

The background features a stylized, layered landscape illustration. The mountains are depicted with various shades of green and teal, creating a sense of depth and texture. At the bottom, a white silhouette of a city skyline is visible against the dark teal background. The overall aesthetic is clean and modern, with a focus on natural and urban environments.

# **Protecting Population Health in a Climate Emergency**

**Report of the Vancouver Coastal Health  
Chief Medical Health Officer, 2023**



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# Letter from the Chief Medical Health Officer



Climate change is one of the most urgent public health issues in Vancouver Coastal Health (VCH) and is the focus of this year's VCH Chief Medical Health Officer Report. The report builds on the 2019 Health Canada-funded HealthADAPT project in VCH and Fraser Health, which studied public health risks and mapped populations vulnerable to the effects of extreme heat, wildfire smoke, and other climate changes. The VCH Healthy Environments and Climate Change team has expanded and received new provincial funding since the HealthADAPT project and now leads the VCH Public Health climate change response.

Medical Health Officers (MHOs) have established critical partnerships with local governments, Indigenous communities, academic partners, and others to respond to the impacts of climate change. While the population health threats have accelerated in the last few years, the expertise and capacity to respond has also accelerated in VCH and across BC. Data included in this report, which identifies populations particularly vulnerable to the impacts of climate change in VCH, can support this response.

Public Health has a mandate to both mitigate climate change (i.e., slow the pace of change) and support populations to adapt to the changes that are inevitable. Much of this report focuses on adaptations that will protect population health, particularly for those at greatest risk. This is not to minimize the importance of mitigation; Medical Health Officers continue to advocate for reductions in greenhouse gas emissions across all sectors, including supporting the excellent work of the VCH Planetary Health team to reduce the health authority's carbon footprint.

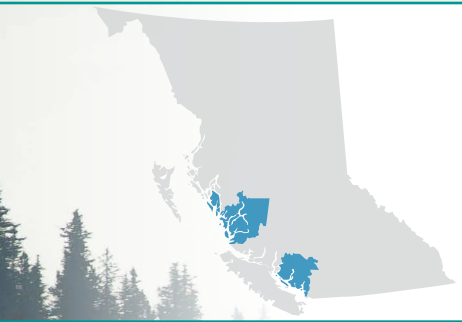
I would like to thank all those who have contributed to this report, including VCH contributors led by Dr. Michael Schwandt, Indigenous partners (First Nations, Métis Nation BC, and First Nations Health Authority), and colleagues at the BC Centre for Disease Control.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. Daly', written in a cursive style.

Dr. Patricia Daly, Chief Medical Health Officer | Vancouver Coastal Health

# People and places of the VCH region



## About the region

Vancouver Coastal Health (VCH) is one of five geographically distinct regional health authorities in British Columbia (BC). It is comprised of three health service delivery areas (HSDAs): Vancouver, Richmond, and North Shore/Coast Garibaldi. More than 1.25 million people live in the region, which is approximately one quarter of the population of BC, and includes First Nations, Métis, and Inuit.

## Territory acknowledgement

VCH carries out its public health and health care functions on the traditional and unceded territories of the Heiltsuk, Kitasoo-Xai'xais, Lil'wat, Musqueam, N'Quatqua, Nuxalk, Samahquam, shíshálh, Skatin, Squamish, Tla'amin, Tsleil-Waututh, Wuikinuxv, and Xa'xtsa Peoples. Meaningful recognition of these territories carries with it a solemn commitment to the active and progressive decolonization of the health system in ways that respect Indigenous self-determination, consistent with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

VCH Medical Health Officers are also committed to close collaboration with First Nations to address the population health impacts of climate change. Medical Health Officers recognize that communities are holders of knowledge about the land, waters, and ecosystems, which will be critical to the collective work to address the impacts of climate change. First Nations Elders, Knowledge Keepers, and community members have and will continue to lead efforts to address the climate emergency. Their work needs to be vigorously supported and amplified by public health and by all levels of government. Recognition of Indigenous knowledge and leadership has informed the development of this report and the recommended actions the report advances.

# Executive summary

*Protecting Population Health in a Climate Emergency*, a report of the Vancouver Coastal Health Chief Medical Health Officer, brings together multiple sources of data and analyses to describe the impacts of climate change on population health in the Vancouver Coastal Health (VCH) region. This report examines the most significant impacts experienced and anticipated in the region.

