Heat Response Planning for Southern Interior B.C. Communities:
A Toolkit

June 2023

Interior Health

ACKNOWLEDGEMENTS

Interior Health would like to recognize and acknowledge the traditional, ancestral, and unceded territories of the Dãkelh Dené, Ktunaxa, Nlaka'pamux, Secwépemc, St'át'imc, Syilx, and Tŝilhqot'in Nations where we live, learn, collaborate and work together.

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A Message from Dr. Sue Pollock, Medical Health Officer, Interior Health

Interior Health produced the inaugural version of a heat planning and response toolkit in 2020, designed to support communities throughout the Southern Interior region of the province prepare for and respond to extreme heat. During the summer of 2021, B.C. experienced record-setting temperatures, known as the heat dome, which had severe and devastating impacts on the health of individuals and communities across B.C..

Since 2021, there have been incredible collective efforts to establish plans, processes and systems to respond to extreme heat regionally and provincially including the B.C. Provincial Heat Alert Response System (BC HARS). We have learned from many successes and challenges when planning and implementing actions through recent extreme heat events. This refreshed toolkit aligns with BC HARS and offers guidance based on key learnings and examples of heat response and adaptation actions from communities across the Southern Interior region.

Interior Health understands the unique context of Southern Interior communities and hopes that the updates to this toolkit will support continued collaboration and learning from each other. Together we will strengthen our collective resilience and support the health and well-being of all community members.

INTRODUCTION

British Columbia (B.C.) is seeing a rise in summer temperatures and extremely hot days as a result of climate change. Canada is warming at twice the global average and B.C. is warming faster than many parts of the country.[1] Episodes of very hot weather, also known as heat waves, are dangerous for the health and wellbeing of our communities and can cause illness and death.

In the Southern Interior, we can expect an increase in the frequency, duration, and severity of extreme heat events due to climate change. Given the health risks associated with extreme heat, it is critical that partners work together across sectors to prepare for and adapt to these events. The good news is that planning, preparation, and responsive adaptation can greatly reduce the negative impacts of heat and build community resilience, as demonstrated during B.C.'s record-setting extreme heat event in 2021. We have a significant opportunity to learn from efforts that are underway in communities across Canada to develop heat response systems and strategies that have been successful and adapt them to our unique context in the Southern Interior of B.C.

Purpose of this Toolkit

The purpose of the toolkit is to provide community partners with practical information and resources that will assist them in developing and implementing systems and strategies to prepare for and respond to extreme heat, specifically in communities **in the Southern Interior of B.C.**

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1   Environment and Climate Change Canada (2019). Canada's Changing Climate. https://changingclimate.ca

Health Equity Considerations

Climate change exacerbates existing inequities, and an equity lens is essential to adaptation planning for extreme heat events.

The 2021 heat dome[2] did not impact all populations equally. Some people who are more vulnerable to heat, like older adults, people with chronic illness, and those living alone are at a higher risk of suffering negative health outcomes during extreme heat events[3]. Heat-vulnerable individuals may have limited mobility, face poverty or discrimination, and may not have access to places where they can cool down during an extreme heat event.

The B.C. Coroners Report from the 2021 extreme heat events highlights the need to identify and support populations most at risk of dying during an extreme heat event. Advanced planning must consider the unique needs and circumstances of heat-vulnerable populations and ensure that services are available to them.

Applying an equity lens is crucial to ensure that policy, planning, service development, and implementation consider the diverse needs of all members of the community, especially those who are most vulnerable to extreme heat events.

WHY HEALTH EQUITY MATTERS

Health equity means that all individuals have an equal opportunity to achieve good health, regardless of social, economic, or other factors[4]. It involves addressing conditions, such as discrimination and unfair distribution of resources, to ensure adaptation policy, planning and strategies benefit those most at risk of experiencing negative health impacts. For example, in heat planning and response, health equity would involve considering the needs of all community members, but having targeted strategies for those who are most heat-vulnerable (see Kelowna Journey Home example). This ensures that all members of the community can achieve health and well-being in the face of climate change.

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2   In June 2021, a heat dome formed over British Columbia, causing a prolonged period of extreme heat and humidity. It is caused by a high-pressure system that traps hot air beneath it, creating a dome of heat over a region that has consequences for health. (2022) http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Health-Environment/Provincial-Heat-Alerting-Response-System.pdf

3   Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021 (2022) https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf

4   World Health Organization. *Health topics. Health equity.* (2023) https://www.who.int/health-topics/health-equity#tab=tab_1

WHAT IS AN EXTREME HEAT EVENT?

Extreme heat events (EHEs), or heat waves, are extended periods of time (at least two days) with relatively high temperatures for a given location. A "heat dome", such as the one that occurred in June 2021, is caused by a high-pressure system that traps hot air beneath it, creating a dome of heat over a region[5]. Not all EHEs are heat domes – while EHEs are increasing in frequency, heat domes with same magnitude and intensity as the 2021 event remain rare. However, with climate change, it is expected that events like the heat dome may increase in frequency. Therefore, it's especially important to plan and prepare now.

These events usually occur during the summer months between May and September and are expected to become more severe, frequent, and longer in B.C. It is predicted that by 2050, extreme heat events will happen every 3 to 10 years[6].

While the Southern Interior of B.C. has always been known for its hot summer weather (and is often the 'hot spot' in Canada and B.C., see Figure 1) climate models show that this region is expected to become even warmer, with more frequent and severe extreme heat events.
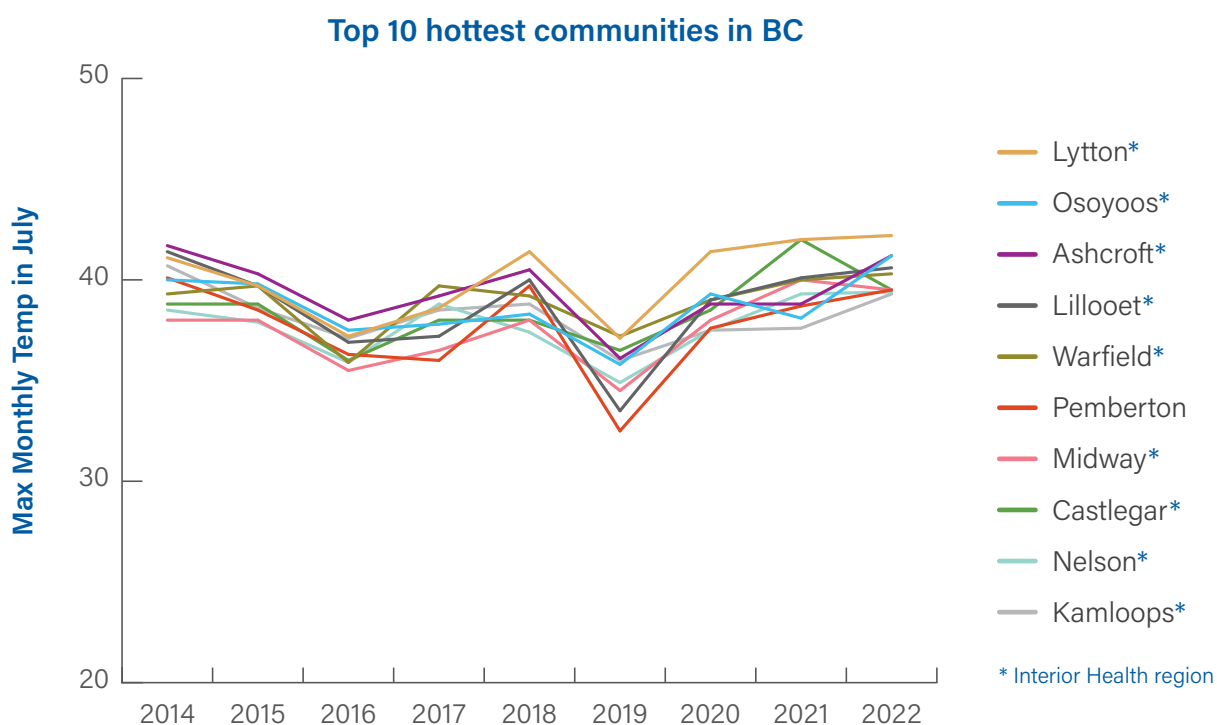
Figure 1. Top 10 hottest communities in B.C. for the month of July(2014-2022)

