



# CLIMATE CHANGE AND HEALTH VULNERABILITY AND CAPACITY ASSESSMENT

**SUMMARY REPORT**  
FEBRUARY 2022

VANCOUVER COASTAL HEALTH AND FRASER HEALTH



## ACKNOWLEDGEMENTS

This report was prepared by Craig Brown, Project Lead for the BC Lower Mainland Health Authorities HealthADAPT project, Emily Peterson, VCH Environmental Health Scientist, and Amy Lubik, FH Policy Analyst. The authors were supported by the HealthADAPT project steering committee, which included Randy Ash and Dr. Michael Schwandt from Vancouver Coastal Health; Oona Kerwin, Dr. Alex Choi, and Dr. Emily Newhouse from Fraser Health; Angie Woo from VCH/FH Facilities Management; and Scott Blessin from Health Emergency Management BC.

The offices where this work was carried out are located on the unceded territories of the Musqueam, Squamish, and Tsleil-Waututh Nations and the work of our organizations takes place in numerous territories and Métis chartered communities in the regions. We approach our work with Indigenous leaders and knowledge keepers with a commitment to respect and reconciliation, and acknowledge the leadership role that all of the First Nations within the Vancouver Coastal Health and Fraser Health regions play in creating healthy, equitable, resilient communities.

The development of this report was made possible by conversations, interviews, written correspondence, review, and engagement with staff from within the four partner organizations, as well as leaders and allies outside of our organizations. We are grateful for this participation.

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Photo by James Wheeler

## Executive Summary

Vancouver Coastal Health (VCH), Fraser Health (FH), VCH/ FH Facilities Management (FM), and Health Emergency Management BC (HEMBC) partnered on a three year Health Canada-funded grant to undertake a climate change and health vulnerability and adaptation assessment. In the first of two phases of the HealthADAPT project, a vulnerability and capacity assessment was produced that assesses the degree to which population health, health care facilities, and certain health services are susceptible to, and prepared for, the effects of various hazards, including heat, air quality, storms and flooding, and changing ecosystems.

### Key findings include:

- The connection between climate change and negative impacts to population health and the health system is strong, especially so during recent extreme heat, smoke, and flooding events.
- **Extreme heat** events like the one that occurred in June 2021 will become much more common as the global climate warms, intensifying impacts to population health and the health system.
- **Wildfire** risk is expected to increase in BC as the climate changes. In addition to direct impacts from fire, the smoke from wildfire events contributes to poor air quality, along with other climate-related air quality impacts including increased ground-level ozone, and longer pollen seasons.
- **Extreme precipitation events** will become more frequent and intense as the climate changes, leading to floods and landslides that affect population health and the health system. **Windstorms** are expected to remain a feature of the regional climate, leading to electricity disruptions that are most impactful when they occur alongside flooding, extreme heat, or poor air quality.
- Changes to our climate will contribute to conditions favourable to the spread of **infectious diseases**, including water- and food-borne diseases (e.g., *Vibrio*), Legionellosis from contaminated water, Lyme Disease, and other less prevalent diseases including those acquired outside of Canada.
- **Changes to our ecosystems** from increasing annual temperatures, ocean warming and acidification, and longer periods of drought are likely to exacerbate the conditions that lead to increased exposure to environmental toxins including blue-green algae and toxins that lead to marine shellfish poisoning. These general changes will likely create widespread mental health challenges. Indigenous communities may be uniquely impacted when cultural practices centred around traditional foods and medicines are affected.
- Many of the impacts described above disproportionately affect populations that already experience health inequities, including those experiencing socioeconomic disadvantages including poverty and under-housing, those experiencing social isolation, older people, and people with disabilities.
- Indigenous people and First Nations communities in the VCH and FH health regions are impacted in unique ways by a changing climate. Indigenous knowledge has led to an understanding of these impacts. Indigenous-led adaptation efforts are underway, as are efforts by the health sector to centre and respectfully support this work.
- An assessment of existing levels of preparedness and capacity indicates a moderate amount of existing health authority activities and collaboration relating to the management of many climate-related health risks. There is a need for more consistency across the health regions, deeper collaborations and public health leadership, and stronger advocacy for climate resilience.

A summary of the vulnerability and capacity assessment is presented below. A full report is also available. A *Climate Change and Health Adaptation Framework* for VCH and FH will follow after additional internal and external engagement. This framework will help define the health authorities' role in climate change and health adaptation by presenting priorities and actions corresponding to the risks and gaps identified in the vulnerability and capacity assessment, and based on guidance from our many collaborators and advisors.





