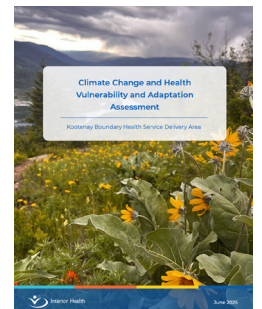


Climate Change and Health Vulnerability and Adaptation Assessment

Kootenay Boundary Health Service Delivery Area

SUMMARY

For more details, refer to the Climate Change and Health Vulnerability and Adaptation Assessment – Full Report.



Acknowledgements

Interior Health (IH) provides health and wellness services across the ancestral, unceded and traditional territories of the Däkelh Dené, St'át'imc, syilx, Tšilhqot'in, Ktunaxa, Secwépemc and Nlaka'pamux Nations. We honour the First Nations as the traditional stewards of these lands and waters. IH recognizes Métis Nation British Columbia (MNBC) and Métis Peoples in the Interior region who contribute to the diverse landscape of Indigenous ways of knowing and being.

We offer our sincere gratitude to our partners who have contributed to this project including representatives from MNBC and Ktunaxa Nation, Regional District of Central Kootenay (RDCK), Regional District of Kootenay Boundary (RDKB), the Cities of Nelson, Castlegar, Rossland and Trail, as well as the Town of Creston, Selkirk College, Columbia Basin Trust, Columbia Basin Environmental Education Network, Neighbours United and Youth Climate Corps. We would also like to thank our IH colleagues for taking time to share their perspectives and experiences with us.

Background

The IH region is experiencing the impacts of climate-related extreme weather events, including heat, flooding, drought and wildfires, which are expected to intensify. In response, communities are working together to reduce climate risks, recognizing the social, economic and environmental benefits of coordinated action. To support these efforts, IH released the five-year [Climate Change and Sustainability Roadmap \(2023-2028\)](#), which includes an action to conduct a climate change and health vulnerability and adaptation assessment (CCHVAA). This assessment defines vulnerability to the health impacts of climate change as the interactions between climate exposure, sensitivity and adaptive capacity. This CCHVAA was guided by Health Canada's [Climate Change and Health Vulnerability and Adaptation Assessment: Workbook for the Canadian Health Sectors](#) and CCHVAAs completed by other jurisdictions.

Exposure

the probability of a climate-related hazard, such as an extreme weather event, occurring to an individual or population.

Sensitivity

the degree to which a populations or systems are affected, either adversely or beneficially, by climate variability or change.

Adaptive Capacity

the ability to adjust to impacts and reduce any health risks.

Purpose and Scope

This CCHVAA focuses on extreme heat, cold, flooding, wildfires and smoke, and drought in the Kootenay Boundary (KB) Health Service Delivery Area (HSDA). We scoped our CCHVAAs to be completed at the HSDA level so we can reflect the sub-regional nuances and contexts across the IH region, while also enabling more thorough engagement with local partners. The KB HSDA was selected as the pilot region based on a high-level assessment of vulnerability across HSDAs and the existing partnerships and ongoing climate initiatives in the area. We focused on climate-related health impacts on populations in the region and adaptation actions that support broader climate resilience. A detailed assessment on the health system or health facilities was out of scope for this assessment.

This assessment employed two key methods:

1 Engagement with local government and Indigenous partners, postsecondary, funding and non-profit organizations, and health system partners across the KB HSDA.

2 Synthesis of the variety of data on exposures, health impacts, and surveys exploring the broader realities of life for people who live in the KB HSDA.

The intended purposes of this work are to:

- Shed light on health inequities and inform ways to reduce these gaps.
- Improve collaboration, open communication and reciprocity between health authorities, local governments, Indigenous partners, community organizations and academic and funding partners.
- Establish a baseline from which we can compare and monitor changes in local risk and resilience.
- Provide a strong basis of evidence for policy- and decision-makers to consider health and well-being in their work and prioritize climate actions tailored for unique regional and geographic needs.
- Identify opportunities to strengthen or create policies and actions that enhance adaptive capacity and support healthy, thriving, and sustainable communities.