5, 6   BC Provincial Heat Alert and Response System (BC HARS): 2023 http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20 Forms/Guidelines%20and%20Manuals/Health-Environment/Provincial-Heat-Alerting-Response-System.pdf

The 2021 heat dome event gave rise to the creation and implementation of a two-tier heat alert and response system (HARS) for the province, the BC HARS[7]. The two tiers are: **Heat Warning and Extreme Heat Emergency**.

Heat Warning

The Interior Health region includes two heat forecast regions. In the southern part of the region, a Heat Warning is triggered when temperatures are above 35°C for two consecutive days and overnight temperatures remain above 18C. In the norther part of the Interior Health region, a Heat Warning is called when temperatures are above 29C for two consecutive days and overnight temperatures remain above 14C.[8]

Criteria must be met for 2 days

- Tmax >= 29°C & Tmin >= 14°C
- Tmax >= 35°C & Tmin >= 18°C
- Tmax >= 33°C & Tmin >= 17°C
- Tmax >= 29°C & Tmin >= 16°C
- Tmax >= 28°C & Tmin >= 13°C

29-14-29

28-13-28

INTERIOR HEALTH

100 Mile House

Golden

Lillooet

Salmon Arm

35-18-35

29-16-29

33-17-33

Figure 2. Current triggers for signaling a heat warning for the specific climatic region(s) being impacted in B.C.

7, 8   BC Provincial Heat Alert and Response System (BC HARS): 2023 http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20 Forms/Guidelines%20and%20Manuals/Health-Environment/Provincial-Heat-Alerting-Response-System.pdf

Extreme Heat Emergency

If the Heat Warning criteria for a specific region has been met and there is high certainty that temperatures would increase substantially each day for three or more consecutive days, the BC HEAT Committee may initiate the process for issuing an Extreme Heat Emergency.

Table 1. Description, Criteria, and Triggers of BC HARS

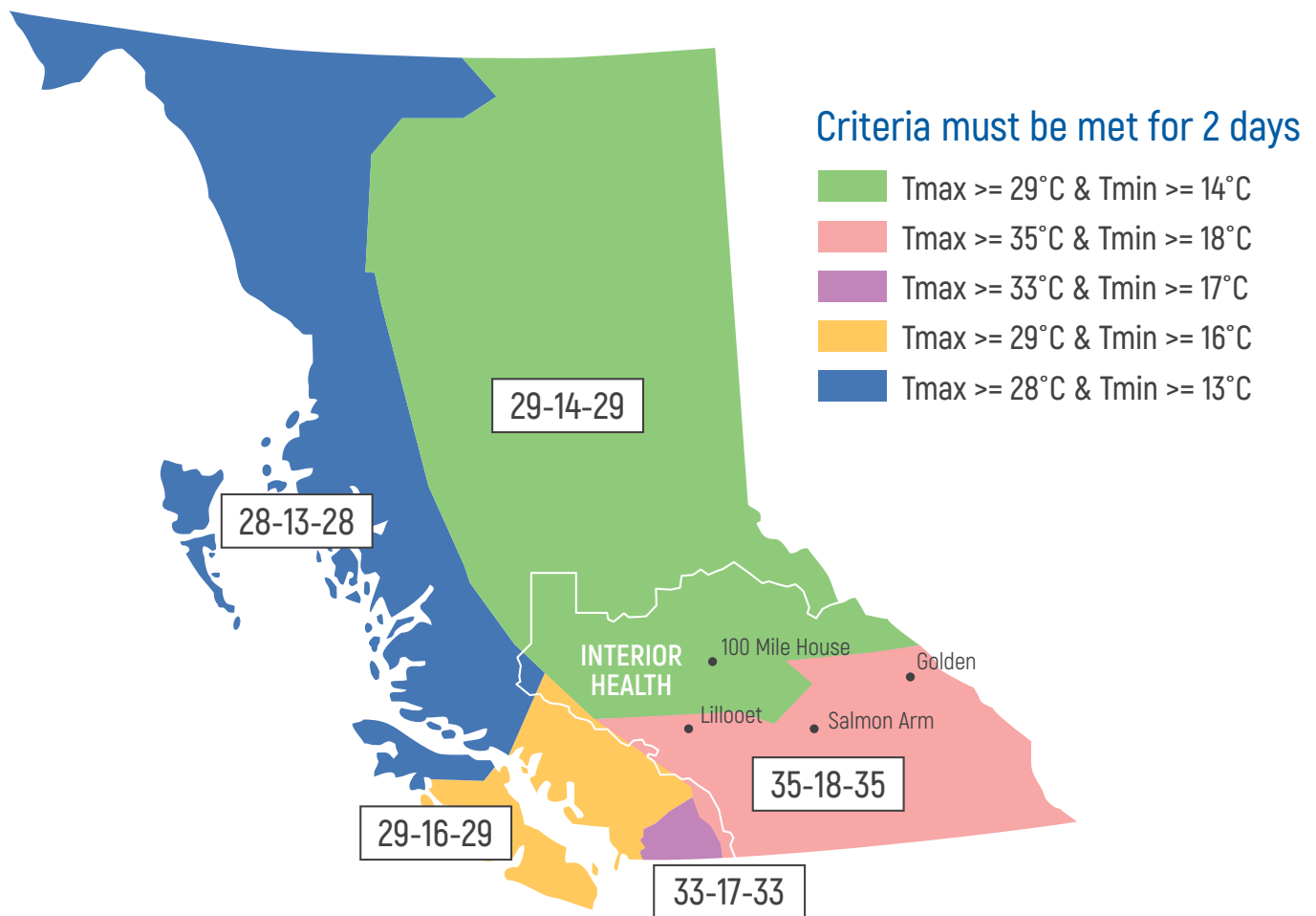| Type of Alert	Heat Warning	Extreme Heat Emergency
Public health risk	**Moderate** (5% increase in mortality)	**Very high** (20% or more increase in mortality)
Descriptor	**Very hot**	**Dangerously hot**
Historic frequency	**1-3 per summer season**	**1-2 per decade**
Criteria (See Figure 2 for a description of the geographical regions that fall under the five ECCC defined heat zones that BC is divided into)	Northeast = 29-14-29* Southeast = 35-18-35* (largely Interior region of BC) * ˚C Tmax ≥ daytime high, Tmin ≥ nightime high, Tmax ≥ daytime high (high-low-high)	Heat Warning criteria have been met and forecast indicates that the daily highs will increase day-over-day for three or more consecutive days

Heat Alert Protocol

The first step that activates a community's heat response plan[9] is a **Heat Warning alert** which is triggered through the following process:

1. Environment and Climate Change Canada (ECCC) and the British Columbia Centre for Disease Control (BCCDC) have an established **threshold that will trigger Heat Warnings** based on findings from a heat-health analysis and community and region-specific weather conditions.