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# SUMMARY REPORT

## Background

Calls to adapt our health systems to a changing climate are heard from all levels of government, as well as from leadership within communities and BC's regional health authorities. Although climate change and health adaptation has been underway in Vancouver Coastal Health (VCH), Fraser Health (FH), VCH/FH Facilities Management (FM), and Health Emergency Management BC (HEMBC) for several years, Health Canada was able to accelerate and strengthen these activities by awarding three years of funding to these four partners under the federal HealthADAPT program.

In addition to funding, Health Canada has also provided methodological guidance by which to conduct a climate change and health vulnerability and adaptation assessment. This two-part process examines the human health and health system vulnerabilities to a changing climate, and then proposes a strategic plan to manage risks on an ongoing basis. The vulnerability and capacity assessment uses environmental scans, literature reviews, primary data collection, internal and external engagement, and input from many advisors to assess current vulnerabilities and capacities. These findings provide the foundational knowledge required to create coordinated, integrated, and multi-agency *Climate Change and Health Adaptation Framework* for VCH and FH. This framework will present priorities and actions corresponding to the risks and gaps identified in this vulnerability and capacity assessment, and based on guidance from our many collaborators and advisors.

## Climate Change and Health Equity

The HealthADAPT project is committed to understanding the disproportionate and intersectional nature of climate-related health impacts, and ensuring that adaptation options acknowledge and reduce existing inequities. The project also acknowledges that those who have been most affected by climate change are a needed voice and driving partner in adaptation efforts.

Climate change does not impact individuals and population groups uniformly. Instead, the impacts tend to correspond to existing health inequities. These differences in health status or in the distribution of health resources between different population groups arise due to relative physiological, social, political, and economic disadvantages. In the context of climate change, this means that some people and communities are more exposed to hazards, more physiologically sensitive to the hazards, and/or less able to adapt than others.

The **tables** contained at the end of this summary report provide an overview of the ways that the groups listed below can experience heightened susceptibility to climate change. The tables also present some demographics for the VCH and FH health regions:

- Children and older adults
- People experiencing socioeconomic disadvantage
- People with pre-existing chronic illness
- People with mental illness or substance use disorders
- People with disabilities
- Recent immigrants and refugees
- Indigenous and racialized communities
- Pregnant women
- Outdoor workers





Additionally, regional [Climate Change and Community Health Maps](#) provide a snapshot of community vulnerability for regions across the VCH and FH health regions using a subset of the above variables.

## Engagement

This summary report reflects engagement with staff from across the health authorities, communities, and community-based organizations. This type of engagement leads to a comprehensive understanding of vulnerability and strengths, as well as to adaptation strategies that are informed and supported by community health priorities.

Multiple engagement sessions were held over the course of the HealthADAPT project and the following reports are available upon request:

- VCH/FH Joint Session on Climate and Health (Nov 2021)
- VCH Central Coast Engagement Summary Report
- FH Indigenous Engagement Summary Report
- Indigenous Climate Change and Health Landscape in the Fraser Salish Region
- FH Community Engagement Summary Report
- VCH/FH Joint Session on Climate and Health (Feb 2022)

These engagement activities provided information for our vulnerability and capacity assessment, and created a context for collaborative planning that will be essential during the development of the forthcoming adaptation framework.

## Indigenous Communities

Indigenous Peoples in BC and across the world are among those that have contributed the least to climate change, yet remain among those being most impacted as the climate changes. Despite the potential for increased risk and disproportionate impacts, Indigenous people are not inherently vulnerable and possess strengths that non-Indigenous cultures may lack. Climate change and health resilience must be considered simultaneously with other values such as self-determination, connection to the land, and cultural wellness.

Impacts to Indigenous People's health and wellness were identified by direct engagement, as well as a review of literature and Indigenous knowledge products. Impacts include on cultural practices and medicines, ecosystems, food sovereignty and security, and physical and mental health. An inventory of Indigenous-led climate change and health initiatives was created that represents possible venues for deeper collaboration in the future, and that signifies strong Indigenous leadership on this issue (see the Adaptive Capacity tables later in this report).