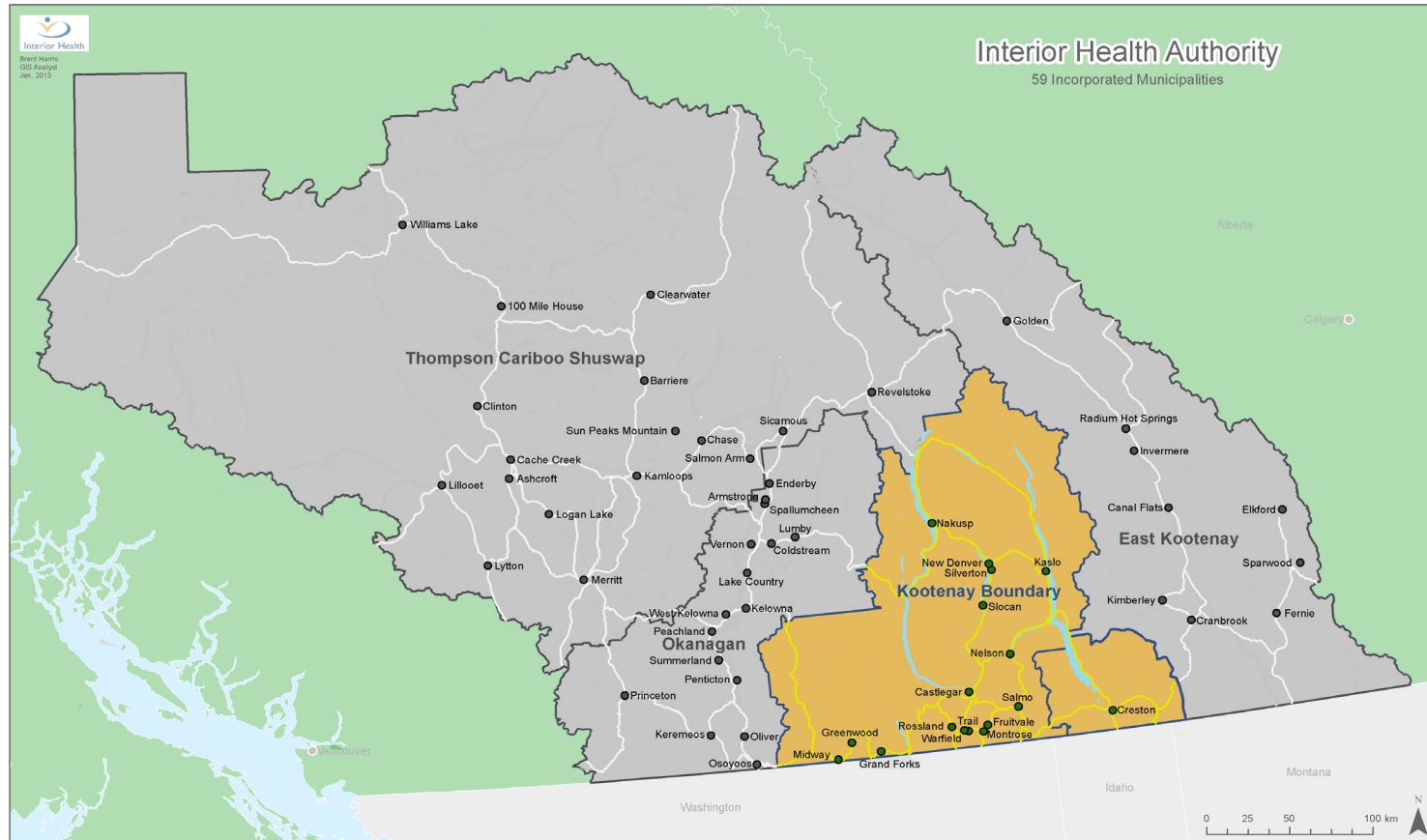


Kootenay Boundary Health Service Delivery Area

We recognize that the KB HSDA is a colonial boundary for health service distribution. The area we are assessing includes the traditional, ancestral, and unceded territory of the Ktunaxa, Sinixt, syilx, and Secwépemc peoples, who have been and continue to be the traditional stewards of these lands, air, and waters. The area is also the chosen home to three Métis Chartered Communities: Nelson and Area Metis Society, Kootenay South Metis Association, and the Boundary Metis Community Association. For more information, refer to the [map of First Nations & Metis Chartered Communities in Interior Health](#).

The KB HSDA covers two regional districts, 17 municipalities and 16 electoral areas:

- Regional District of Central Kootenay RDCK: 9 municipalities, 11 electoral areas
- Regional District of Kootenay Boundary RBKB: 8 municipalities, 5 electoral areas



What We Learned

Sensitivity to climate impacts

Across the KB HSDA, all communities experience sensitivity to climate impacts due to physiological, socio-economic, and geographic factors, though the reasons and severity vary. For example, small local governments may struggle to fund infrastructure upgrades, or communities may have more low-income residents or people with chronic health conditions – factors that increase vulnerability to extreme weather.