Climate change presents health risks through multiple pathways including extreme heat, wildfires, extreme weather (drought, flooding, and storms), and changes to ecosystems and society (Table 1). This report weaves together findings from public health surveillance, Indigenous and academic research, and narratives from community members to explore how the health and wellness of populations in the VCH region are being impacted by climate change. Each section of the report highlights actions already underway to mitigate and adapt to climate change.

The report concludes with evidence-based recommendations that flow directly from the local data described in the prior sections. These approaches can advance community wellbeing while providing protection from climate hazards and supporting sustainable health-promoting communities. Actions to reduce the health impacts of climate change can also improve other social and environmental factors that influence population health. Indigenous perspectives that prioritize the interconnections between human and ecosystem health can inform this path forward.

All levels and sectors of government, non-governmental organizations, and other partners can play a role and cooperate to reduce the population health impacts of climate change. The **Recommendations** in this report can guide actions to *Protect at-risk populations*, *Adapt to a changing climate*, *Learn through monitoring and research*, and *Mitigate further climate change*. VCH Medical Health Officers are committed to active collaboration to bolster the region's resilience to climate change and will work with partners to advance these actions.

Table 1. Summary of key climate change health hazards and risks for the VCH region

Hazard	Impacts	Risk Summary
<p><a href="#"><u>Extreme heat</u></a></p>	<ul style="list-style-type: none"> <li>• Heat-related illness and deaths</li> <li>• Mental wellbeing</li> <li>• Overheating in buildings, including homes</li> </ul>	<p>Extreme heat events are becoming more common. Preparedness planning is increasing, but building improvements are needed to protect people from high indoor temperatures. Extreme heat is expected to remain a significant health risk in the VCH region.</p>
<p><a href="#"><u>Wildfires and smoke</u></a></p>	<ul style="list-style-type: none"> <li>• Respiratory and cardiovascular disease and deaths</li> <li>• Mental wellbeing</li> <li>• Poor air quality in buildings, including homes</li> <li>• Effects on First Nations lands and First Nations, Métis, and Inuit cultural practices</li> <li>• Evacuation and displacement</li> </ul>	<p>Periods of poor air quality due to wildfire smoke occur across the VCH region, and reducing exposure can be challenging. Short- and long-term effects are increasingly well understood, and efforts to reduce exposure are improving. This is likely to remain a persistent risk to health in the VCH region.</p>
<p><a href="#"><u>Drought, flooding, and storms</u></a></p>	<ul style="list-style-type: none"> <li>• Disruption of drinking water systems</li> <li>• Evacuation and displacement</li> <li>• Interruption of supply chains and health services</li> <li>• Mental wellbeing</li> <li>• Coastal erosion, with impacts on ecosystems and cultural sites</li> <li>• Power outages during storms</li> </ul>	<p>Communities in the VCH region are at risk of negative impacts from drought, flooding, and storms. These events are likely to intensify, with increasing direct and indirect health impacts. Although many communities have preparedness plans in place, there is ongoing risk to safety, food systems, and infrastructure (including drinking water systems) related to these hazards.</p>
<p><a href="#"><u>Ecosystems and society</u></a></p>	<ul style="list-style-type: none"> <li>• Food security</li> <li>• First Nations food sovereignty and Indigenous cultural practices</li> <li>• Mental wellbeing and climate anxiety</li> <li>• Environmental changes impacting infectious diseases</li> <li>• Population movements</li> </ul>	<p>Ecosystem changes include higher sea surface temperatures and habitat loss. Future changes remain uncertain and will impact, and be impacted by, where people live and how they use natural resources. This risk is likely to intensify as climate change continues, despite adaptation efforts.</p>

## Indigenous Peoples and climate change

A changing climate threatens to deepen the structural inequities that Indigenous Peoples experience due to the impacts of colonialism and systemic racism. The VCH region includes urban, rural, and remote First Nation reserves and a significant population of Indigenous people living away from home or in other urban areas. Indigenous communities, though not inherently vulnerable, are often more likely to face negative impacts such as evacuations, lack of access to traditional foods, and disruption of in-community health and social services during extreme weather events. The [First Nations Perspective on Health and Wellness](#) and the [Métis Public Health Surveillance Program baseline report \(\*Taanishi Kiiya?\*\)](#) emphasize resilience through connections between healthy lands and healthy people. A holistic view of mental, emotional, spiritual, and physical health is instrumental for health and wellbeing in Indigenous communities.