Engagement in VCH's **Central Coast** region, the population of which is predominantly Indigenous, included interviews with members from Wuikinuxv Nation (Rivers Inlet), Heiltsuk Nation (Bella Bella), Kitasoo Xai'xais Nation (Klemtu), Nuxalk Nation (Bella Coola). The purpose of these sessions was to better understand the unique dimensions of climate change impacts to health care services and communities in the region, to understand existing initiatives and capacities, and to help VCH to better center and respectfully support work in the region. This engagement found that climate change is often considered in relation to other systemic challenges and risks, and that future work on climate change and health needs to focus on implementation, and to be community-grounded.

HealthADAPT resources were used to understand the **Indigenous health system in the Fraser Health region**. This was done in order to inform how non-Indigenous organizations can best contribute to a landscape of supports and services that is complex and evolving, and to serve as a resource for those interested in advancing climate and health adaptation in Fraser Salish First Nations, whether from Fraser Health, First Nations Health Authority, from a First Nations or an allied organization. The content reflects conversations with Indigenous leaders in this space, as well as publicly available resources, and presents a landscape with substantial Indigenous leadership that is working towards an inspiring vision of the future in an holistic and fairly coordinated way. **Additional engagement** was carried out with First Nations Health Authority staff and representatives from Fraser Salish Indigenous communities to better understand the impacts of climate change on the First Nations and Territories in the Fraser Salish region, including their strengths and assets, and to lay the groundwork for collaborative planning and action in the future. *All reports are available upon request.*

## FINDINGS

The climate-sensitive hazards below are already leading to negative impacts to human health, health facilities and service delivery in the VCH and/or FH health regions:

1. Extreme heat events;
2. Poor air quality from wildfire smoke, ground-level ozone, and longer pollen seasons;
3. Storms and flooding;
4. Increase in infectious diseases;
5. Impacts to ecosystems and the food, water, and cultural services they provide.

Findings are summarized below and about impacts also appears in the figure on the following page.

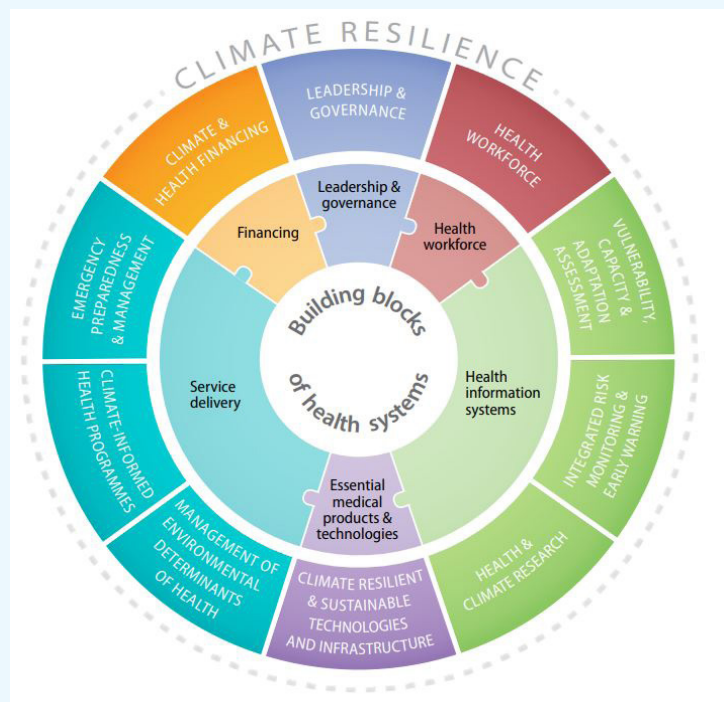
## Extreme Heat

- Extreme heat events like the one that occurred in June 2021 will become much more common across the VCH and FH health regions as the global climate warms.
- Extreme heat already causes measurable health impacts (i.e., morbidity and mortality) in our region and will become more of an issue as the climate warms. Older adults, people with chronic conditions, people on certain medications, infants and young children, those with disabilities, and outdoor workers are especially sensitive to the health effects of heat.
- High indoor temperatures are a major driver of negative health outcomes during extreme heat events, especially in buildings without air conditioning, and on higher floors. This can lead to high demands for necessary action from social housing providers and landlords, as well as health care workers who provide services in people's homes. Although market-based, site-level adaptation measures in people's homes can be adaptive in some circumstances, cooling and air filtration can be expensive and difficult to provide consistently. The same is often true at the building level, where cooling and air filtration retrofits are very costly.
- Cooling centres play an essential role in keeping some people safe during extreme heat events, but it is often difficult for municipal governments to keep up with demand and not all residents are able to benefit from cooling centres. Municipalities are primarily responsible for leading the response to emergency events, and meanwhile work closely with health partners, and community-based organizations to deliver these health-related services.
- The importance of social connection (and risks of social isolation) are increasingly well known in relation to the health impacts of extreme heat events. It is important to take intersectoral action in support of social connection, which can be mobilized during extreme heat events (e.g. through check-in practices among communities and networks).