Some communities face higher sensitivity due to aging infrastructure, weak social connections, or multiple health challenges. Others are better positioned with stronger social networks, fewer economic pressures, or better overall health. While sensitivity levels differ, these challenges are common across the region.

Population group	Mechanism of disproportionate risk and health impact
Individuals with pre-existing chronic conditions	Compared to provincial rates, the KB HSDA has higher rates of mental health disorders and chronic diseases like COPD. Conditions that affect circulation, nerve function or metabolism, as well as medications that interfere with processes like sweating or blood flow, can increase vulnerability to extreme heat or cold. Chronic obstructive pulmonary disease (COPD) and asthma can worsen with exposure to smoke particles during wildfires and mold spores in the aftermath of flooding.
Children	Children's bodies are not fully developed to handle extreme heat, extreme cold, or filter pollutants which makes them more vulnerable to dehydration, heat rash, and the risk of developing pediatric pneumonia in extreme cold. ¹ In the event of smoke, even short-term exposure can have lasting effects on their respiratory health. ^{2,3}
Older adults	Across the KB HSDA, the proportion of the population aged 75+ is expected to grow by 36% between 2021 and 2026. ⁴ As people age, their bodies are more sensitive to heat and cold. ^{5,6,7} Additionally, they may have pre-existing chronic conditions such as heart disease which can make exposure to extreme weather more dangerous. ⁸
Individuals who are precariously housed	Individuals who are unable to find adequate shelter from extreme weather events, or whose shelter may be severely compromised by these events are drastically more exposed and at risk of negative health impacts. ⁹⁻¹¹
Outdoor workers	Outdoor work, such as in agriculture, construction, and other industries, can expose workers to the elements for extended periods of time. Prolonged exposure increases the risk of health harms, such as to smoke during wildfire season, or to mold spores in the aftermath of a flood.
Individuals with low socio-economic status	In 2021, the percentage of low-income persons exceeded the provincial rate in nine municipalities in the KB HSDA. Financial constraints significantly affect the ability of individuals to take health-protective actions like retrofitting a home to ensure it stays adequately cool in the summer or warm in the winter.
Individuals who live in very rural and remote areas	The risk of harmful impacts is heightened in communities with limited access to health and social services due to their location. For example, communities that rely on single access routes, such as bridges and mountain passes, may find these routes impassable during extreme weather events, isolating them and hindering emergency response efforts.

Exposure to climate hazards

The KB HSDA experiences climatic conditions that can result in severe weather. While these phenomena are not new, their frequency and severity have been growing, driven by climate change, which also increases the potential for health impacts. Beyond the direct health impacts, climate change and its associated extreme weather events disrupt local ecosystems, economies, infrastructure, and social networks which subsequently impact physical and mental health through their effects on social, economic, and other determinants of health.

Extreme Heat

During the past summers from 2022 to 2024, communities in the region have seen temperatures exceed 40°C, breaking historical records.^{12–14} These heatwaves are becoming a recurring summer phenomenon.^{15–17} Climate models project that average temperatures in the KB HSDA will significantly increase, with annual averages rising by 2.5–4.5°C by 2050.ⁱ

