like businesses can be used as temporary cooling centres (20). If access to cooling centers involve the transportation of at-risk people to the site, implement protective measures for the transportation service.

A heat-stressed individual suffering from heat exhaustion or heat syncope may be mistaken for someone with a fever associated with COVID-19. It is important that the person is monitored until hyperthermia subsides by letting them rest in a cool place for 30 minutes (58). If symptoms persist, seek medical advice immediately (54).

Consider training cooling centre staff in first aid, infection control and prevention, and use of personal protective equipment. Local or regional health authorities may provide their own guidance for assessing and managing risks to health from heat in cooling centres during the pandemic. The British Columbia Centre for Disease Control (BC CDC) provides [guidance](#) on implementing COVID-19 assessments and options for physical distancing in cooling centres.

As some cooling options may not be available in some locations or have reduced capacity due to COVID-19, health authorities may need to plan for more clients than normal, presenting challenges where physical distancing is required. Public health officials should consider opening additional locations where possible to maintain physical distancing.

Where communities face short or longer-term restrictions on operating cooling centres and facilities, health authorities may wish to communicate other existing measures for staying cool at home including:

- Closing blinds to reduce indoor heat
- Spending time in a basement
- Staying hydrated
- Using a fan (not in the presence of an infected person unless the person is alone in an isolated room with room with a high volume of outside air exchange (49))
- Taking a cool shower
- Misting
- Taking a sponge or assisted bath
- Using damp wet towels
- Avoiding hot meals
- Reducing use of heat - generating electrical appliances
- Removing clothing layers (47)

3.4 Education and outreach

Given the potential overlap in risk factors for extreme heat and COVID-19 coupled with the pandemic environment of fear and uncertainty, it is important for public health authorities to provide reliable and actionable information on taking protective measures from both heat stress and COVID-19 (4).

Communication products should meet the needs of linguistically and culturally diverse communities including First Nations, Métis, and Inuit peoples. Modes of communication should consider accessibility

across a range of groups, technological abilities, availability of technological services, and preferred methods of communication.

Public health authorities need to provide the following community cooling centre guidance for people seeking respite from extreme heat:

- Hours of operation
- Occupancy limits
- Availability of masks and requirements for mask use
- Screening policies for people who are ill, in isolation, or in quarantine
- Mitigation measures (i.e. physical distancing measures, promotion of personal preventive practices, screening, ventilation, enhanced cleaning/disinfecting protocols, mask wearing, etc.)

It is important to align messages on extreme heat and COVID-19 as much as possible. Public health authorities should consider how heat messages may be interpreted by the public or acted upon differently during the COVID-19 pandemic. New messaging may be required to protect individuals from extreme heat in a context where risk perception may have changed (such as people exposing themselves to extreme heat when seeking reprieve from physical isolation) or where misinformation or incorrect information is prevalent. For example, there is no evidence that exposure to the sun or high temperatures prevents or cures COVID-19 (59).

Public perception of the high risk involved in visiting health facilities due to COVID-19 may prevent people from seeking medical attention for heat illness (4), resulting in impacts to health. Public health officials may wish to update communications materials to remind people of the necessity of seeking medical attention for themselves or loved ones during extreme heat events, including contacting telehealth services to seek medical advice. Public health officials can remind the public that health care facilities have taken required measures to prevent COVID-19 spread.

Due to limited access to child and home-based care, the potential for long line-ups, and risk of infection, people providing care for children or elderly family members may face greater uncertainty when determining whether or not to leave those in their care unattended in vehicles or to have them accompany them into stores or other facilities. Public health authorities should communicate the significant health risks of such actions and that individuals requiring care should never be left unattended in vehicles, especially during the summer months.

3.5 Health Care Delivery and Health Care Workers and other Essential Workers

Extreme heat events and COVID-19 can place great stress on health and social services, which can impact efforts to protect health (4); proactively planning for the potential of cumulative pressures to staff, facilities, and operations, before and during the heat season, is therefore necessary. It is recommended to review existing occupational health and safety plans, or develop new ones, with these considerations.