2. ECCC communicates the potential[10] for a Heat Warning to Interior Health, local and First Nation communities and other decision-makers a few days prior to a heat event, allowing enough time for partners to **mobilize and prepare a response**.

3. Interior Health local and First Nation communities and other key community partners respond to the Heat Warning by **activating their heat response plan**. The plan provides information on the actions that the lead agency and community partners will take to reduce heat-related risks when a Heat Warning is called.

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9   See the section of this toolkit on a "Heat Response and Preparedness Framework" for more information on community heat planning.

10   NOTE: ECCC will communicate the **potential** of a heat warning a few days in advance. A full decision on issuing a heat warning will not be made until the day prior to when the warning is expected to be achieved.

WHAT ARE THE HEALTH IMPACTS OF EXTREME HEAT?

In Canada, heat waves are the leading weather-related cause of death. People tend to adapt to gradually rising temperatures, but extreme heat events relative to average temperatures can lead to harmful health consequences[11].

In Canada, the number of deaths associated with extreme heat events is substantially higher compared to the combined deaths from other natural disasters
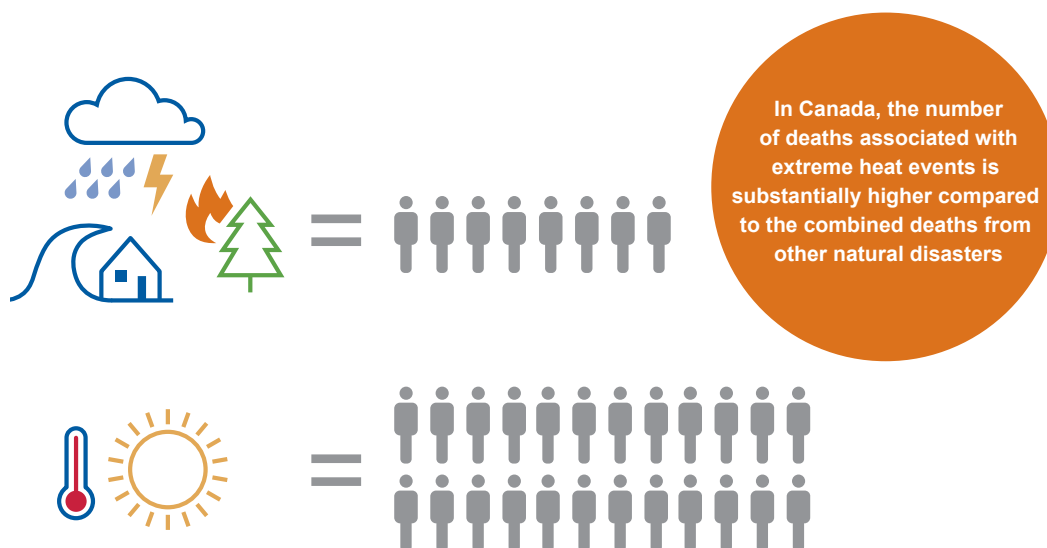
Figure 3. Number of deaths associated with extreme heat in Canada

Risk factors associated with heat that impact our health

There are five main elements of heat exposure that are projected to increase under climate change and compound the health risks associated with heat waves:

- **Frequency** - The more often extreme heat events occur, the greater the risk of adverse health outcomes. The lack of a rest period between events magnifies the risk.

- **Duration** - The longer the heat event, the higher the health risk and the greater the likelihood of impacts on other sectors (power outages).

- **Intensity** - The higher the daily maximum and minimum temperature (or other indices of heat stress) the greater the health impact.

- **Heat Season** (Duration and Timing) – The heat season may start earlier and end later which could result in an inability to acclimatize sufficiently or implement cooling strategies. Early summer extreme heat events generally result in higher health impacts than those occurring later in the summer.

- **Geographic Location and Range** – Due to climate change, we may experience extreme heat events in places where they have never occurred.

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11   Province of British Columbia (2019). B.C. Climate Risk Assessment Summary. https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/climate-risk-summary.pdf

Heat-related mortality

Between June 25 and July 1, 2021, a heat dome resulted in at least 619 heat-related deaths in B.C., with **64 heat-related deaths occurring in the Interior Health region** (see Table 2). This represented a 440% increase in heat-related deaths when compared to the expected number[12].

Table 2. Heat-related deaths and rates by HSDA of injury, Jun 25 – July 1, 2021

Heat-related deaths and rates by health service delivery area (HSDA) of injury, Jun 25 – July 1, 2021[13]		
Interior Health HSDA	**# of Deaths**	**Crude Rate per 100,000**
East Kootenay	4	4.6
Kootenay Boundary	3	3.6
Okanagan	32	7.8
Thompson Cariboo Shuswap	25	10.3
Total	**64**	

Of the total deaths in the province, 90% occurred in persons aged 60+, and 98% occurred indoors, due to lack of adequate cooling and poor ventilation (see Figure 3)[14,15]. Risk of death was also higher in neighbourhoods with more social and material deprivation and less neighbourhood greenness — reduced tree density and canopy can reduce shade available, increase the temperature people experience, and exacerbate the urban heat island effect.

12   Henderson et al. (2022) Analysis of community deaths during the catastrophic 2021 heat dome: Early evidence to inform the public health response during subsequent events in greater Vancouver, Canada. doi:10.1097/EE9.0000000000000189

13   HSDA is derived from injury township. B.C. Coroner's Service: Heat-Related Deaths in B.C. Knowledge Update. Death township is used where injury township is unknown. Rates should be interpreted with caution due to small numbers. https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/statistical/heat_related_deaths_in_bc_knowledge_update.pdf

14   Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021 (2022) https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf

15   Henderson et al. (2022) Analysis of community deaths during the catastrophic 2021 heat dome: Early evidence to inform the public health response during subsequent events in greater Vancouver, Canada. doi:10.1097/EE9.0000000000000189

Heat-related deaths by injury location and health authority of injury, June 25 – Jul 1, 2021	
Inside Residence	57
Outside	3
Public Building	1
Unknown	3
Total	**64**

Inside Residence – includes either decendent's own or another's residence, hotels/motels, rooming houses, SROs (single room occupancy), shelters, social/supportive housing, seniors' homes, long term care facilities, nursing homes, etc.
Outside – includes vehicles, streets, sidewalks, parking lots, public parks, wooded areas, and campgrounds
Public Buildings – includes restaurants, community centres, post offices, businesses, etc.

Table 3. Heat-related deaths by injury location and health authority of injury, June 25 - July 1, 2021

Impacts of heat on our health

Heat waves have severe negative consequences for human health. Direct impacts on health from heat can result in a cascade of illnesses including heat cramps, heat exhaustion, and life-threatening heatstroke. During periods of extreme heat, people may also succumb to underlying health conditions (e.g., respiratory, cardiovascular conditions) that are heat sensitive.[16] Health effects from extreme heat events can also be experienced sometime after the heat wave has occurred, not only if indoor temperatures remain high, but also because of the accumulated heat stress on the body. For example, the impact of heat on pre-existing health conditions may manifest gradually and take a few days to result in mortality.

Heat also has important **indirect health effects** (see Figure 4). For example, heat waves can trigger or exacerbate mental, behavioural, and cognitive disorders ranging from negative feelings of exhaustion or stress to suicide. In addition, a heat wave may place stress on infrastructure and transportation systems, economic productivity, and ecosystems.