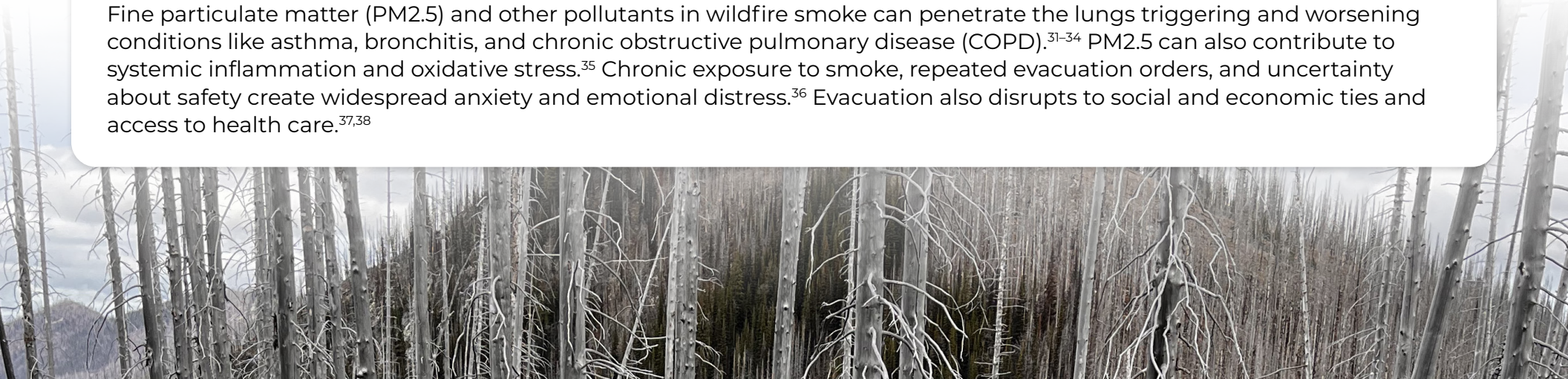
These extreme heat events impose strains on the human body. Heat-related illnesses range from mild conditions like heat cramps to severe and life-threatening conditions like heatstroke.¹⁸ Extreme heat also places a significant strain on cardiovascular systems.^{19–22} High temperatures can also disrupt sleep patterns, increase irritability and exacerbate anxiety and depression.²³

ⁱ Annual averages rising by 2.5–4.5°C by 2050 if greenhouse gas emissions continue at or exceed current levels

Wildfire and wildfire smoke

During the 2024 wildfire season, communities in the Slocan Valley faced evacuation orders due to encroaching wildfires.^{24–26} The 2021 and 2023 wildfire seasons saw parts of the region with air quality indices (AQI) reaching "hazardous" levels for weeks at a time.^{27–29} Wildfire smoke exposure is anticipated to worsen, with AQI reaching hazardous levels more frequently.³⁰

Fine particulate matter (PM2.5) and other pollutants in wildfire smoke can penetrate the lungs triggering and worsening conditions like asthma, bronchitis, and chronic obstructive pulmonary disease (COPD).^{31–34} PM2.5 can also contribute to systemic inflammation and oxidative stress.³⁵ Chronic exposure to smoke, repeated evacuation orders, and uncertainty about safety create widespread anxiety and emotional distress.³⁶ Evacuation also disrupts social and economic ties and access to health care.^{37,38}



Floods

Communities in the region have experienced multiple high-water events resulting in heightened alert levels and evacuation orders being issued.³⁹⁻⁴³ These events impact critical infrastructure in the region, including roads, bridges and utilities.⁴⁴⁻⁴⁷ Climate models project that the KB HSDA will experience increases in annual total precipitation and maximum one-day precipitation, which is sometimes called the “wettest day of the year”. Heavier downpours, which concentrate large amounts of water in short timeframes, can lead to flash floods that erode land, and damage infrastructure.

Floodwaters often carry harmful pathogens, chemicals, and debris impacting the quality of drinking water and creating public health risks.⁴⁸ Standing water following floods can promote mold growth in homes and buildings, contributing to respiratory conditions such as asthma and allergies.^{49,50}

Cold and Winter Storms

Cold and winter storms: A portion of the housing stock in the KB HSDA comprises of older buildings that lack modern weatherproofing and are highly susceptible to heat loss.⁵¹ Energy poverty exacerbates these issues, as low-income households may struggle to afford adequate heating, leading to prolonged exposure to harmful indoor cold.⁵¹ Winter road conditions are also a significant hazard in the KB HSDA. In 2024, winter storm warnings were issued on Highway 3 from Hope to Princeton and from Grand Forks to Creston which are main transportation corridors in the region.⁵²⁻⁵⁴

Cold-related illnesses like hypothermia and frostbite disproportionately impact individuals who are precariously housed.⁵⁵ Cold exposure also exacerbates respiratory and cardiovascular diseases.^{56,57,58} Falls, and other injuries that occur in icy conditions, can lead to fractures and other injuries.^{59,60}

Drought

The KB HSDA has residents who rely on small drinking water systems and private wells, which are at risk of reduced water quality and quantity during drought. As water levels in rivers, lakes and reservoirs decline, the concentration of pollutants increases.⁶⁴ Exposure to contaminated water can cause gastrointestinal illnesses. Drought conditions can also result in dry, dusty environments, increasing airborne particulate matter which can result in irritation in the eyes, throat and airways.⁶⁵⁻⁶⁸ The KB HSDA has also seen heightened fire risk during drought years.⁶³