Some health care or health-supporting facilities in Canada (e.g., hospitals, health clinics, long-term care facilities) have limited air conditioning or none at all. Alternative measures for reducing indoor heat should be explored where possible (e.g., using window blinds during hotter parts of the day, opening of cooling rooms). Such actions may need to consider implications for maintaining COVID-19 infection control (e.g., the potential impacts of opening windows or use of fans to circulate cool air on virus transmission). PHAC provides [advice for COVID-19 related to community-based measures](#) (e.g., congregate living settings, businesses and workplaces, child and youth settings, community gathering spaces or settings, outdoor

spaces and public transportation) as well as [advice for home care settings, outpatient and ambulatory settings and long-term care homes](#). The INSPQ provides [guidance on portable air conditioners and stand fans](#).

Health care workers and community care workers (e.g., assisted living support in private homes) required to wear additional PPE (e.g., gowns and medical masks) due to COVID-19 may face risks from heat stress, particularly in facilities and residences that may not be air conditioned. To reduce risks, provide direction on how to minimize increases in body core temperature at work and improve thermal tolerance through acclimatization and physical activity (i.e. improved fitness). It is important to inform workers of heat health risks and heat illness prevention strategies, so that workers can identify heat strain in themselves, co-workers, and those under their care (60).

The Canadian Centre for Occupational Health and Safety's advice for mask wearing and heat stress is "If performing heavy tasks or working in a hot / humid environment, workers who are wearing a mask may experience heat stress sooner than otherwise. This issue can be resolved under the existing workplace heat stress control program. Workers may require more frequent rest or water breaks" (61).

3.6 Built Environment and Outdoor Spaces

Access to pools, beaches, and green spaces like parks and gardens may be limited at times during the COVID-19 pandemic, depending on local public health recommendations and restrictions, and could affect the ability of those without air conditioning to escape extreme heat. Public health authorities may need to evaluate the benefits of these outdoor spaces for heat relief compared to any risks of COVID-19 transmission, especially in the context of uncertainty, as risks can quickly change. Base these evaluations on the local context, conditions, and considerations.

Making outdoor spaces and venues available for cooling requires additional consideration of factors that may reduce the risk of COVID-19 transmission such as:

- Capacity limits, mask policies, physical distancing, and hand hygiene measures in indoor public facilities
- Availability of cleaning compounds and disinfectants used to ensure cleanliness of changing rooms and bathrooms in parks
- Limiting access to high-touch surfaces such as playgrounds, gym equipment, and water fountains
- Increased communication and signage (4).

PHAC has developed a risk mitigation [tool](#) for operators of non-health care community settings the public can access during the COVID-19 pandemic. INSPQ provides [guidance](#) on opening community gardens safely, and [a guidance update on all outdoor activities](#).

In some cases, outdoor spaces like temporary shade structures outside businesses where people may need to stand in line, or urban parks, may be effective means of providing relief from the heat, particularly for groups that may live in areas with fewer cooling options. Decisions to open existing or create new outdoor cool spaces should incorporate equity considerations (62). For example, neighbourhoods with lower socioeconomic status are at increased risk of extreme heat and have less access to green spaces (4).

With more people working from home using air conditioners, fluctuations in electricity demand and supply

could disrupt electricity networks in some communities. Ensuring all residents have access to information on how to keep cool and healthy with low-tech options in the absence of air conditioning may help prepare communities for this risk. This will be particularly important if other options for cooling are not available to them because of the COVID-19 outbreak.

The COVID-19 pandemic may create new and unanticipated situations that increase risks from extreme heat like standing in long line-ups in hot and sunny conditions without shade or water, or sitting in dangerously hot cars during drive-through and drive-in events like religious ceremonies, movies, and concerts when vehicles are turned off. Health authorities should consider developing public messages to reduce such risks, including reminders to wear a hat, bring an umbrella, and stay hydrated when standing in line.

Health authorities may also advise businesses and other facility operators to provide shade (plastic covered walkways with open sides to ensure proper ventilation), chairs, water and, where possible, adopt approaches that avoid physical line-ups, like booking appointments. If such approaches are adopted, equity of access should also be considered, ensuring that all clients be able to book ahead. Line attendants or first aid volunteers can identify people at risk and permit them advanced entry into the facility.