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***Indigenous* is a collective term for First Nations, Métis, and Inuit.**

***First Nations*** are the largest group of the three recognized Indigenous Peoples in what is now called Canada. VCH operates on the traditional territories of 14 First Nations.

***Métis*** “means a person who self-identifies as Métis, is distinct from other Aboriginal Peoples, is of historic Métis Nation Ancestry and who is accepted by the [Métis Nation](#).”

***Inuit*** are the Indigenous people of the Arctic. Although there is no historical Inuit homeland in BC, many Inuit reside within the VCH region.



# Climate change and health in the VCH region

In BC and around the world, average temperatures are increasing, extreme weather events are becoming more frequent, and sea levels are rising due to human-caused climate change. These climate hazards affect population health and wellbeing in VCH communities.

People in VCH can expect to experience more extreme heat, poorer air quality from wildfire smoke, more storms and flooding, longer periods of drought, and numerous ecosystem changes throughout the region. These changes affect health directly and acutely through exposure to environmental hazards. Climate-related changes to social and economic conditions, ecosystems, and cultural activities will also affect population health.<sup>1</sup>

## **CLIMATE CHANGE MITIGATION**

*can slow the pace of climate change and minimize future impacts on health. This requires drastically reducing greenhouse gas emissions to limit the speed and extent of climate change.*



## **CLIMATE CHANGE ADAPTATION**

*will protect populations from the hazards of climate change, which are already occurring in VCH. Populations and communities in the region will be more resilient with planning and preparation for both gradual changes and extreme events.*

Global efforts to mitigate and adapt to climate change are intensifying. Much more action is required, globally and here in the VCH region, to limit further climate change and protect health amidst expected changes.

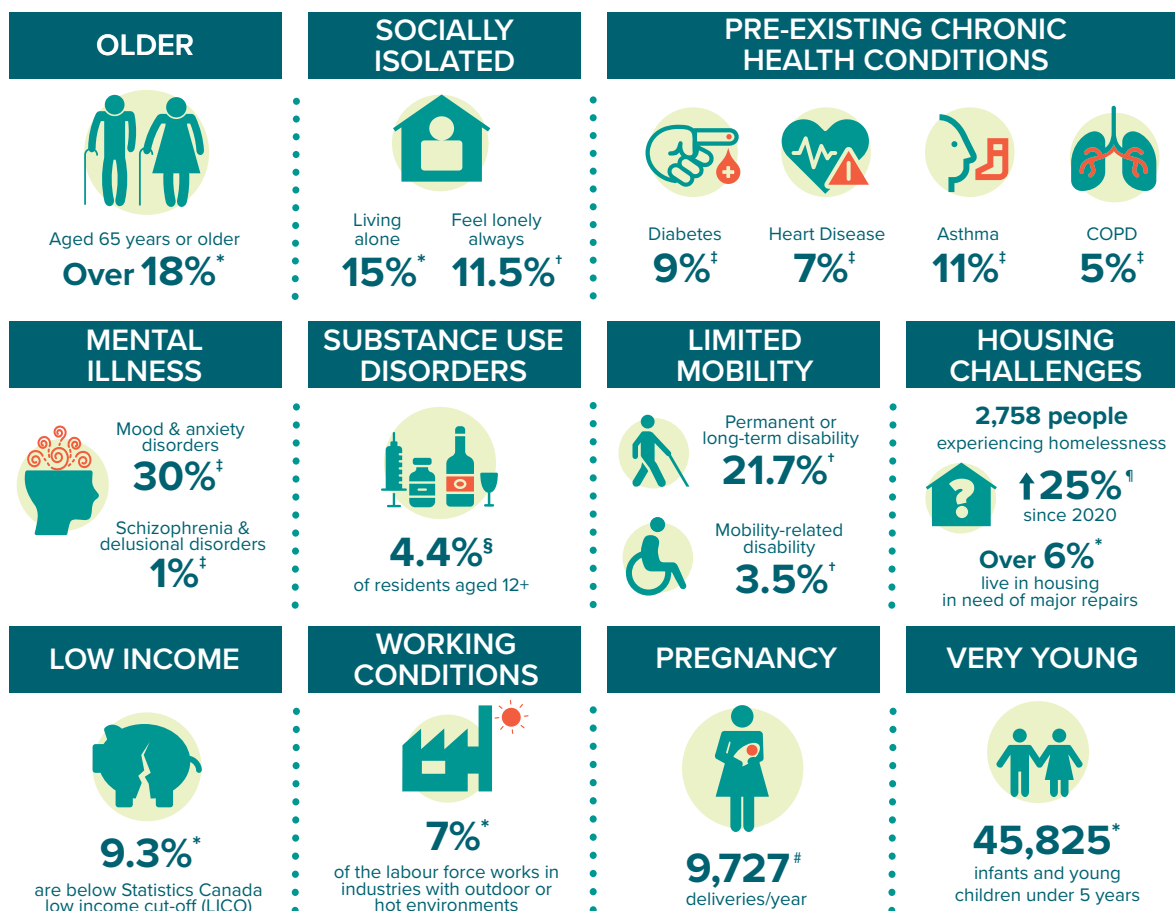
Climate change does not affect everyone in the same way. Some populations are more exposed to climate hazards, while others are at increased risk for health impacts related to climate hazards. Others face barriers to adapt or to be protected from climate change. Many people experience a combination of interconnected and intersecting factors that put them