Persistent drought conditions create economic instability due to impacts to industries like agriculture. The resulting financial stress and uncertainty can contribute to increased rates of anxiety and depression.⁶⁸



Compounding climate hazards: The increasing frequency and intensity of climate-driven extreme weather events has resulted in rising co-occurrence and/or sequential occurrence of these events. Some communities may see extreme heat and wildfire occurring at the same time, while other communities may experience back-to-back drought, fire, and flood. The combination of exposure to extreme heat and wildfire smoke has been shown to be even more detrimental, increasing hospitalizations for respiratory distress and cardiovascular complications.^{69,70}

These compounding hazards mean people struggle to cope and have little time to recover between events, resulting in longer-term physical and mental health impacts. People exposed to multiple disasters, such as wildfires and floods, are more likely to report severe mental health outcomes, including post-traumatic stress disorder (PTSD).⁷¹

Health System Impacts of Climate-Driven Extreme Weather Events: The health system in the KB HSDA is also exposed to all the extreme weather events described. These events disrupt health-care operations, strain workforce capacity, and damage critical infrastructure, making it difficult for medical facilities to provide timely and effective care. Health-care workers experience immense pressure during extreme weather events as they are experiencing the impacts while trying to support communities, leading to increased fatigue, burnout and staff shortages.^{72,73}

Severe weather events create significant logistical challenges for health-care delivery. Snow and ice accumulation, flooding and wildfire-related road closures prevent ambulances from reaching patients in time, leading to critical delays in emergency response. Rural clinics and hospitals often lack sufficient resources to handle surges in patient volume due to these events. Evacuation alerts and/or orders may mean that health-care facilities are evacuated, and patients are transferred to sites outside the evacuation zone; these are challenging undertakings with significant impacts on care delivery.

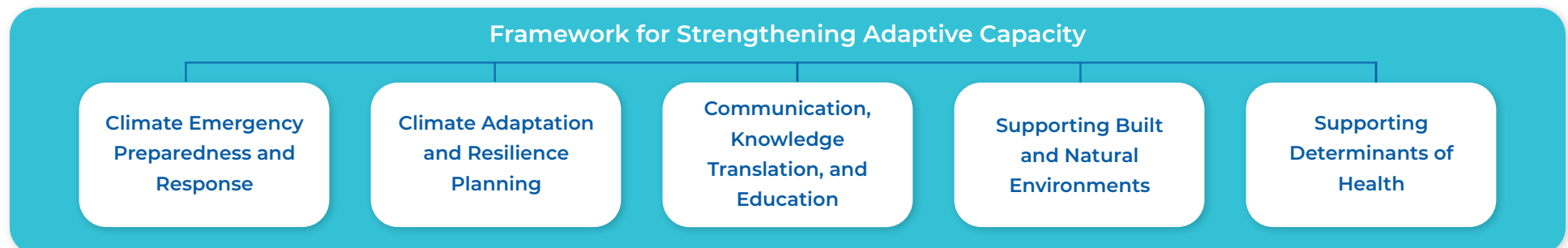
Health-care facilities may also face structural damage and operational disruptions due to extreme weather events.⁷⁴ Power outages from winter storms, wildfires, floods, and heatwaves compromise facility operations and the ability to use essential medical equipment, including ventilators, dialysis machines, and refrigeration units for medications and blood storage.⁷⁴

Strengths and Opportunities for Adaptation

Adaptive capacity is a dynamic and multi-faceted concept that determines how effectively communities can respond to and recover from climate-related health risks. By engaging with a variety of people with local expertise including local governments, Indigenous partners, community and funding organizations, post-secondary institutions and IH staff, the assessment identified strengths and barriers, as well as opportunities for strengthening adaptive capacity in the KB HSDA into the future.