## Health System Resilience

Health systems are networked and collaborative, requiring multiple entities to work together towards shared objectives. A climate-resilient health system has the ability to anticipate, prepare for and respond to hazardous events, trends or disturbances related to climate change. Improving climate resilience involves assessing how climate change will create new, or altered climate-related risks, and taking steps to better cope with these risks. Our *Vulnerability and Capacity Assessment* presents high-level insights into health system resilience, for example in response to extreme heat events.

However, our assessment did not systematically assess health system resilience across all hazards, or across all dimensions of the health system in the image to the right. A pilot methodology for assessing health system resilience was developed however it was not utilized due to capacity constraints and leadership on health system resilience by BC's Ministry of Health. The Ministry of Health is using the framework to the right to assess and improve the climate resilience of BC's health system. All four project partners are contributing to this process.



**EXTREME  
WEATHER**

**RIISING  
TEMPS**

## CLIMATE IMPACTS ON HEALTH AND THE HEALTH SYSTEM



### EXTREME HEAT

- » Heat-related mortality
- » Heat-related illnesses and hospital visits
- » Mental health effects
- » Overheating in facilities



### POOR AIR QUALITY & WILDFIRES

- » Premature mortality, respiratory and cardiovascular disease, allergies
- » Mental health effects
- » Poor air quality in facilities
- » Closures and evacuations



### STORMS, FLOODING, POWER OUTAGES & LANDSLIDES

- » Injuries and mortality
- » Damage to facilities and infrastructure
- » Health service disruptions
- » Impacts to water quality



### STORM SURGE & SEA LEVEL RISE

- » Damage to facilities and infrastructure
- » Salination of groundwater sources
- » Coastal erosion, loss of ecosystems and cultural sites
- » Displacement during flood events



### INFECTIOUS DISEASES

- » Increasing water- and food-borne diseases like Legionella and Vibrio
- » Uncertainty about future risk of vector-borne diseases like Lyme Disease
- » Increased risk of exposure when travelling to tropical locations



### CHANGES TO ECOSYSTEMS

- » Longer droughts, warmer rivers, ocean acidification and warming
- » Food and water quality, safety and security (e.g. shellfish poisoning)
- » Less access to traditional foods, medicines and materials for Indigenous communities



**SEA LEVEL RISE**



- Negative effects of heat on mental health and wellness are established in the scientific literature, and local evidence on impacts during heat events is emerging.
- Heat events impact health care facilities and community health services by affecting patients, staff, indoor environmental conditions, and by increasing demand on public health, community, and acute services. Seasonal readiness planning and design guidelines for climate-resilient health facilities represent important capacities in this area, but more work is needed to assess and improve resilience of the health system to extreme heat events.
- Existing initiatives and collaborations are evidence of significant adaptive capacity in the VCH and FH health regions, although there is a need to better understand where gaps in capacity exist and to intensify and accelerate action as the climate warms. It is also essential to better understand and support the heat response planning and capacities of municipal and regional governments, First Nations, and social service providers.