at even greater risk from the impacts of climate change.<sup>2</sup> Key risk factors for climate impacts on health are described in Figure 1, along with information about how these factors affect the VCH population.

Many of the factors that increase people’s risk from climate hazards are the same economic or social circumstances that create the foundation for overall health and wellbeing. Climate change exacerbates existing health inequities created by differences in income, living and working conditions, or social support networks.

**Figure 1. Factors that increase risk for climate-related health impacts, and the proportion of each within the VCH population**



Sources: \* Stats Can Census Profile 2021 | † BC SPEAK Round 2 2021 | ‡ BC Chronic Disease Registry 2020/2021 | § BC Centre on Substance Use | ¶ 2023 Homeless Count in Greater Vancouver | # Perinatal Services BC, Perinatal Health Report VCH 2019/2020

*These factors, alone or in combination, can increase susceptibility to health effects from exposure to extreme heat or wildfire smoke, as well as decrease access to emergency services and health or social supports during climate-related events. The values represent the number or proportion of VCH residents with each risk factor (with the exception of “experiencing homelessness,” which is for the urban VCH communities of Richmond, Vancouver, and the North Shore). Industries with outdoor or hot environments include agriculture, construction, fishing, forestry, hunting, mining, and oil and gas.*

Medical Health Officers can help communities to prepare for, adapt, and respond to climate change. This requires *upstream* action to address the economic, social, and ecological factors that determine population health and wellbeing, along with additional support for groups that face increased risk. At the same time, *downstream* responses are essential to manage the immediate and inevitable health impacts of climate change.<sup>3</sup> Indigenous perspectives that connect environmental, social, cultural, and economic factors with land and community could guide a journey toward climate resilience in society at large.

There is an urgent need to respond to the growing health impacts of climate change.<sup>4</sup> This is also an opportunity to promote population health and address health inequities through actions that build stronger, more resilient communities. Confronting the dual challenges of mitigating emissions and adapting to a changing climate requires moving towards a low-carbon future.



## Extreme heat

During the week of June 25 to July 1, 2021, a weather phenomenon called a “heat dome” broke temperature records and profoundly affected communities across southern BC. According to the BC Coroners Service, 145 of the 619 people who died of heat-related causes during the 2021 BC heat dome resided in the VCH region.<sup>5</sup> Older adults and others at high risk for heat-related illness were particularly impacted. The BC Coroners Service Death Review Panel noted that some people may have avoided indoor public spaces such as cooling centres due to the COVID-19 pandemic.