As understanding of overlapping vulnerabilities to COVID-19 and extreme heat in a changing climate evolves, and measures are implemented to make communities healthier and safer, public health authorities should evaluate these actions and share learnings with partners. COVID-19 also highlights the need to establish heat-resilient communities by design, and the opportunity for public health authorities to contribute via healthy built environment programming; providing advice to municipalities, local governments and Indigenous communities on implementing more permanent heat and infectious disease prevention and mitigation approaches such as large outdoor physically and culturally safe cool spaces. Also, the creation of COVID-19 public health tables may provide opportunities to continue conversations about planning healthy and livable environments, including improving indoor air quality and healthy outdoor spaces. Finally, emerging evidence that some COVID-19 patients experience long term health impacts on respiratory, neurological (63) and renal systems (64) suggests the importance of further study about whether or not infection with SARS-CoV-2 increases the risk of extreme heat.

4 Resources

4.1 Heat Health and Air Quality Resources

Health Canada. 2020. *Guidance for Cleaner Air Spaces during Wildfire Smoke Events*.

<https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidance-cleaner-air-spaces-during-wildfire-smoke-events.html>

Health Canada. 2020. *Wildfire smoke and your health*. <https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index/wildfire-smoke/wildfire-smoke-health.html>

Health Canada. 2011. *Acute Care During Extreme Heat: Recommendations and Information for Health Care Workers* <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/acute-care-extreme-heat-recommendations-information-health-care-workers-fact-sheet-health-canada-2011.html>

Health Canada. 2011. *Extreme Heat Events Guidelines: Technical Guide for Health Care Workers* <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/extreme-heat-events-guidelines-technical-guide-health-care-workers.html>

Health Canada. 2012. *Heat Alert and Response Systems to Protect Health: Best Practices Guidebook* <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/heat-alert-response-systems-protect-health-best-practices-guidebook.html>

Health Canada. 2011. *Communicating the Health Risks of Extreme Heat Events* <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/communicating-health-risks-extreme-heat-events-toolkit-public-health-emergency-management-officials-health-canada-2011.html>

4.2 Extreme Heat and COVID-19 Resources

World Health Organization EURO. 2020. *Health advice for hot weather during the COVID-19 outbreak*.

Santé Montréal. 2020. *QUOI FAIRE QUAND IL FAIT TRÈS CHAUD?* <https://santemontreal.qc.ca/chaleur/>. Also available in English: <https://santemontreal.qc.ca/en/heat/>

Ottawa Public Health. 2021. *Beat the Heat 2021 / Combatez la chaleur 2021*. Bilingual / Bilingue.

City of Toronto. 2021. *Tips to Beat the Heat*. Only available in English / Seulement disponible en anglais. <https://www.toronto.ca/wp-content/uploads/2021/05/8e25-Tips-to-Beat-Heat-May-2021-letter-poster.pdf>

Global Heat Health Information Network. 2020. *Q&A: How can residents stay cool at home when they lack air conditioning?* <http://www.ghhin.org/heat-and-covid-19/low-tech-cooling>. Only available in English / Seulement disponible en anglais.

Global Heat Health Information Network. 2020. *Q&A: How can I carry out public outreach on heatwaves during the COVID-19 pandemic*. Only available in English / Seulement disponible en anglais.

Global Heat Health Information Network. 2020. *Q&A: What social services should be mobilized to deal with combined risks of hot weather and COVID-19?* Only available in English / Seulement disponible en anglais. <http://www.ghhin.org/heat-and-covid-19/social-services>.

Global Heat Health Information Network. 2020. *Q&A: Which people are the most vulnerable to both heat stress and COVID-19?* Only available in English / Seulement disponible en anglais. <http://www.ghhin.org/heat-and-covid-19/vulnerability>.

Global Heat Health Information Network. 2020. *Q&A: How can health workers and other responders manage heat stress while wearing personal protective equipment (PPE)?* Only available in English / Seulement disponible en anglais. <http://www.ghhin.org/heat-and-covid-19/PPE>.