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[16]   Health Canada (2012). Heat Alert and Response Systems to Protect Health: Best Practices Guidebook. Located on May 18, 2023 at: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/climat/response-intervention/response-intervention-eng.pdf

Health

During extreme heat, health consequences and impacts to the health system can include:

- **Heat related illness**
  - » Dehydration, heat cramps, and heat stroke
- **Accelerated death** from heat
  - » Cardiovascular disease, respiratory disease, other chronic diseases
- **Sleep loss, accidents, violence**
- **Maternal, fetal, and child health**
  - » Sudden infant death syndrome, early delivery/ pre-term birth, gestational diabetes
- **Mental health**
  - » Increase in suicide, admission to hospital for other mental health disorders
- **Health care utilization**
  - » Increased emergency department visits, ambulance calls, telehealth calls, and visits to primary care physicians

Infrastructure & Services

- During heat events, residents may rely on electrical cooling systems (e.g., fans and air conditioning)
- Power outages may put heat-vulnerable populations **at even greater risk** of heat exhaustion or heat stroke
- Extreme temperatures may increase **community demand for water** and wastewater treatment services at times when water levels are low

Natural Systems & Agricultural Loss

- During the 2021 heat dome, the Okanagan and Kootenay regions, along with the Fraser Valley, experienced significant **crop damage**:
  - » In the Okanagan region, approximately **50-70%** of cherry crops were impacted, leading to complete losses in certain orchards. The extreme heat also resulted in the unfortunate death of over 650,000 chickens and other poultry.[17]
- **Cultural Impact**
  - » Impacts to growth and harvest of traditional plants and medicines as well as hunting and fishing practices

Economy

- Across sectors, it is estimated that between **$205 million and $328 million** in income was lost during the 2021 heat dome[18]
- **Productivity loss**
  - » Workers respond to extreme heat by taking longer breaks, working fewer hours and slowing down work, all of which undercut productivity
  - » Working in extreme heat also increases the **risk of injury**

Figure 4. Related impacts of extreme heat events

17, 18   Canadian Centre for Policy Alternatives. A Climate Reckoning The economic costs of B.C.'s extreme weather in 2021 (2022)
https://policyalternatives.ca/sites/default/files/uploads/publications/BC%20Office/2022/11/ccpa-bc_Climate-Reckoning_web.pdf

Heat vulnerable populations

Some populations and individuals in your community will be more vulnerable to the negative health risks from extreme heat. Therefore, it is important to understand **who is at particular risk** and where vulnerabilities overlap in order to effectively target extreme heat response strategies and ensure everyone in the community is safe. Refer to Table 4 for a description of characteristics that can make someone more vulnerable to extreme heat.

Intersectionality and overlapping vulnerabilities

Intersectionality is a way of understanding how different parts of who we are, like our race, gender, income, and ability, intersect and influence how we experience the world. It helps us see that people with overlapping vulnerabilities experience different realities compared to those with overlapping privileges.[19] Intersectionality, or applying an intersectional lens, helps us create fairer and more inclusive policies and strategies that take these overlapping factors into account.

Table 4. Heat-vulnerable populations

Population	Description of heat-vulnerability
Socially isolated	• People who live alone or are socially isolated, homeless, or unsheltered may have limited access to heat-health information and services and limited social networks. • During the 2021 heat dome, many communities indicated it was challenging to identify and reach those that are not connected to a system of caregivers or services. • 98% of deaths from the 2021 heat dome occurred indoors, most in homes without adequate cooling systems and over half of those that died (56%) lived alone.
Chronic health conditions	• The risk of death during the 2021 heat dome increased with an increasing number of co-occurring chronic diseases. • During the 2021 heat dome, 91% of the people that died related to heat had at least one chronic disease (e.g., schizophrenia, substance use disorder, epilepsy, chronic obstructive pulmonary disease, depression, asthma, mood and anxiety disorders, and/or diabetes). • Schizophrenia was the most strongly associated with higher risk of death during the 2021 heat dome.

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19   Crenshaw (1990). Mapping the margins: Intersectionality, identity politics, and violence against women of color. https://doi. org/10.2307/1229039

Population	Description of heat-vulnerability
Elderly	• During the 2021 heat dome, 67% (415) of people who died were 70 years of age or older. • For many elders/seniors that are aging in place (at home), it was challenging to reach them, and they were less represented in cooling centers. • For Southern Interior communities that have an older population compared to the Canadian average, there is a concern that an aging population may be more at risk if not checked on daily. • See T'ít'q'et, for an example of successful elder engagement
Insecurely-housed	• The unhoused population is more exposed to heat and requires targeted outreach and cooling strategies. • During the 2021 heat dome there was a lack of access to indoor cooling centres/spaces that were accessible and inclusive to those that are insecurely housed. • See Kelowna Journey Home for an example of cooling strategies for insecurely housed.
Location and place of residence	• During the 2021 heat dome, a number of deaths occurred indoors in neighbourhoods with large roads, large buildings, high density, and low greenness (e.g., tree canopy coverage, green space). • A disproportionate number of those who died during the 2021 heat dome lived in neighbourhoods with lower income and education levels.
People with disabilities	• People with disabilities are more susceptible to extreme heat due to limited mobility, increased reliance on caregivers, social isolation, compounding health related challenges, and other influences such as discrimination, marginalization and socio-economic factors.
Outdoor workers	• The Southern Interior region's agricultural economy is dependent on approximately 5,000 migrant workers to do physically demanding work outdoors in direct sunlight during the hottest months of the year, putting them at a higher risk of heat-related illness.[20] • People who harvest and gather plants and medicines and hunt during heat events may also be at increased risk.

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20   Weinberger et al. (2023) Heat-Related Illness Among Workers in British Columbia, 2001–2020. doi: 10.1097/JOM.0000000000002761

Population	Description of heat-vulnerability
Recreational users and mobile homes	• Recreational users in campgrounds have higher exposure to heat, and therefore require specific outreach. • Those living in mobile homes are potentially at higher risk as many are living without air-conditioning.
Low-income	• During the 2021 heat dome, a disproportionate number of deaths occurred in lower income neighbourhoods. • Low-income populations may experience financial barriers to purchasing and running an air conditioner, and may live in older housing that may gain and retain heat.
Pregnant people	• Maternal and fetal health outcomes may be adversely impacted by heat (i.e., pre-term births, lower birth weights).
Infants and young children	• Infants and young children are physiologically more vulnerable to heat. • These populations can also be at risk due to their potential increased exposure to extreme heat due to the importance of outside play. They are reliant on their caregivers to recognize extreme temperatures and adjust/reschedule outdoor play, and/or monitor for signs of heat illness.

Kelowna Journey Home and Pop-Up Cooling Tents

Coordination among community partners, outreach teams and people with lived experience is crucial for local heat response to protect heat-vulnerable populations like the unhoused and insecurely housed, as demonstrated by Kelowna's Journey Home Strategy-driven collaborative networks in their quick mobilization to develop 'pop-up cooling tents' and outreach initiatives during the 2021 heat dome.

Kelowna's heat response to protect the unhoused and insecurely housed was supported by a collective of over 50 community partners such as Interior Health, the City of Kelowna (including Social Development and Bylaw Services), RCMP, BC Housing, Canadian Mental Health Association, and the Ki-Low-Na Friendship Society, with backbone support from the Central Okanagan Journey Home Society. The collaborative had strong relationships and organizing structures which emerged through the community's Journey Home Strategy to end homelessness and the antecedent response to increased outdoor sheltering during the COVID-19 pandemic. This enabled working groups in the areas of community outreach, shelter operation, interfaith and lived experience voice to quickly mobilize to respond to the June 2021 heat dome by tapping into shared community resources and knowledge.