Building adaptive capacity in the KB HSDA

Current Strengths	Current Barriers
<ul style="list-style-type: none"> • A foundation to build upon of existing climate adaptation and emergency preparedness and response efforts • Initiatives aimed at reducing the impacts of climate change on vulnerable populations • Data and information available to illustrate the connection between climate change and well-being. • Committed grassroots organizations supporting environmental engagement and education 	<ul style="list-style-type: none"> • Limited staff and volunteer capacity • Community polarization hindering adaptation efforts • Competing demands for many organizations • Inadequate and inconsistent funding alternatives • Aging infrastructure that is not resilient to climate impacts
Pathways to Strengthen Adaptive Capacity	
<ul style="list-style-type: none"> • Climate adaptation and resilience planning, provides a framework for action and spreads awareness about the interconnected impacts of climate change, health and well-being. • Climate emergency preparedness and response, ensures that communities are ready to face and recover from extreme weather events and other climate-related disasters. • Communication, knowledge translation and education, increases awareness of climate change impacts, empowering individuals and communities to take informed action. It can also support evidence-based adaptation strategies by bridging the gap between research and practice. • Supporting determinants of health, reduces inequitable impacts of climate change by empowering communities and creating systems of support. • Supporting the built and natural environments, adopting a climate informed approach to the decision making around land-use and ecosystem management can build resilient communities and systems that support health and well-being. 	



Pathways to Build Adaptive Capacity

The pathways and opportunities presented here emerged from our assessment process. They are not intended to be prescriptive but rather identify ways in which adaptive capacity can be strengthened in the KB HSDA. Some of these pathways include opportunities that could contribute to adaptive capacity in the near term, whereas some pathways include opportunities that build longer-term adaptive capacity and resilience. Some of the strategies are more specific to roles that IH can play, and other opportunities will require collaboration with external partners.

Pathways	Future Opportunities	E.g.'s of Current Initiatives	Resources
Improving Near-term Adaptive Capacity: These pathways and strategies represent opportunities to work through some of the issues and barriers identified to be impacting how communities can plan and respond to climate events currently.			
Climate Adaptation and Resiliency Planning	<ul style="list-style-type: none"> Baseline work to ensure there is framework for action and spread awareness about the interconnected impacts of climate change, health and well-being Strategies can include many of the ideas below 	<ul style="list-style-type: none"> Nelson Next Climate Action Plan RDKB Climate Action Plan 	<ul style="list-style-type: none"> Preparing for Climate Change
Climate Emergency Preparedness and Response	<p>IH Strategies</p> <ul style="list-style-type: none"> Strengthen IH's role in preparedness and response efforts by actively participating in emergency preparedness planning with local governments Clarify roles and responsibilities by mapping out planning and response actions Advocate to BC HEAT and Environment and Climate Change Canada for greater transparency on weather monitoring Explore opportunities for IH Employed Student Nurses to conduct outreach Implement climate resilience program for IH leadership to support staff <p>Collaborative Strategies</p> <ul style="list-style-type: none"> Actively consider mental health as part of climate preparedness efforts (e.g., establishing mental health training for frontline response personnel) 	<ul style="list-style-type: none"> RDCK Neighbourhood Emergency Preparedness Program Grand Forks Flood Mitigation Program City of Castlegar Wildfire Protection Plan Emergency Preparedness Webinars for Métis Chartered Communities IH Seasonal Readiness Working Group IH Site-Level Climate Assessment and Emergency Response Planning 	<ul style="list-style-type: none"> BC Heat Alert Response Plan Recommendations to Reduce the Impacts of Exposure to Winter Weather on People Experiencing Homelessness Mental Health and Climate Change Alliance PHSA- Psychosocial First Aid resources UBC Climate Wellbeing Resource Kit
Communication, Knowledge Translation, and Education	<p>IH Strategies</p> <ul style="list-style-type: none"> Refine IH's hazard-specific communication plans annually, incorporating community feedback to ensure messaging is relevant and addresses multiple risks Share findings from the Climate Change and Health Vulnerability and Adaptation Assessment (CCHVAA) to support decision-making 	<ul style="list-style-type: none"> Selkirk College State of the Basin Columbia Basin Environmental Education Network - Wild Voices Programs 	<ul style="list-style-type: none"> CCHVAA Knowledge Translation items to be developed early summer 2025