***“It was really challenging because of the age group that we support. I knew there were not adequate resources in place, so it was very stressful. We were very concerned for the seniors that did not have family in Vancouver and did not have anyone to turn to for help. My first reaction was fear. Where are our seniors going to go? [People were] trying to figure out how seniors were going to get to cooling centres. We were anticipating a bit of a disaster, but we were devastated when we saw the extent of it. If we felt that seniors were not doing well, we would determine their symptoms, calm them, and guide them on how to decrease their body temperature. Some seniors were saying they were red and really hot and having some difficulty breathing. What were we to do when we determined that somebody should go to emergency? All the ambulances were in use, obviously. They were going full tilt.”***

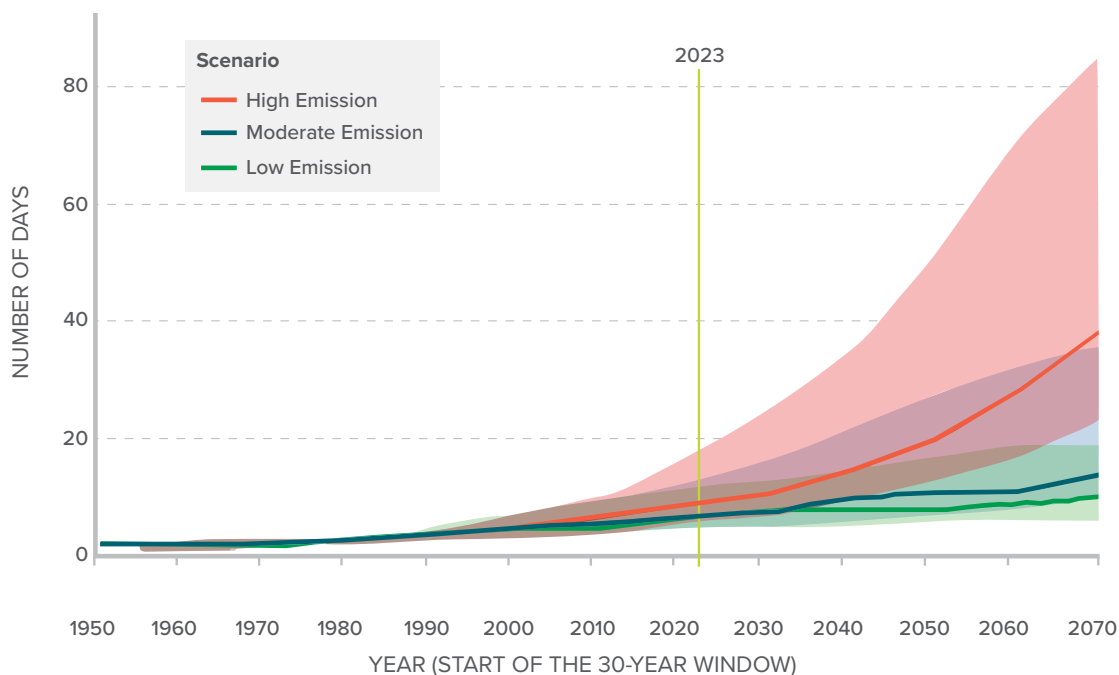
Donna Clarke,  
Executive Director, Renfrew Collingwood Seniors Society



## The region is warming and severe weather events will become more common

Climate scientists have stated that the 2021 BC heat dome would have been “virtually impossible without human-caused climate change.” They anticipate that the region will experience events of this magnitude every 5 to 10 years by 2040 (Figure 2).<sup>6</sup>

**Figure 2. Number of days per year over 29°C in the VCH region (averaged over 30 years using historical data from 1950–2014)**