In the early days of the heat dome, members of the Lived Experience Circle on Homelessness (LECoH) identified that community cooling centres were not accessible and did not meet the needs of community members experiencing unsheltered homelessness. To ensure equitable access to cooling locations, the collaborative mobilized partners to develop 'pop-up cooling tents' in accessible downtown locations. The cooling tents were operated by Peer Navigators who provided a safe first point of contact and provided shade, 'misters' and cooling supplies. Peer-operated Personal Belonging Storage Programs offered by partner agencies across the downtown core ensured that people had a secure place to leave their belongings while accessing the cooling tents during the day.

In addition to the strong governance structure and communication amongst partners, community outreach was critical to check on people and to provide a better understanding of needs. This included:

Members of the **Lived Experience Circle on Homelessness (LECoH)** who were 'in community' during the heat event to check on people, report back on needs, and guide solutions;

Peer navigators who connected people to services and shared information about where people could access accessible cooling locations, supports and supplies, including sharing an outdoor sheltering guide;

Outreach workers searched for people seeking shade in isolated locations, monitored people for warning signs of heat exhaustion and handed out frozen facecloths and water; and

Bylaw officers and **RCMP** conducted health checks and worked in collaboration with the outreach teams to ensure people felt welcome to access shaded public parks.

Having strong structures for working together enabled partners to mobilize quickly, to leverage resources and draw on community capacity and strengths to keep the unsheltered population safe during the heat dome. This has helped to build a foundation for future extreme weather response.

T'ít'q'et Response to Local Climate Change Impacts

To keep communities safe from extreme heat, it's important to create a heat response plan that works with existing emergency plans and is based on local knowledge, as seen in T'ít'q'et.

T'ít'q'et, a community that is part of the St'át'imc Nation in B.C., has been severely impacted by climate change and extreme weather events such as wildfires and heat waves. These events have **disrupted traditional livelihoods** such as fishing, hunting, and gardening.

With the support of funding from Health Canada, a consultant worked with a local T'ít'q'et Heat Team to develop a **heat response plan** that integrates existing emergency plans and **builds on local knowledge**. The project team has raised awareness of heat preparedness through various means, including **a video made by Chief Sidney Scotchman**, social media and community meetings. During heat events, staff checked in on elders and those most vulnerable regularly, delivering water and distributing air conditioners. Cooling spaces were also established in two community buildings through the installation of tinted windows and a heat pump.

When developing the heat response plan, both the consultant and the T'ít'q'et Heat Team saw so much value in engaging with community members and elders in order to align temperature and weather data with lived experiences and local knowledge.

Going forward, T'ít'q'et will provide **feedback opportunities after each heat season to improve the heat response plan** and will continue to look for ways to support community resiliency such as adequate insulation in homes and planting trees (following Fire Smart principles) to provide shade. They also intend to work with the Squamish-Lillooet Regional District to ensure the plan is integrated into existing emergency response plans.

HEAT RESPONSE IN SOUTHERN INTERIOR COMMUNITIES

The Southern Interior region is home to diverse communities, including many rural communities, with unique needs. Some of the important considerations for developing a heat response plan for communities in the Southern Interior are:

- **Community Capacity:** Not all communities will have planners and emergency management staff that can provide leadership to the development and implementation of a heat response plan. Thus, strong community partnerships, collaboration, and volunteers will be critical to preventing health risks from heat.

- **Asset/Strength-based Planning:** Every community has unique strengths and assets that can be mobilized to address heat-related challenges. Beyond cooling centers, asset/strength-based planning offers a more comprehensive and sustainable approach for communities to respond to heat. By using existing resources such as outdoor spaces, community programs, and networks, communities can build resilience to heat and mitigate its effects by emphasizing collaboration and community engagement to build preparedness for future heat events.

- **Engagement and Communication Channels:** One of the main steps in developing a heat response plan is the establishment of a communications plan. While many rural communities will not have their own radio station or newspaper, communities may rely more on social networks (e.g., caregivers, community groups) to raise awareness of heat alerts and community action.

- **Assessing Vulnerability:** Communities need to consider heat-vulnerable groups such as the elderly, those living in isolated areas, outdoor workers (e.g., farmers, agricultural workers, tree planters)

- **Compounding Emergencies:** Rural communities are often on the frontlines of adapting to climate change, responding to compounding hazards such as wildfires, air quality from wildfire smoke, flooding, drought, and water quality/quantity concerns. While the impact of extreme heat is hard to visualize relative to other climate hazards like wildfire and floods, it can have serious consequences for health and well-being in communities. It is important that heat is integrated into rural Emergency Response Plans to ensure a robust and coordinated response to potentially multiple, concurrent and or successive challenges.

Xeni Gwet'in First Nation Takes Action to Protect Community From Climate Risks

Xeni Gwet'in First Nation (XGFN) demonstrates how embedding heat planning around community risks and priorities, and engaging with community members, can effectively address climate risks and prioritize health and safety.

XGFN is one of the six communities that form the Tŝilhqot'in Nation located in traditional Tŝilhqot'in territory approximately 200km west of Williams Lake, B.C.. Through Health Canada, they received funding to hire an Emergency Program Coordinator to develop an emergency response plan with a focus on heat and provide educational opportunities for community members.

The Coordinator played a crucial role during the 2022 heat season to plan and implement response activities such as **establishing a cooling station** equipped with air conditioning and fans. The cooling station was used by elders, outdoor workers and community members who didn't otherwise have the electrical capacity in their homes to run an air conditioner. The Coordinator also played a role to **ensure ongoing engagement with community members about climate change, heat waves, and their health and safety needs**. This was particularly vital for connecting with elders who lacked phone or Wi-Fi access and would have **otherwise been isolated**. In future heat planning, XGFN will look to further support elders including, **enhance the cooling station** to include spaces for elders to

spend the night, and investigate **passive cooling strategies** for the homes of elders in the community given the limited electrical capacity of many homes.

To embed heat planning into other community emergency and planning processes, the Coordinator also liaised with the **B.C. Wildfire Service** to respond to a wildfire that threatened the community and has worked to address challenges the community faced with emergency response, such as **communication with community members** during emergencies and **building capacity locally** through training for community members to respond to emergencies. Lastly, through the heat planning engagement, the community identified food security as a key priority and XGFN has been able to leverage their heat planning work to access funding to hire a Food Security Coordinator to move this priority area forward.

Ashcroft Community Demonstrates Effective Planning and Preparedness

Ashcroft's Heat Alert and Response System (HARS) is an example of how rural heat preparedness and response can be done in a way that is locally relevant and strengths-based—drawing on the community's strong social cohesion, existing physical infrastructure, and appropriate communication channels. The Ashcroft HARS was activated for the second time in 2021 and demonstrated several areas that have been successful:

- pre-heat notifications and communication of 'heat aware' information;
- direct mail-outs to resident mailboxes;
- the new Voyent Alert mass notification system;
- designated cooling centres;
- neighbours talking to/checking on neighbours; and
- outreach to vulnerable populations such as the elderly.

The challenges Ashcroft experienced during the 2021 heat dome are similar to those experienced by many small rural communities in the Southern Interior region, such as

- co-occurring wildfire and heat events, adding to the potential for service disruption (water, power, transportation) and strain on emergency response capacity;
- limited staff capacity, resource availability, and competing demands for resources and time; and
- limited data availability on the health impacts of heat.