## Air Quality

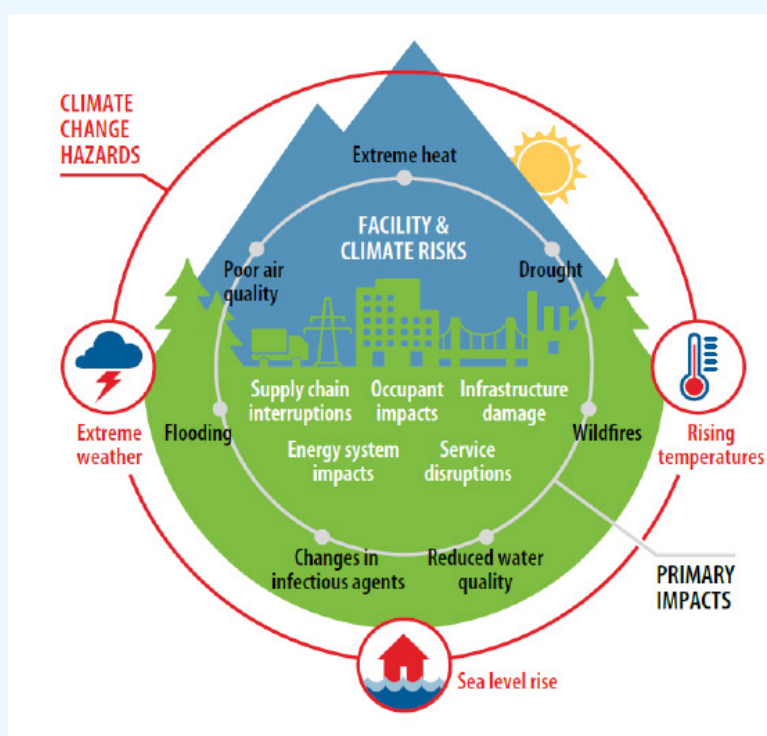
- Significant wildfire smoke impacts in five of the last seven summers demonstrate that we need to continue to adapt to a changing climate that is expected to increase the frequency and severity of both wildfires and heatwaves.
- Acute wildfire smoke events have already led to measurable health impacts in the VCH and FH health regions, and new exposure-response relationships are still emerging (e.g., smoke and cognition). Exposure to wildfire smoke can make it more difficult to fight respiratory infections such as COVID-19.
- Ground-level ozone creates acute and chronic physical and mental health impacts and is expected to increase as a result of climate change. The symptoms associated with aeroallergen exposure are expected to increase, though much more monitoring will be required to understand the burden of illness. Data on the future impacts and costs of smoke, ozone, and aeroallergens is still relatively nascent.

## Health Facilities

The impacts of climate change are particularly disruptive for individuals and communities when they affect health care facilities. VCH and FH facilities management programs operate and oversee hospitals, primary care clinics, community health centres, long-term care facilities, hospices, licensed child care facilities, etc., all of which will be impacted as the climate changes. Cascading impacts on health staff and patients, communities and critical infrastructure create additional challenges.

For several years, VCH/FH Facilities Management's *Climate Risk & Resilience* program has enabled VCH and FH to meet legislated requirements for addressing climate risk and reducing emissions. They have also led a number of site-level climate risk and resilience assessments, and work at the health system level to create resilient supply chains as well.

Recently, the program initiated and led the process of developing a set of planning and design guidelines to help ensure that major capital projects take a systematic and iterative approach to understanding and reducing key climate risks to a variety of health facilities. They were also able to lead a pilot project that aimed to understand how critical infrastructure interdependencies like electricity, gas, and telecommunications—affect the resilience of facilities and their broader communities of care.



- Older adults, people with existing respiratory conditions, infants and young children, pregnant women and outdoor workers are especially susceptible to the health effects of poor air quality. The built environment can play a protective role, with access to cleaner air spaces, and to cool spaces when it is hot and smoky, being most important. Many public and private buildings in both health regions lack the required filtration to keep occupants safe during smoke events.
- Wildfire smoke can increase demand on health services, impact indoor environmental conditions in facilities and in patients' homes, and can affect staff wellbeing and productivity. Wildland urban interface fires can directly affect health facilities and private property, although these risks have not been formally assessed. Wildfires also lead to property loss and displacement, creating challenges for health authorities and local governments who receive displaced people. The same is true during major flooding events. Internal seasonal readiness planning for heat produces many useful operational and data-related capacities that apply to air quality events.
- Collaborations between health authorities and provincial and regional organizations is quite strong for air quality, but gaps will need to be strategically address by multiple sectors. There is a leadership opportunity to better understand and support response planning of municipal and regional governments, First Nations, and social service providers.

## Storms and Flooding

- Population health and the health system impacts from flooded rivers, coastal storm surges, landslides and extreme precipitation in urban areas will intensify as climate change alters hydrological regimes and sea levels rise. Windstorms are expected to remain a feature of the regional climate, although there is low confidence in future projections. These events will continue to create risk for electricity distribution systems, and health impacts will be heightened when they occur alongside flooding, extreme heat, or poor air quality.
- Research into the regional population health and health system impacts of extreme precipitation and windstorms is relatively limited. Evidence from community engagement and published literature indicates a number of challenging outcomes, and the extreme precipitation event in November 2021 provides an opportunity to better understand impacts to mental health and wellness, critical infrastructure, water and food security, and others.
- Storms and floods exacerbate existing health inequities and increase vulnerability for populations that have been placed at risk. This includes those experiencing social isolation, mental illness, or homelessness. Some people experiencing poverty lack the means and opportunity to take protective health measures,

such as affording extra medications, property level flood protection, and evacuation planning. Exposure is less widespread than hazards like smoke, however the cascading impacts of a major flood event create disproportionate impacts for populations that have been placed at risk, including those who are outside of the flooded areas.