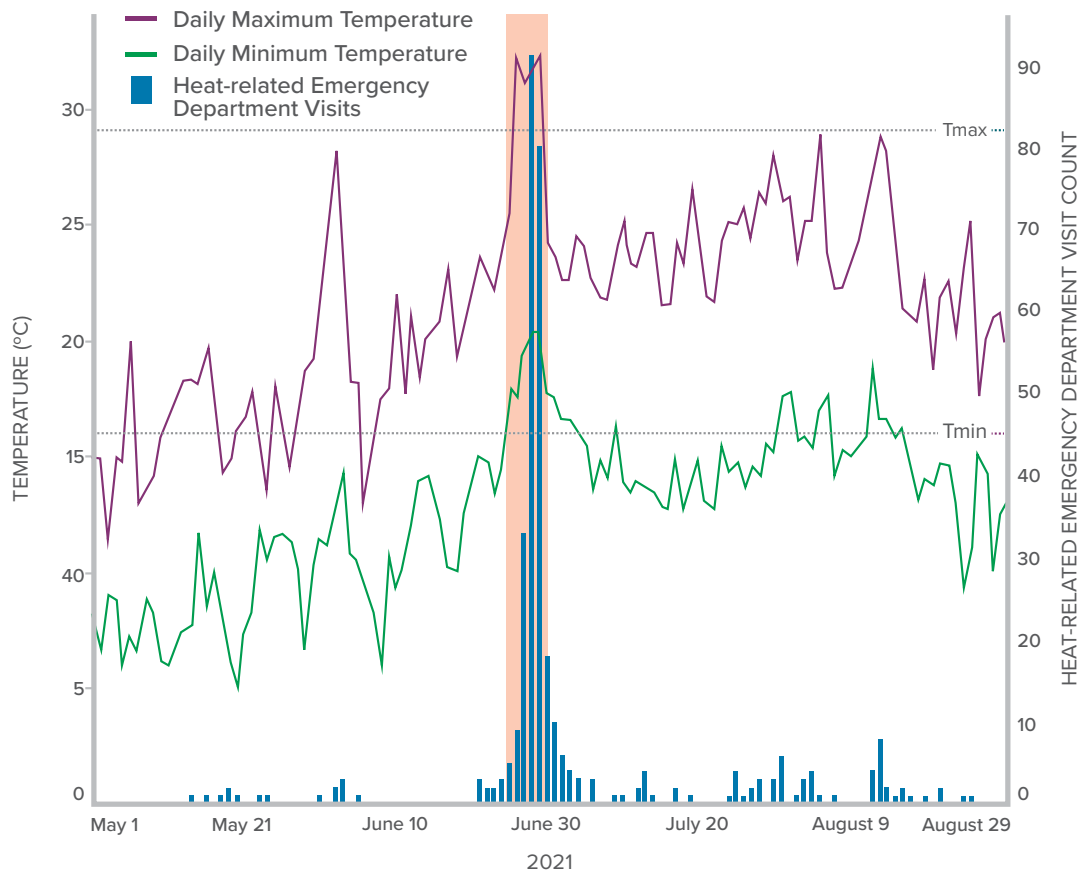
Source: BC Centre for Disease Control Climate Preparedness and Adaptation Program ([bccdc.shinyapps.io/climatedata/](http://bccdc.shinyapps.io/climatedata/))

*The shaded region is the range of modelled values between the 10<sup>th</sup> and 90<sup>th</sup> percentiles (the highest and lowest 10% of model results are omitted). The relationship between future temperatures and the three emission scenarios highlights the urgency of climate action. Temperatures will increase, but reducing greenhouse gas emissions can reduce the extent, and impacts, of change.*

## Very hot weather has immediate impacts on people’s health

Visits to VCH and Providence Health Care emergency departments for heat-related illness increase when temperatures exceed the regional “Heat Warning” threshold of 29°C during the day and 16°C at night (Figure 3). These same thresholds have been linked to increased deaths due to heat.

**Figure 3. Daytime temperatures, heat warnings, and VCH emergency department visits (Summer 2021)**



Source: Environment and Climate Change Canada (Vancouver International Airport (YVR) Weather Station); VCH Emergency Department Visits Database\*

*An Extreme Heat Alert was issued June 25–July 1, 2021 (orange shaded area). Heat warnings are based on the maximum daytime temperature value or Tmax (29°C), the minimum nighttime temperature value or Tmin (16°C), the number of consecutive days and nights above these values, and forecasted temperatures.*