Since the 2021 heat season, the Village of Ashcroft has updated their HARS (January 2022) to include:

- updated heat alert tiers and language to describe alert levels;
- new communication strategies and actions, such as the new Voyent Alert system and the LED sign in town; and
- designating the Community HUB building to be the official cooling centre moving forward.

WHAT CAN YOUR COMMUNITY DO TO PREPARE FOR HEAT?

Actions can be taken in preparation for, during, and after extreme heat events. Keeping everyone safe during extreme heat events requires collaboration across public health, emergency management departments, local governments, First Nations, community partners, and community members.

Heat Preparedness and Response Framework

Communities across Canada are preparing for extreme heat by developing **heat response plans** which:

- identify heat-vulnerable populations and hot/cool places in the community;
- facilitate the development of heat response strategies with community partners to help people at the highest risk; and
- provide individuals with information and other resources to help them take protective actions before and during an extreme heat event.

> Most communities already have an all–hazard or emergency response plan in place which can be adapted for extreme heat.

A heat response framework (Figure 5) involves the following elements that would be shared by various partners such as Interior Health, local governments, First Nations, and communities:

Community Engagement & Response Planning

Prepares the community for the upcoming heat season by identifying community needs, recruiting partners, and developing/updating a heat response plan.

Alerts and Communication

A communication plan supports consistent, audience-appropriate, and easily understood messages about the health risks of heat and how residents can stay safe and cool.

HEAT PREPAREDNESS & RESPONSE FRAMEWORK

Community Mobilization

A coordinating agency activates, coordinates, and facilitates the actions of community partners to implement heat response strategies.

Evaluation/After Action Review

Assesses post-heat season activities, documents lessons learned, and identifies areas for improvement.
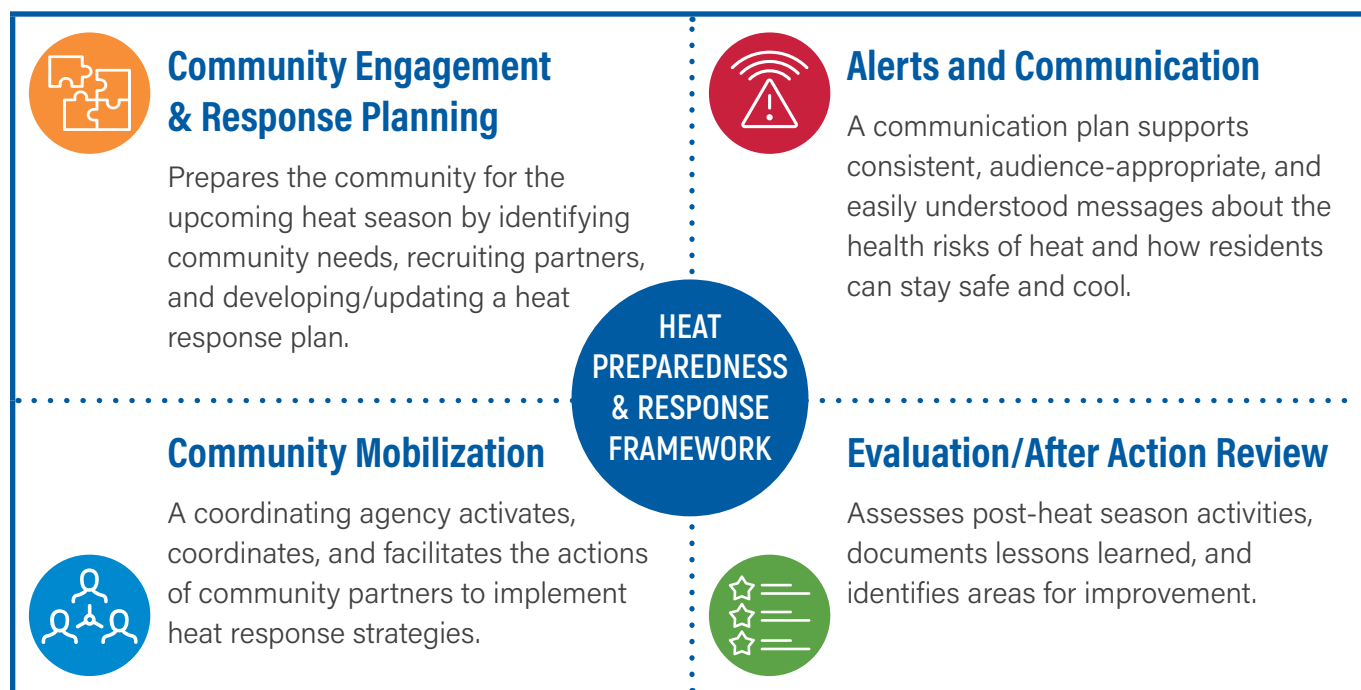
Figure 5. Heat preparedness and response framework

Practical Strategies and Tasks for Heat Preparedness and Response

The ultimate objective of a community heat response plan is to increase community resilience to extreme heat events and develop actions that are most effective in reducing heat-health risks, especially for those who are most vulnerable. While there is no one-size-fits-all plan, there are several practical strategies that have been effective in other Canadian communities. Table 5 (below) shows key tasks associated with each of the four elements of the community heat preparedness and response framework. These tasks are shared by local authorities (see local governments Roles in Heat Preparedness and Response for more details on specific roles).

Table 5. Heat preparedness and response planning key tasks

Pre-Heat Season	
Community Engagement & Response Planning	**Developing a heat response plan** • Identify a lead coordinating agency for the community • Recruit and engage diverse partners to identify community assets, needs, and heat-vulnerable populations • Engage community partners to develop a heat response plan with clear roles, responsibilities, and protocols • Review other relevant emergency response plans, including local authority emergency management plans and business continuity plans **Staff, partner & volunteer readiness** • Convene key community partners to review the plan in preparation for the upcoming heat season • Offer education and training to community partners and other interested parties that work with heat-vulnerable groups • Plan for summer vacations by identifying and educating substitute staff/volunteers to ensure adequate coordination of activities and communications during heat events **Facility and infrastructure readiness** • Contact municipal departments to check inventory and functioning of emergency response equipment such as fans and generators • Develop plans to offer accessible air-conditioned public buildings (e.g., libraries, community centres, town halls) and other cooling options (e.g., pools, shade in parks, misting stations, etc.), especially for heat-vulnerable populations. • Identify transportation options to get people to and from cooling spaces • Alert staff/volunteers that these facilities and spaces may need to remain open and supported beyond regular hours during extreme heat events

Alerts & Communication

Heat Alerts

- Become familiar with B.C. heat alert triggers and activation process.
- Ensure all relevant staff and partners are subscribed to receive weather alerts using the WeatherCAN app

Communications Planning

- Develop a communications plan with identified communication channels (e.g., through media releases, websites, social media, posters, etc.) and informal networks
- Prepare community heat messages and communication strategies for residents, including audience-specific heat messages and outreach strategies that are culturally appropriate
- Collaborate with community partners to develop communications strategies and distribution networks for heat-vulnerable populations

Communications Strategies

- Update websites and distribute promotional material from related agencies and partners (e.g., BCCDC, Health Canada) with information about health risks from heat and how to stay cool
- Place signage inside and outside facilities with air conditioning, and use standardized symbols and signage for cooling spaces
- Order and display heat-health communication material in venues/town halls and distribute to strategic community groups or programs that have interface with high-risk or susceptible populations

Evaluation/After Action Review

- Establish a formal heat after action review process[21] or evaluation plan to reflect on what parts of the heat response plan worked well and where it can be improved

During a Heat Event

Alerts and Communication

- Update local authority websites and social media pages with consistent community messages and heat health information or messaging
- Issue heat messaging to community members and organizations that serve heat-vulnerable populations
- Issue public service announcements with reminders about health risks from extreme heat
- Distribute information to community service providers (e.g., targeted outreach)

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21   An After-Action Review is a structured emergency management process of evaluating and learning from a past event or project to identify strengths, weaknesses, and areas for improvement.