Global Heat Health Information Network. 2020. *Q&A: I run a health/ care facility. How can I protect staff from heat strain and heat-related illness?* Only available in English / Seulement disponible en anglais. <http://www.ghhin.org/heat-and-covid-19/health-workers>

Health Canada. 2020. *Wildfire smoke and your health*. <https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index/wildfire-smoke/wildfire-smoke-health.html>

Hein Daanen, Stephan Bose-O'Reilly , Matt Brearley , D. Andreas Flouris , Nicola M. Gerrett , Maud Huynen , Hunter M. Jones , Jason Kai Wei Lee , Nathan Morris , Ian Norton , Lars Nybo , Elspeth Oppermann , Joy Shumake-Guillemot & Peter Van den Hazel. 2020. *COVID-19 and thermoregulation-related problems: Practical recommendations. Temperature*, DOI: 10.1080/23328940.2020.1790971.

Institut national de santé publique du Québec. 2020. *COVID-19: Adaptation of public health recommendations for extreme heat in accordance with physical distancing recommendations*. <https://www.inspq.qc.ca/en/publications/3024-extreme-heat-physical-distancing-adaptation-of-PH-recommendations-covid19>

United States Centers for Disease Control (CDC). 2020. *Employer Information for Heat Stress Prevention during the COVID-19 Pandemic*. <https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/heat-stress-employers.html>

4.2.1 Cooling Centres

British Columbia Centres for Disease Control (BC CDC). 2020. *Guidance for community cooling centres during B.C.'s Restart Plan*. <http://www.bccdc.ca/Health-Info-Site/Documents/Guidance-for-Cooling-Centres-COVID-19.pdf>

United States Centre for Disease Control (CDC). 2020. *COVID-19 and Cooling Centers*. Only available in English / Seulement disponible en anglais. <https://www.cdc.gov/coronavirus/2019-ncov/php/cooling-center.html>

Global Heat Health Information Network. 2020. *Q&A: How should cooling centres be managed during the COVID-19 pandemic?* Only available in English / Seulement disponible en anglais. <http://www.ghhin.org/heat-and-covid-19/cooling-centres>.

Institut national de santé publique du Québec. 2020. *Adaptation of Public Health Recommendations for Extreme Heat in Accordance with Physical Distancing Recommendations*.

Global Heat Health Information Network. 2020. *Q&A: Is it safe to use outdoor public spaces for cooling? If so, how?* Only available in English / Seulement disponible en anglais. <http://www.ghhin.org/heat-and-covid-19/outdoor-cool-spaces>.

Toronto Public Health. 2020. *COVID-19 Guidance for Cooling Rooms*. Only available in English / Seulement disponible en anglais. https://www.toronto.ca/wp-content/uploads/2020/05/958d-COVID-19_Fact-Sheet_Cooling-Rooms.pdf

4.3 COVID-19 Resources

Canada COVID-19 webpage.

<https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19.html>

Canadian Centre for Occupational Health and Safety. 2021. *Coronavirus (COVID-19) - Tips*. <https://www.ccohs.ca/covid19/faq/index.html>

Institut national de santé publique du Québec. *COVID-19 : Santé au travail*. <https://www.inspq.qc.ca/covid-19/sante-au-travail>

Institut national de santé publique du Québec. 2021. *COVID-19: Environnement extérieur*. <https://www.inspq.qc.ca/publications/3002-environnement-exterieur-covid19>

National Collaborating Centre for Environmental Health. *Environmental Health Resources for the COVID-19 Pandemic* <https://ncceh.ca/environmental-health-in-canada/health-agency-projects/environmental-health-resources-covid-19>

Government of Canada. 2021. *COVID-19 signs, symptoms and severity of disease: A clinician guide*. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/signs-symptoms-severity.html>

Public Health Agency of Canada. 2021. *Reducing COVID-19 risk in community settings: A tool for operators*. <https://health.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/reducing-covid-19-risk-community-settings-tool-operators.html>

Public Health Agency of Canada. 2021. *COVID-19: Guidance on indoor ventilation during the pandemic*. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-indoor-ventilation-covid-19-pandemic.html>

Public Health Agency of Canada. 2021. *Adjusting public health measures in the context of COVID-19 vaccination*. [Adjusting public health measures in the context of COVID-19 vaccination](https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/adjusting-public-health-measures-in-the-context-of-covid-19-vaccination.html)

Public Health Agency of Canada. 2021. *At home: using ventilation and filtration to reduce the risk of aerosol transmission of COVID-19*. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-home-ventilation-covid-19-pandemic.html>

Public Health Agency of Canada. 2021. *COVID-19: Life after vaccination*. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/awareness-resources/vaccinated-against-covid-19.html>

[19.html](#)

Public Health Ontario. 2021. *The Use of Portable Fans and Portable Air Conditioning Units during COVID-19 in Long-term Care and Retirement Homes*.