- Impacts to the health care facilities and health services have occurred historically, and represent significant risk in the future. Flooding in particular can cause significant disruptions to health service delivery and emergency management by disrupting and damaging community and health infrastructure.
- Since local flood risks are primarily managed by municipal and regional governments, and First Nations, collaborations are essential to ensure that health impacts are considered in local planning and response, and that the project partners have the most up to date information. Existing initiatives indicate a scattered approach to flood risk management, although a variety of regional initiatives could hold potential. As with heat and smoke, there is a need to better understand where gaps in capacity exist and to intensify and accelerate action as the climate warms.

## Ecosystem Changes and Infectious Diseases

- The ecosystems that VCH and FH communities rely on will undergo changes as a result of slower onset hazards including increasing annual temperatures, ocean warming and acidification, and longer periods of drought. These changes will impact forest conditions, animal and plant species, food and water safety and security, and cultural practices that are land-based.
- Changes to our ecosystems are likely to exacerbate the conditions that lead to increased exposure to environmental toxins including blue-green algae and those that lead to marine shellfish poisoning. These will impact Indigenous communities disproportionately, including by impacting cultural practices centred around traditional foods. A number of existing initiatives and collaborations exist to manage these risks, but widespread changes will make adaptation very difficult in some circumstances (e.g., loss of salmon habitat).
- Ecosystem changes - and climate change generally - are affecting mental health in ways that are only beginning to be understood. This includes a sense of loss (i.e., solastalgia) that is experienced when the landscape that one is familiar with undergoes significant changes.
- Climate change will contribute to conditions favourable to the spread of infectious disease, including water- and food-borne diseases (e.g., *Vibrio* and Norovirus), Legionellosis from contaminated water, Lyme Disease,



and other less prevalent diseases including those acquired outside of Canada. Not enough is known about the epidemiology and ecology of many of these diseases, and caution should be used to avoid dismissing risks.

- It is likely that adaptive capacity for infectious diseases is high in both VCH and FH given robust and networked surveillance and response capacity. Agencies beyond the health authorities are also active on this issue, and the collective response should be able to manage the risks as they emerge. That said, these risks should be re-evaluated periodically.

## Adaptive Capacity Assessment

Understanding vulnerability to climate change in our health regions involves assessing capacities and initiatives that increase the ability to adapt in our communities, facilities, and in the health system itself. For example, people living in Vancouver will be increasingly exposed to extreme heat events, but a baseline of adaptive capacity (e.g., cooling centres operated by the City in public buildings) reduces overall vulnerability.

The full vulnerability and capacity assessment report inventories adaptive capacities across all of the relevant climate-sensitive hazards. These inventories are not meant to be exhaustive, but to highlight key activities taken by the health authorities, governments, and community-based organizations. The inventories were used to assess adaptive capacity within the VCH and FH health regions and to support ongoing gap analysis and action planning.

The capacity assessment indicates a moderate amount of health authority action and collaboration relating to the management of many climate-related health risks. It also points to a moderate amount of action by many governments and community-based organizations.


The assessment also clearly highlights a need for greater consistency across the health regions, deeper collaborations and public health leadership, and stronger advocacy for climate resilience in our communities and our own organizations. The assessment also highlights the need to work in partnership with Indigenous communities and organizations to support and centre solutions that are identified and driven by the community.

## Next Steps

This summary report is accompanied by a full vulnerability and capacity assessment report. Findings from the vulnerability and capacity assessment were used to support engagement with internal and external partners and organizations during the development of a *Climate Change and Health Adaptation Framework* for VCH and FH. This framework will present priorities and actions across a number of areas, including leadership and advocacy, health equity, communications, epidemiology and research, emergency preparedness and health care facilities. Release is planned for Spring 2022.

Climate change is a significant health issue. This assessment and the associated framework are crucial steps in ensuring that we can help support individuals and communities within the VCH and FH health regions in adapting to climate change.