Community Mobilization

Coordination

- Coordinate and facilitate the actions of community partners to implement heat response strategies
- Coordinate regular updates and communication with community partners
- Identify established and informal networks to connect and engage with Indigenous and culturally diverse communities
- Undertake community outreach aimed at reaching those who are heat-vulnerable and require assistance during extreme heat events.

Heat response activities

- Open well-identified, welcoming, accessible cooling spaces (e.g., libraries, community centres, shady outdoor areas) and publicize their locations/hours through all feasible media sources
- Explore potential options for coordinating free transport with local public transport provider for accessing cooling shelters.
- Consider extending hours of air-conditioned facilities and places where people are likely to seek heat relief (e.g., libraries, pools)
- Encourage local services, clubs, and organizations to reschedule services or major events to cooler times of the day (particularly relevant for outdoor events or in venues without air conditioning).
- Suggest alternative work hours for some occupational groups (e.g., outdoor workers), where staff work evenings or nights to avoid intense heat during the day
- Provide public access to drinking water in key areas for those at-risk (e.g., in parks, for the insecurely housed, outdoor workers)
- Work with community partners to distribute fans to populations at risk
- Community partners mobilize staff/volunteers to assist with monitoring and responding to people who are more at risk and/or suffering from heat illness

After a Heat Event

Evaluation / After Action Review

- Host end-of-season evaluation / after action review with involved response partners
- Assess effectiveness of strategies
- Identify what went well, lessons learned, and improvement opportunities

City of Kamloops Heat Communication Plan

Extreme heat response planning needs to involve a communications plan to help community members prepare for the upcoming heat season and stay safe during hot weather.

With support from Interior Health's Healthy Community Development team, the City of Kamloops Social and Community Development and Communications departments jointly created an Extreme Heat Communications Plan that describes organizational roles and key messages to use before and during heat events. This plan also uses an equity lens and demonstrates how municipal staff can play a leadership role in heat planning.

The purpose of the plan is to initiate actions that the City will take to educate and inform residents of the dangers of heat, how to stay safe, and what to do if heat warnings or an extreme heat emergency are triggered. Below is a seasonal guideline and some examples from the communications plan:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
			Heat Education					
				Call for Volunteers				
					HARS Activation (if needed)			
						Extreme Heat Education		
		News Release	Social	Website	City Page (space pending)	NA/Group Sharing		
Heat Education			✓		✓	✓		
Call for Volunteers		✓	✓	✓	✓	✓		
HARS Alert Activation		✓	✓	✓	✓	✓		
Extreme Heat Education			✓	✓		✓		

Figure 6. Seasonal guidelines for City of Kamloops heat communications

Examples of activities include:

- Develop weekly educational social media content about heat risk and tips to stay safe

- Distribute heat communications through committee and working groups

- Educate about heat through City channels (e.g., City website, lobby screens, newsletters, television)

- Send out news releases about cooling centre sites/hours, encouraging neighbour-to-neighbour checks

- Share/retweet messages from Interior Health/Province (as needed)

For more information on City of Kamloops heat preparedness, see https://www.kamloops.ca/public-safety/emergency-preparedness/heat-response

ROLES IN HEAT PREPAREDNESS AND RESPONSE

Developing and implementing a heat response plan requires collaboration, leadership and engagement across several sectors and partners. Some of the most common parties involved in heat response planning include:

- Health authority staff and Medical Health Officers

- Local and regional governments

- First Nations

- Emergency management staff

- Fire officials

- First responders (EMT, etc.)

- Community organizations that work with vulnerable populations (e.g., seniors, low-income, homeless)

- School districts

- Community members and volunteers

To develop a community heat response plan, it is important to **identify an organization that will be responsible for leading** the initiative. The lead organization coordinates overall development of the plan, engages partners and assumes the role of, or picks, a local champion. The lead organization needs to be clearly identified to all participants. All partners should understand their respective roles and responsibilities and be engaged in various stages of the plan development. (Note: local governments are often the lead organization for a community heat response plan, especially if heat response is integrated with existing emergency management plans.)

Health Canada (2012). Heat Alert and Response Systems to Protect Health: Best Practices Guidebook

Specific Roles

Federal Government

Federal government partners support heat alert and response by providing up-to-date data and research as well as producing resources, training, tools, and promotional materials for staying safe and healthy in extreme heat.

- Environment and Climate Change Canada (ECCC) works with the BCCDC and health authorities to develop heat alert triggers for regions across B.C. Health Canada works closely with the Meteorological Service of Canada in monitoring the weather and developing Heat Warnings that underpin a successful heat response.

- Health Canada also produces educational, communications and promotional material on heat risks and adaptive behaviours that can be accessed online and sent to communities by request.

Provincial Government

The provincial government plays a key role in collaborating with other government agencies and departments to promote a whole-of-government approach to heat communications, emergency management planning and emergency structure activations. Specific roles include:

- The Government of British Columbia created the **B.C. HEAT Coordinating Committee** which has:

  » Established recommended actions, standardized language and key messaging that can be used in preparation for, and during an extreme heat event

  » Created the B.C. Heat Alert and Response System in collaboration with key partners at the Ministry of Emergency Management and Climate Readiness (EMCR), ECCC, BCCDC, and health authorities to be used as a reference point for partners and local authorities to build out their heat plans.

- The **Ministry of Health** (in collaboration with health authorities) has developed communication tools such as guides, infographics, and communications templates.

- **EMCR** is the province's lead coordinating agency for all emergency management activities, including response, planning, training, and testing. They have:

  » Developed a funding policy in relation to the *Emergency Program Act which* supports local authorities / First Nations in accessing funds during Heat Warnings/extreme heat emergencies.

  » Developed an engagement plan for partners and the public on provincial extreme heat-related activity and support to date.

Interior Health

Interior Health can support communities across the region to reduce the impact of extreme heat. Specifically, Interior Health can:

- Support the development of community heat preparedness and response plans;

- Participate in regional briefing calls with local governments/First Nations to provide public health advice;

- Communicate publicly about Heat Warnings and key public health messaging related to the prevention of heat-related illness;

- Provide and review public health messaging for community heat response communications;

- Support the engagement of Interior Health staff in heat response planning and implementation internally;

- Monitor clients and patients who are vulnerable to heat-related illness; and

- Provide available and appropriate public health surveillance data from previous heat events to partners to inform decision-making.

Local Governments

Local governments are critical for providing leadership and support for any type of community-led planning and implementation. Local governments can:

- Convene and engage local partners in heat planning;

- Ensure extreme heat is considered and integrated into existing emergency response plans;

- Support communication about heat alerts and actions to mitigate heat risk via municipal websites, social media and other communication channels;

- Educate and engage municipal staff in developing and implementing heat response strategies; and

- Evaluate and update heat response plans to ensure they stay relevant.

Community Partners

Community partners are essential contributors to the development and implementation of outreach and communication strategies, particularly agencies that work with populations at the highest risk.