<https://www.publichealthontario.ca/-/media/documents/ncov/ltrh/2020/08/covid-19-fans-air-conditioning-ltrh.pdf?la=en>

US Centers for Disease Control and Prevention. *COVID-19*.

<https://www.cdc.gov/coronavirus/2019-ncov/index.html>

World Health Organization. 2021. *Coronavirus disease (COVID-19) pandemic*.

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>

World Health Organization. 2021. *Coronavirus disease (COVID-19): Ventilation and air conditioning*.

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19-ventilation-and-air-conditioning>

4.4 Health Equity and COVID-19

Karen Rideout. *Environmental public health professionals can support health equity in the time of COVID-19*.

<https://ncceh.ca/content/blog/environmental-public-health-professionals-can-support-health-equity-time-covid-19>

Chief Public Health Officer of Canada's Report on the State of Public Health in Canada 2020. *From risk to resilience: An equity approach to COVID-19*.

<https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/from-risk-resilience-equity-approach-covid-19.html>

National Collaborating Centre for Determinants of Health. *Equity-informed responses to COVID-19*.

<https://nccdh.ca/our-work/covid-19>

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6 References

1. **Guo, Yuming, et al.** Quantifying excess deaths related to heatwaves under climate change scenarios: A multi-country time series modelling study. [Online] July 31, 2018. <https://pubmed.ncbi.nlm.nih.gov/30063714/>.
2. **Zhang, Zuebin, et al.** Changes in Temperature and Precipitation Across Canada; Chapter 4. [Online] 2019. <https://changingclimate.ca/CCCR2019/chapter/4-0/>.
3. **Government of Canada.** Coronavirus disease (COVID-19). [Online] 2020. [Cited: 06 15, 2020.] <https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19.html>.
4. **Global Heat Health Information Network.** Technical brief: Protecting health from hot weather during the COVID-19 pandemic. [Online] 2020. <http://www.ghhin.org/assets/technical-brief-COVID-and-Heat-finalv2.pdf>.
5. **Berry, Peter, et al.** Human Health. [book auth.] F.J. Warren and D.S. Lemmen. *Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation*. Ottawa, ON : Government of Canada, 2014, 7, pp. 191-232.
6. **Government of Canada.** People who are at risk of more severe disease or outcomes from COVID-19. [Online] 2020. [Cited: June 15, 2020.] <https://www.canada.ca/en/public-health/services/publications/diseases-conditions/people-high-risk-for-severe-illness-covid-19.html>
7. **Health Canada.** Extreme Heat Events Guidelines: Technical Guide for Health Care Workers. [Online] 2011. <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/extreme-heat-events-guidelines-technical-guide-health-care-workers.html>.
8. *Hot weather and heat extremes.* **Ebi, Kris, et al.** Submitted.
9. *Physiological factors characterizing heat-vulnerable older adults: A narrative review.* **Meade, Robert D., et al.** 2020, Environment International, Vol. 144.
10. **Henderson, Sarah.** Summer is coming: Wildfire Smoke + COVID-19. [Online] April 21, 2020. <https://ncceh.ca/content/blog/summer-coming-wildfire-smoke-covid-19>.
11. **Conticini, Edoardo, Frediani, Bruno and Caro, Dario.** Can Atmospheric Pollution Be Considered a Co-Factor in Extremely High Level of SARS-CoV-2 Lethality in Northern Italy? [Online] June 2020. <https://doi.org/10.1016/j.envpol.2020.114465>
12. **Stieb, Dave, et al.** An ecological analysis of long-term exposure to PM2.5 and incidence of COVID-19 in Canadian health regions. [Online] 2020. <https://doi.org/10.1016/j.envres.2020.110052>.
13. **Nadim, Mitra K., et al.** COVID-19-associated acute kidney injury: consensus report of the 25th Acute Disease Quality Initiative (ADQI) Workgroup. [Online] 2020. <https://doi.org/10.1038/s41581-020-00356-5>.