	<ul style="list-style-type: none"> Build capacity for population health programs to integrate a climate change and health lens into knowledge translation work with external partners <p>Collaborative Strategies</p> <ul style="list-style-type: none"> Engage new partners (e.g., libraries) to raise awareness of the links between climate change and health year-round and during climate events. 	<ul style="list-style-type: none"> RDKB Boundary Watershed Webinars—Science & Learning Youth Climate Corps – Community Ambassador Ktunaxa Nation – Cultural Burning 	
<p>Building long-term adaptive capacity: These pathways and strategies represent opportunities to collaborate with Indigenous partners, local governments and community organizations, they can serve as a next step to provide in-community support by helping to integrate findings from this assessment into community planning processes and programs.</p>			
Supporting Determinants of Health	<p>Strengthen Social Connection and Support Resilient Local Food Systems.</p> <p>IH Strategies</p> <ul style="list-style-type: none"> Integrate a climate and health lens into frontline public health practice Encourage frontline staff to connect clients with local social programs (e.g., library events, community programs) to strengthen community ties. Identify role in supporting Indigenous food security and sovereignty <p>Collaborative Strategies</p> <ul style="list-style-type: none"> Embed social connectedness principles into policies Support investment in social events and programs that enhance well-being and resilience (e.g., support investments by writing letters of support for grants). Use health evidence to advocate for economic innovations that support a resilient, low carbon local food system that enhance regional food access (e.g., community food hubs, emergency food access initiatives) 	<p>Community-level actions</p> <ul style="list-style-type: none"> Boundary Food Hub Grow and Connect: Kootenay-Boundary Distribution Pilot Resilience and Alternative Food Network Bridging Rural Homelessness Project RDCK Housing Needs Assessment and Report Well-Being in the Boundary Region: Strategy to Eliminate Poverty 	<ul style="list-style-type: none"> Public Health Guidelines for Social Connection: Building Healthier Lives and Communities Social Connection Guidelines Social Prescribing Resources Environment and Climate Regional Guidebook Climate Change Mitigation in the Food System
Supporting the Built Environment and Natural Environment	<p>Collaborative Strategies</p> <p>Strengthen local government climate action by promoting the health co-benefits through community planning and implementation. This can include:</p> <ul style="list-style-type: none"> Implementing the BC Step Code to improve building energy efficiency Expanding retrofit programs that prioritize renters and low-income community members Using natural asset management for climate resilience 	<p>Community-level actions</p> <ul style="list-style-type: none"> RDKB Floodplain Mapping and Management Bylaw South Kootenay Green Link Active Transportation Plan RDCK Regional Energy Efficiency Program yaqan nu?kiy Wetland Restoration 	<ul style="list-style-type: none"> Advancing Adaptation Case Studies Climate Change, Health Equity and the Built Environment

Looking forward

This assessment was created to take a deep and thoughtful look at how climate change affects health in the KB HSDA. We know that climate change is much more than just rising temperatures or shifting weather patterns; it affects our social lives, our jobs, and our overall well-being, impacting everyday lives and the health of individuals and populations. With this in mind, the assessment aimed to illustrate and connect current and future impacts and provide a full picture of the challenges that come with a changing climate as well as the opportunities to build on community strengths and bolster resilience.

There are notable strengths and assets to build on, despite the many challenges. Many communities have cultivated strong social network—neighbours regularly check on vulnerable community members, share equipment and pool resources during crises. Formal and informal collaborations between local governments, Indigenous communities, health authorities and volunteer-led initiatives also contribute to improved communication and more effective implementation of adaptation actions.

Building on the insights from this assessment, the next steps are focused on transforming the information into practical actions that benefit both our communities and the local health system. The key is to use this knowledge to build resilience and improve preparedness, ensuring that everyone is better protected against the evolving challenges posed by climate change.



Project Development Team

The CCHVAA was completed by the CCHVAA Working Group, a cross-disciplinary group with representation from Population and Public Health programs and the Epidemiology and Surveillance Unit. This included:

- Dr. Sue Pollock, Medical Health Officer
- Julian Mallinson, Director, Strategic Initiatives
- Kady Hunter, Lead, Climate Change and Health
- Glory Apantaku, Climate and Health Scientist
- Carolina Arana, Coordinator, Climate Readiness and Resilience
- Jenny Green, Team Lead, Healthy Community Development Team
- Chanelle Giroux, Administrative Assistant
- Vi Nguyen, Public Health Epidemiologist
- Melissa Cline, Community Health Facilitator (during engagement period)

The working group was responsible for scoping, establishing a framework, collecting and analyzing data, and synthesizing the information into this report and future knowledge translation materials.

In addition, the CCHVAA was reviewed by IH staff external to the working group including the Chief Medical Health Officer, and staff from Population and Public Health, Emergency Response, Health Emergency Management BC, Communications and Engagement, and Indigenous Partnerships. In addition to this summary, a full report is also available.

This project was completed as part of broader work supported by the Ministry of Health and the Climate Preparedness and Adaptation Strategy.



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