- Engage organizations that deliver homecare services, poverty and literacy agencies, Aboriginal Friendship Centres, homelessness services, tourism centres, and active living and faith-based organizations to ensure the heat plans include partners that can support specific populations (e.g., seniors, homeless, etc.) during heat events.

Early in the process of developing a heat response plan, ensure a community **engagement plan** is developed. All partners that are involved in developing and implementing the heat response plan should be provided with information about the risks of extreme heat and why it is important that the community work together to plan for action now.

Long-Term Strategies and Preventive Actions

A heat response plan is most effective when it is delivered in conjunction with preventative actions that provide long-term and sustainable protection from extreme heat events such as reducing greenhouse gas emissions, improving social networks, and promoting healthy communities. Local governments can undertake specific preventive actions for extreme heat such as:

- Developing climate change adaptation strategies

- Updating municipal emergency protocols

- Installing public water fountains

- Planting trees and increasing canopy coverage

- Changing the built environment to reduce heat (high albedo surfaces for buildings and pavements)

- Researching/mapping populations at high risk to heat in your community

- Setting up systems for people to self-register to receive updates on response measures (e.g. new cooling facilities) and heat alerts by telephone, e-mail, text message.

- Cultivating social connection across the community (for example, most people who died during the 2021 heat season lived alone)

- Setting building standards (e.g., maximum indoor temperatures)

- Creative public shared spaces (e.g., playgrounds designed to increase shade, misters, etc.)

TOWN OF OSOYOOS INTEGRATES HEAT RESPONSE INTO COMMUNITY PLAN AND WORKS TO INCREASE TREE CANOPY COVERAGE

The Town of Osoyoos includes a focus on heat in the Official Community Plan 2040, and is taking proactive steps to address the potential health impacts of extreme heat by developing their own municipal heat alert and response system. The Official Community Plan also includes policy direction to **retain and increase tree canopy coverage** to reduce urban heat islands and reduce energy demands on buildings. Urban tree canopies provide shade and equitable distribution of green space which can be a protective factor during extreme heat events[22]. The Town of Osoyoos is prioritizing both immediate response and longer-term strategies to mitigate the impacts of extreme heat.

CONTACT

To learn more about how Interior Health can support your community to develop a community heat response plan, please contact Interior Health through this email address: HBE@interiorhealth.ca

RESOURCES & TOOLS FOR HEAT RESPONSE

Category	Resource	Description
Funding & capacity building	Union of B.C. Municipalities Community Emergency Preparedness Fund	There are funding streams intended to enhance the resiliency of local governments, First Nations, and communities in responding to emergencies.
	Infrastructure Canada: Disaster Mitigation and Adaptation Fund	In 2018, the Government of Canada launched the Disaster Mitigation and Adaptation Fund (DMAF), committing $2 billion over 10 years to invest in structural and natural infrastructure projects to increase the resilience of communities that are impacted by natural disasters triggered by climate change.
	British Columbia Centre for Disease Control. Developing a Municipal Heat Response Plan: A Guide for Medium-Sized Municipalities.	The BCCDC has developed a short practical guide for municipalities that outlines key considerations before, during and after a heat event.
Management & planning	Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021	The Chief Coroner convened a death review panel to review the circumstances around heat-related deaths to identify actions to improve public safety and prevent future deaths. This multi-disciplinary panel was comprised of experts in emergency management, medicine, public health, First Nations health, seniors, city and municipal planning, health administration, poverty reduction, patient safety, policy, research, housing, police, fire and ambulance services.

22   Henderson et al. (2022) Analysis of community deaths during the catastrophic 2021 heat dome: Early evidence to inform the public health response during subsequent events in greater Vancouver, Canada. doi:10.1097/EE9.0000000000000189

Category	Resource	Description
Practice & behaviour	PreparedBC: Extreme Heat Preparedness Guide	Accessible guide to help individuals, households and communities prepare for the next Extreme Heat Emergency in British Columbia. Includes advice and actions to protect individuals, households, and communities by providing tips on how to stay cool both inside and outside.
Communications	Extreme heat social media package	PreparedBC has created an easy-to-use social media package with graphics and pre-written content.
	Communicating the Health Risks of Extreme Heat Events: Toolkit for Public Health and Emergency Management Officials	Health Canada has developed a guidebook on best communication practices for targeting heat-health messages to specific populations at risk. The guidebook is based on leading research and practices used by communities to communicate with vulnerable populations through health promotion campaigns.
	Instagram post re: knowing the difference between a heat warning and an extreme heat emergency	Government of B.C. Instagram post about understanding the difference between a Heat Warning and an extreme heat emergency.

Category	Resource	Description
Communications (continued)	Infographic: Staying Healthy in the Heat	Health Canada has produced a number of public communications materials that are available to municipalities free of charge. Hard copies of all Health Canada extreme heat communication materials (e.g., brochures, infographics) are available free of cost and can be mailed to your community.
	Infographic: Be prepared for hot weather	Infographic on how to prepare for hot weather developed by First Nations Health Authority
Information	Irreversible Extreme Heat: Protecting Canadians and Communities from a Lethal Future	This guide presents a compendium of practical actions that Canadians can undertake to reduce risks in relation to extreme heat that fall into three categories: changing behaviour (non-structural), working with nature (green infrastructure), improving buildings and public infrastructure (grey infrastructure)
	Climate Ready B.C.	ClimateReadyBC is an online platform to help the public and communities: 1) Understand disaster and climate risks 2) Find funding and supports to make communities more resilient

Category	Resource	Description
Alert & Warning systems	B.C. Provincial Heat Alert and Response System (BC HARS)	The BC HARS serves as a comprehensive plan for managing heat-related risks and provides guidance for various partners and public health actors to prepare for and respond to heat events in B.C. The document's four-part structure, covering pre-season, during a Heat Warning, during an Extreme Heat Emergency, and post-season or deactivation, highlights the importance of proactive measures and the need for a well-coordinated response to heat events.
	B.C. Heat Impacts Prediction System (BCPS)	Interactive online mapping system (the BCHIPS Map) intended for use by members of the public to support health protection during hot weather. It provides heat health risks for today, tomorrow and two days after, as well as daily risk comparison using observed data from the hottest and coldest years. Reported at the level of local health area (LHA).
	Heat Alert and Response Systems to Protect Health: Best Practices Guidebook	Health Canada has developed a best practices guidebook for developing a HARS. The Guidebook helps users take into consideration community-specific vulnerabilities and identify appropriate outreach and response activities.

Category	Resource	Description
Vulnerability assessment	Lived Experience of Extreme Heat in B.C.	This report provides a summary of engagement of people with lived experience of extreme heat events in B.C. in 2021.
	NCCEH Wellness Check	A guide for doing in-person or remote health checks. Created in partnership with the BCCDC.
	Heat Check-In Support Framework	Complementary resource to the NCCEH/BCCDC guide, to empower organizations to conduct heat check-ins.
	Climate change and community health maps: Interior Health	Maps and identifies community vulnerability to 4 hazards: summer heat, flooding, wildfire smoke, and lower winter temperatures in Interior Health regions. Vulnerability is determined by exposure, sensitivity, and adaptive capacity. Explore example communities and interactive hazard maps for each area at Regional Maps. Data is from 2016 census and mapped at census dissemination area.
	Adapting to Extreme Heat Events: Guidelines for Assessing Health Vulnerability	Health Canada has developed this resource to provide guidance on the steps needed to better understand the vulnerabilities of different populations in Canadian communities.

Interior Health