14. **World Health Organization (WHO) Regional Office for Europe.** Health advice for hot weather during the COVID-19 outbreak. [Online] May 8, 2020. [Cited: June 15, 2020.]
15. *Increased risk of COVID-19 infection and mortality in people with mental disorders: analysis from electronic health records in the United States.* **Wang, QuanQiu, Xu, Rong and Volkow, Nora D.** 1, *World Psychiatry*, Vol. 20, pp. 124-130.
16. *Temperature-related deaths in people with psychosis, dementia and substance use.* **Page, Lisa A., et al.** 2012, *The British Journal of Psychiatry*, Vol. 200, pp. 485-490.
17. *Prognostic Factors in Heat Wave-Related Deaths : A Meta-analysis.* **Bouchama, Abderrezak, et al.** 20, 2007, *JAMA Internal Medicine*, Vol. 167, pp. 2170-2176.
18. *6-month neurological and psychiatric outcomes in 236 379 survivors of COVID-19: a retrospective cohort study using electronic health records.* **Taquet, Maxime, et al.** 2021, *The Lancet Psychiatry*.
19. *Associations between high ambient temperatures and heat waves with mental health outcomes: A systematic review.* **Thompson, R., et al.** 2018, *Public Health*, Vol. 161, pp. 171-191.
20. **Global Heat Health Information Network (GHHIN).** Heat & COVID-19: Q&A Series. [Online] May 22 2020, 2020. [Cited: June 15, 2020.] <https://ghhin.org/heat-and-covid-19>.
21. **Health Canada.** Heat alert and response systems to protect health: Best practices guidebook. [Online] 2012. <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/heat-alert-response-systems-protect-health-best-practices-guidebook.html>.
22. **Government of Canada.** Long-Term Care and COVID-19. [Online] June 30, 2020. [Cited: June 11, 2021.] https://www.ic.gc.ca/eic/site/063.nsf/eng/h_98049.html.
23. **Joe, L., Hoshiko, S., Dobraca, D., Jackson, R., Smorodinsky, S., Smith, D., et al.** Mortality during a large-scale heat wave by place, demographic group, internal and external causes of death, and building climate zone. [Online] March 9, 2016. <https://dx.doi.org/10.3390%2Fijerph13030299>.
24. **Lamothe, F., Roy, M., & Racine-Hamel, S.** Vague de chaleur à l'été 2018 à montréal - Enquête épidémiologique. (Only available in French). [Online] 2019. https://santemontreal.qc.ca/fileadmin/user_upload/Uploads/tx_asssmpublications/pdf/publications/Enquete_epidemiologique_-_Vague_de_chaleur_a_l_ete_2018_a_Montreal_version15mai_EUSHV_finale.pdf.
25. **Health Canada.** Acute Care During Extreme Heat: Recommendations and Information for Health Care Workers. [Online] 2011. <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/acute-care-extreme-heat-recommendations-information-health-care-workers-fact-sheet-health-canada-2011.html>.
26. *Taking the Heat: Potential Fetal Health Effects of Hot Temperatures.* **Konkel, Lindsey.** <https://doi.org/10.1289/EHP6221>, 2019, *Environmental Health Perspectives*.