PRIORITY POPULATIONS	VULNERABILITY TO CLIMATE CHANGE	VANCOUVER COASTAL HEALTH	FRASER HEALTH
 <b>CHILDREN</b> Source: <a href="#">Stats Canada</a> . Data reported at the Health Service Delivery Area level.	Higher sensitivity to environmental exposures, behaviors that increase exposure risk and great dependence on caregivers. During heat events, children's greater surface area to body mass ratio than adults, production of more metabolic heat per kilogram of body weight, blunted thirst response, and lower cardiac output increases their sensitivity (NCCEH, 2010b). During poor air quality, their still-developing lungs are more sensitive (BC Centre for Disease Control, 2020).	11-15%* of the population was 0-14 years old	15-18% of the population was 0-14 years old
 <b>OLDER ADULTS</b> Source: My Health My Community <a href="#">2014</a> . Data reported at the MHMC neighborhood level. The number of people 65 and over is estimated to grow 63% between 2020 and 2041 ( <a href="#">source</a> ).	Higher sensitivity to environmental exposures, more likely to have existing chronic disease (e.g. cardiovascular disease) and increased risk of falls and non-fatal injuries. During heat events, older people's increased burden of chronic disease and decreased thermoregulation increase their sensitivity (Kafeety et al., 2020). Older people who experience greater social isolation and poorer mental health are at even greater risk during extreme heat events. Older adults are at increased risk of health effects from short-term exposures to poor air quality because of their higher prevalence of pre-existing lung and heart diseases, and because important physiological processes decline with age (Stone, 2019).	6-40% of the population was 65 years and older	15-18% of the population was 65 years and older
 <b>PEOPLE EXPERIENCING SOCIOECONOMIC DISADVANTAGE</b> Source: My Health My Community <a href="#">2014</a> . Data reported at the MHMC neighborhood level.	Higher likelihood of suffering from chronic medical conditions. People may reside in areas with older infrastructure and increased exposure (e.g. urban heat islands) and to experience social isolation (Vancouver Foundation, 2017). Some people experiencing poverty lack the means and opportunity to take protective health measures such as affording extra medications, accessing quality housing and/or air filtration (NCCEH, 2010b). Certain populations are also more likely to experience income inequality (e.g. single parents, new immigrants, seniors, etc.). In the FH health region, some cities are seeing increases in low and very low income earners and a shrinking middle income demographic (Gold, 2017).	14-76% of households had incomes under \$40,000	30-32% of households had incomes under \$40,000
 <b>INDIVIDUALS WITH EXISTING CHRONIC ILLNESSES</b> Source: My Health My Community <a href="#">2014</a> . Data reported at the MHMC neighborhood level.	Increased susceptibility to environmental exposure such as temperature, poor air quality, vector-borne disease and food- and water-borne diseases. During heat events, individuals with one or more of these conditions experience amplified health risks (Health Canada, 2011). People taking certain medications (e.g., antihypertensives, antidepressants) are more sensitive, as are those who are confined to bed or dependent on assistance for daily living. During poor air quality, people with respiratory conditions such as asthma or chronic obstructive pulmonary disease (COPD) are at highest risk, as are those with heart disease, diabetes, cancer, or mental illness (BC Centre for Disease Control, 2020).	15-43% reported that a doctor had diagnosed them with one or more chronic condition±	16-48% reported that a doctor had diagnosed them with one or more chronic condition±

\*Ranges represent differences between neighbourhoods or regions  
 ± Includes diabetes, heart disease, stroke, high blood pressure, or a chronic breathing condition