27. **Power, Tamara, et al.** COVID-19 and Indigenous Peoples: An imperative for action. [Online] 05 15, 2020. <https://doi.org/10.1111/jocn.15320>.
28. **Statistics Canada.** The housing conditions of Aboriginal people in Canada. [Online] 2017. <https://www12.statcan.gc.ca/census-recensement/2016/as-sa/98-200-x/2016021/98-200-x2016021-eng.pdf>.
29. **Employment and Social Development Canada.** Everyone Counts 2018: Highlights - Report. [Online] 08 31, 2020. <https://www.canada.ca/en/employment-social-development/programs/homelessness/reports/highlights-2018-point-in-time-count.html#3.4>.
30. **Toronto Public Health.** COVID-19 infection in Toronto: Ethno-racial identity and income. [Online] 2020. <https://www.toronto.ca/home/covid-19/covid-19-latest-city-of-toronto-news/covid-19-status-of-cases-in-toronto/>.
31. **Rocha, Roberto, Shingler, Benjamin and Montpetit, Jonathan.** Montreal's poorest and most racially diverse neighbourhoods hit hardest by COVID-19, data analysis shows. [Online] June 11, 2020. <https://www.cbc.ca/news/canada/montreal/race-covid-19-montreal-data-census-1.5607123>.
32. **Ottawa Public Health.** Report: COVID-19 and Racial Identity in Ottawa. [Online] 2020. <https://www.ottawapublichealth.ca/en/reports-research-and-statistics/resources/Documents/covid-19/Special-Focus/Report---COVID-19-and-Racial-Identity-in-Ottawa-2020.pdf>.
33. **Gronlund, C.** Racial and socio-economic disparities in heat-related health effects and their mechanisms: a review. [Online] September 1, 2014. <https://doi.org/10.1007/s40471-014-0014-4>.
34. *Cumulative air pollution indicators highlight unique patterns of injustice in urban Canada.* **Giang, Amanda and Castellani, Kaitlin.** 12, 2020, Environmental Research Letters, Vol. 15.
35. *Disparities in Distribution of Particulate Matter Emissions Sources by Race and Poverty Status.* **Mikati, Ihab, et al.** 2018, American Journal of Public Health, pp. 480-485.
36. *Severe air pollution links to higher mortality in COVID-19 patients: The "double-hit hypothesis".* **Frontera, Antonio, et al.** 2, 2020, Journal of Infection, Vol. 81, pp. 255-259.
37. **Centers for Disease Control and Prevention.** COVID-19 Considerations for Cleaner Air Shelters and Cleaner Air Spaces to Protect the Public from Wildfire Smoke. [Online] 2021. <https://www.cdc.gov/coronavirus/2019-ncov/php/cleaner-air-shelters.html>.
38. **World Health Organization.** Protecting Health from Climate Change: Vulnerability and Adaptation Assessment. [Online] 2013. <http://apps.who.int/iris/handle/10665/104200>.
39. **Ebi, K.L., et al.** Stress testing the capacity of health systems to manage climate change-related shocks and stresses. [Online] October 26, 2018. <https://doi.org/10.3390/ijerph15112370>.
40. **Ebi, K.L., Hasegawa, T., Hayes, K., Monaghan, A., Paz, S., Berry, P.** Health risks of warming of 1.5 °C, 2 °C, and higher, above pre-industrial temperatures. [Online] 2018. <https://iopscience.iop.org/article/10.1088/1748-9326/aac4bd/pdf>.

41. **Health Canada.** Communicating the Health Risks of Extreme Heat Events: Toolkit for Public Health and Emergency Management Officials. [Online] 2011. <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/communicating-health-risks-extreme-heat-events-toolkit-public-health-emergency-management-officials-health-canada-2011.html>.
42. —. Extreme heat: heat waves. [Online] 2020. <https://www.canada.ca/en/health-canada/services/sun-safety/extreme-heat-heat-waves.html>.
43. **Global Heat Health Information Network; Red Cross Red Crescent.** *Planning Checklist: Managing Heat Risk During the COVID-19 Pandemic.* s.l. : Global Heat Health Information Network; Red Cross Red Crescent, 2020.
44. **Global Heat Health Information Network.** How can I carry out public outreach on heatwaves during the COVID-19 pandemic? [Online] 05 22, 2020. <https://ghhin.org/faq/how-can-i-carry-out-public-outreach-on-heatwaves-during-the-covid-19-pandemic/>.
45. **Government of Canada.** Non-medical mask: About. [Online] 2021. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks/about-non-medical-masks-face-coverings.html>.
46. —. COVID-19: Guidance on indoor ventilation during the pandemic. [Online] 01 18, 2021. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-indoor-ventilation-covid-19-pandemic.html>.
47. **Global Heat Health Information Network.** How can residents stay cool at home when they lack air conditioning? [Online] 05 22, 2020. <https://ghhin.org/faq/how-can-residents-stay-cool-at-home-when-they-lack-air-conditioning>.
48. **Government of Canada (GoC).** At home: using ventilation and filtration to reduce the risk of aerosol transmission of COVID-19 . [Online] 04 12, 2021. <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-home-ventilation-covid-19-pandemic.html>.
49. **World Health Organization.** Home care for patients with suspected or confirmed COVID-19 and management of their contacts: Interim Guidance. [Online] 08 12, 2020. <https://apps.who.int/iris/bitstream/handle/10665/333782/WHO-2019-nCoV-IPC-HomeCare-2020.4-eng.pdf>.
50. **American Society of Heating, Refrigerating and Air-Conditioning Engineers.** ASHRAE Position Document on Infectious Aerosols. [Online] 04 14, 2020. https://www.ashrae.org/file%20library/about/position%20documents/pd_infectiousaerosols_2020.pdf.
51. **Public Health Ontario.** AT A GLANCE The Use of Portable Fans and Portable Air Conditioning Units during COVID-19 in Long-term Care and Retirement Homes. [Online] 2020.

<https://www.publichealthontario.ca/-/media/documents/ncov/ltrh/2020/08/covid-19-fans-air-conditioning-ltrh.pdf?la=en>.

52. **National Institute on Occupational Safety and Health (NIOSH)**. Acclimatization. [Online] June 18, 2018. <https://www.cdc.gov/niosh/topics/heatstress/acclima.html>.

53. **Global Heat Health Information Network**. How should cooling centres be managed during the COVID-19 pandemic? [Online] May 17, 2020. [Cited: June 15, 2020.] <https://ghhin.org/faq/how-should-cooling-centres-be-managed-during-the-covid-19-pandemic/>.

54. **Centers for Disease Control and Prevention**. COVID-19 and Cooling Centers. *Centers for Disease Control and Prevention*. [Online] 2020. <https://www.cdc.gov/coronavirus/2019-ncov/php/cooling-center.html>.

55. **Haut Conseil de la santé publique**. Coronavirus SARS-CoV-2 : gestion de l'épidémie en cas de survenue de vagues de chaleur. (Only available in French). *Haut Conseil de la santé publique*. [Online] 2020. <https://www.hcsp.fr/explore.cgi/avisrapportsdomaine?clefr=817>.

56. **Government of Canada**. Risk mitigation tool for workplaces/businesses operating during the COVID-19 pandemic. *Canada.ca*. [Online] 2020. [Cited: December 22, 2020.] <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/risk-informed-decision-making-workplaces-businesses-covid-19-pandemic.html#a1>.

57. —. Guidance for providers of services for people experiencing homelessness (in the context of COVID-19). *canada.ca*. [Online] 2020. [Cited: 12 22, 2020.] <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/homelessness.html>.

58. **Global Heat Health Information Network**. How to distinguish between fever caused by infection, and environment and or exercise-induced hyperthermia and heat illness? [Online] 05 22, 2020. <https://ghhin.org/faq/fever-covid/>.

59. **National Academies of Sciences, Engineering, and Medicine**. Rapid Expert Consultation on SARS-CoV-2 Survival in Relation to Temperature and Humidity and Potential for Seasonality for the COVID-19 Pandemic. [Online] April 7, 2020. <https://doi.org/10.17226/25771>.

60. **Global Heat Health Information Network**. I run a health/care facility. How can I protect staff from heat strain and heat-related illness? [Online] April 22, 2020. <http://ghhin.org/faq/i-run-a-health-care-facility-how-can-i-protect-staff-from-heat-strain-and-heat-related-illness/>.

61. **Canadian Centre for Occupational Health and Safety (CCOHS)**. Coronavirus (COVID-19) - Tips. [Online] 04 13, 2021. <https://www.ccohs.ca/covid19/faq/index.html>.

62. **Global Heat Health Information Network**. Is it safe to use outdoor public spaces for cooling? If so, how? [Online] 05 17, 2020. <https://ghhin.org/faq/outdoor-cooling/>.

63. *Respiratory and Psychophysical Sequelae Among Patients With COVID-19 Four Months After Hospital Discharge.*

Bellan, Mattia, Soddu, Daniele and Balbo, Piero Emilio. 1, *Infectious Diseases*, Vol. 4, p.

<https://dx.doi.org/10.1001/jamanetworkopen.2020.36142>

64. *Systematic review and subgroup analysis of the incidence of acute kidney injury (AKI) in patients with COVID-19.* **Xu,**

Zhenjian, et al. 2021, *BMC Nephrology*, Vol. 22, pp. 52 <https://doi.org/10.1186/s12882-021-02244-x>.