PRIORITY POPULATIONS	VULNERABILITY TO CLIMATE CHANGE	VANCOUVER COASTAL HEALTH	FRASER HEALTH
 <b>MENTAL HEALTH AND ADDICTION</b> Source: My Health My Community <a href="#">2014</a> . Data reported at the MHMC neighborhood level.	Mental health challenges make it more difficult to cope during extreme events, and can occur for those with pre-existing conditions, as well as people not typically affected. During heat events, anxiety, depression, and suicidal ideation increase, as do the risks associated with social isolation. There is an association between certain psychiatric medications and adverse health outcomes during heat events, and people experiencing addiction and/or substance use disorders are also at higher risk. Those with depression or anxiety are at increased risk of further mental health impacts from heat, air quality, and flooding. In addition, those with severe mental illness are more likely to be dependent upon service, infrastructure, and medication supply chains that are often disrupted after disasters (American Psychiatric Association, 2019).	7-26% of residents report being diagnosed with mood or anxiety disorder	8-30% of residents report being diagnosed with mood or anxiety disorder
 <b>SOCIALLY ISOLATED INDIVIDUALS</b> Source: My Health My Community <a href="#">2014</a> . In Metro Vancouver, 23% of people spend more time alone than they would like; 14% of people report feeling lonely almost always or often ( <a href="#">source</a> ).	Lack of social support and strong social networks, reducing adaptability and increasing susceptibility to climate change impacts. Social isolation has been found to be a predictor of mortality in heat waves in Paris, Chicago, and Montreal, and individuals with stronger social supports have more resources to draw on during poor air quality events (Kafeety et al., 2020). During flood events, people experiencing social isolation, especially those with mobility limitations, may not have the social resources to get the evacuation support they need.	37-61% of residents reported having four or more people to confide in	27-57% of residents reported having four or more people to confide in
 <b>INDIGENOUS STATUS AND RACE</b> First Nations, Metis, Inuk, other Aboriginal Identity. Source: <a href="#">Stats Canada</a> . Data reported at the Health Service Delivery Area level.	Indigenous status is commonly included in the social determinants of health (e.g., Canadian Public Health Association) because of the ways that the legacy of colonial policies, and current structural, political, cultural, and economic power imbalances can negatively impact adaptive capacity. This does not reflect an inherent physiological sensitivity on the part of Indigenous people. Instead, it suggests that efforts related to reconciliation, self-governance, and anti-racism will help to increase climate resilience. Additional information about community-level adaptive capacities is provided below in the adaptation strengths section. Race is commonly included in the social determinants of health (e.g., Canadian Public Health Association) because systemic racism influences the living and working conditions that people experience every day.	1-5% of the population identify as Indigenous	3-7% of the population identify as Indigenous
 <b>RECENT IMMIGRANTS</b> Source: <a href="#">Stats Canada</a> . Data reported at the Health Service Delivery Area level.	May speak limited English and are more likely to live in areas with urban heat islands, have difficulty finding suitable employment, and experience material deprivation and food insecurity (Macdonald, Perri, Jubas-Malz, & Mulligan, 2019). May also experience lower socioeconomic status. The number of immigrants in the Metro Vancouver region is projected to increase between 2020 and 2049.	5-7% of the population immigrated in the previous 5 years	14-32% of the population immigrated in the previous 5 years

PRIORITY POPULATIONS	VULNERABILITY TO CLIMATE CHANGE	VANCOUVER COASTAL HEALTH	FRASER HEALTH
 <b>PREGNANT WOMEN</b>	<p>During pregnancy, physiological changes, such as higher respiratory rates and increases in blood and plasma volumes, increases a woman's vulnerability to poor air quality and extreme heat. Additionally, during critical windows of human development, a mother's exposure to poor air quality may harm the developing fetus. Maternal and fetal health outcomes may be adversely impacted during extreme heat events (i.e. pre-term births, lower birth weights) (Konkel, 2019; Kuehn &amp; McCormick, 2017).</p>	<i>Data forthcoming</i>	
 <b>PEOPLE WITH DISABILITIES</b>	<p>People with disabilities are at increased risk of the adverse impacts of climate change and extreme weather events due to limited mobility, increased reliance on caregivers, social isolation, other compounding health related challenges, interruption to supply chains for medicines, and also due to discrimination, marginalization, and certain social and economic factors.</p>	<i>Data forthcoming</i>	
 <b>OUTDOOR WORKERS AND ACTIVITY</b>	<p>People in occupations where it is difficult to limit exposure high temperatures, poor air quality, and extreme weather are at higher risk of health impacts (Flouris et al., 2018). These include outdoor workers and wildland firefighters (Navarro, 2020), farmers and temporary foreign workers. Smoke, for example, can lead to or worsen respiratory and cardiovascular conditions, and affect mental health, for example via increased irritability, loss of concentration and a decreased ability to do mental tasks or heavy work (Canadian Centre for Occupational Health and Safety, 2021).</p>	<i>Data forthcoming</i>	
 <b>HOUSING QUALITY AND ACCESS</b>	<p>Climate change affects the physical and mental health of those experiencing homelessness or underhoused, who can be completely exposed during extreme weather events (Bezgrebelna et al., 2021; Kidd, Greco, &amp; McKenzie, 2020). Those living in homes without air conditioning, with fewer natural ventilation opportunities, or in high-rises can lack the ability to reduce their exposure to high temperatures and poor air quality. Those living in floodplains and without the means of protecting themselves experience higher flood risk, and renters generally experience less agency and higher risk.</p>	<p>Seniors aged 55 and over represented 24% of people experiencing homelessness during a 2020 count in Metro Vancouver. This proportion has been growing since 2002 and is projected to continue to grow without appropriate intervention (BC Non-Profit Housing Association, 2020).</p>	