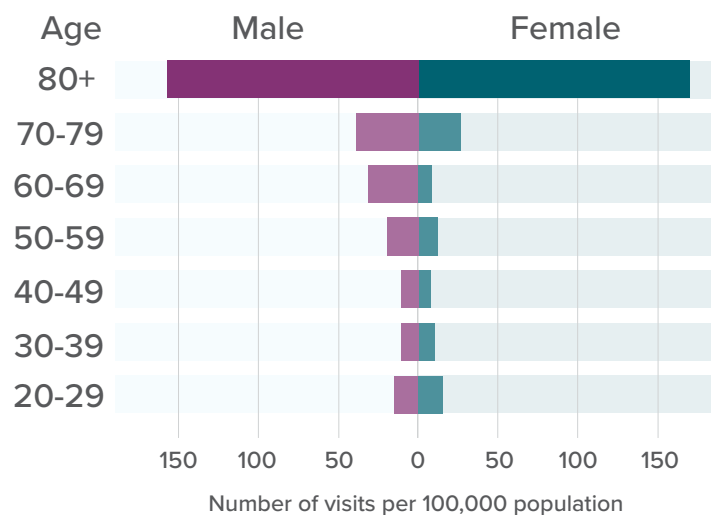
\* The VCH Emergency Department Visits Database includes emergency department (ED) visits from the CareCast (Richmond Hospital, UBC Hospital, and Vancouver General Hospital) and CST Cerner (Mount Saint Joseph Hospital, St. Paul’s Hospital, Lions Gate Hospital, Pemberton Health Centre, Squamish General Hospital, and Whistler Health Care Centre) systems.

## Extreme heat intersects with other health risks

**Some populations are at higher risks of health harms due to extreme heat.** Younger or older age groups, those with certain chronic health conditions (such as respiratory diseases), mental health conditions (including mood disorders and schizophrenia), and problematic substance use (including alcohol), all put people at higher risk for heat-related illness and death.<sup>7</sup>

Adults 80 years of age and older were far more likely to visit an emergency department in VCH for heat-related issues during the 2021 BC heat dome (Figure 4).

**Figure 4. Adult heat-related VCH emergency department visits per 100,000 population (June 25–July 2, 2021)**

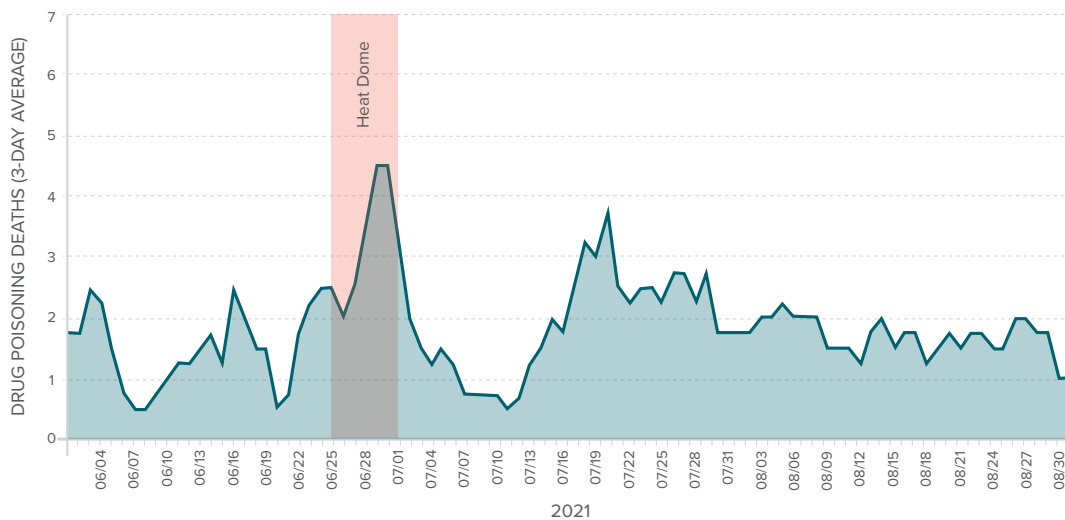


Source: VCH Emergency Department Visits Database

*Young children are also at higher risk during heat events. This analysis does not include data from BC Children's Hospital, part of the Provincial Health Services Authority.*

Impacts of the 2021 BC heat dome likely interacted with BC’s ongoing toxic drug crisis. According to data from the BC Coroners Service, people died from toxic drugs at a higher rate during the peak of this extreme heat event than they did during any other time in the summer of 2021 (Figure 5). Recent BC research found that hot weather was associated with higher risk of death from toxic drugs. This is likely due to a combination of factors, including possible changes in drug use patterns during hot weather and changes in heat avoidance behaviours during drug use. Some psychoactive substances cause increased body temperature and drugs such as opioids affect the respiratory system, making people more physiologically vulnerable to heat.<sup>8</sup>

**Figure 5. Toxic drug related mortality in the VCH region (averaged over 3 days, June 1–August 31, 2021)**



Source: BC Coroners Service: Illicit Drug Toxicity Death Data

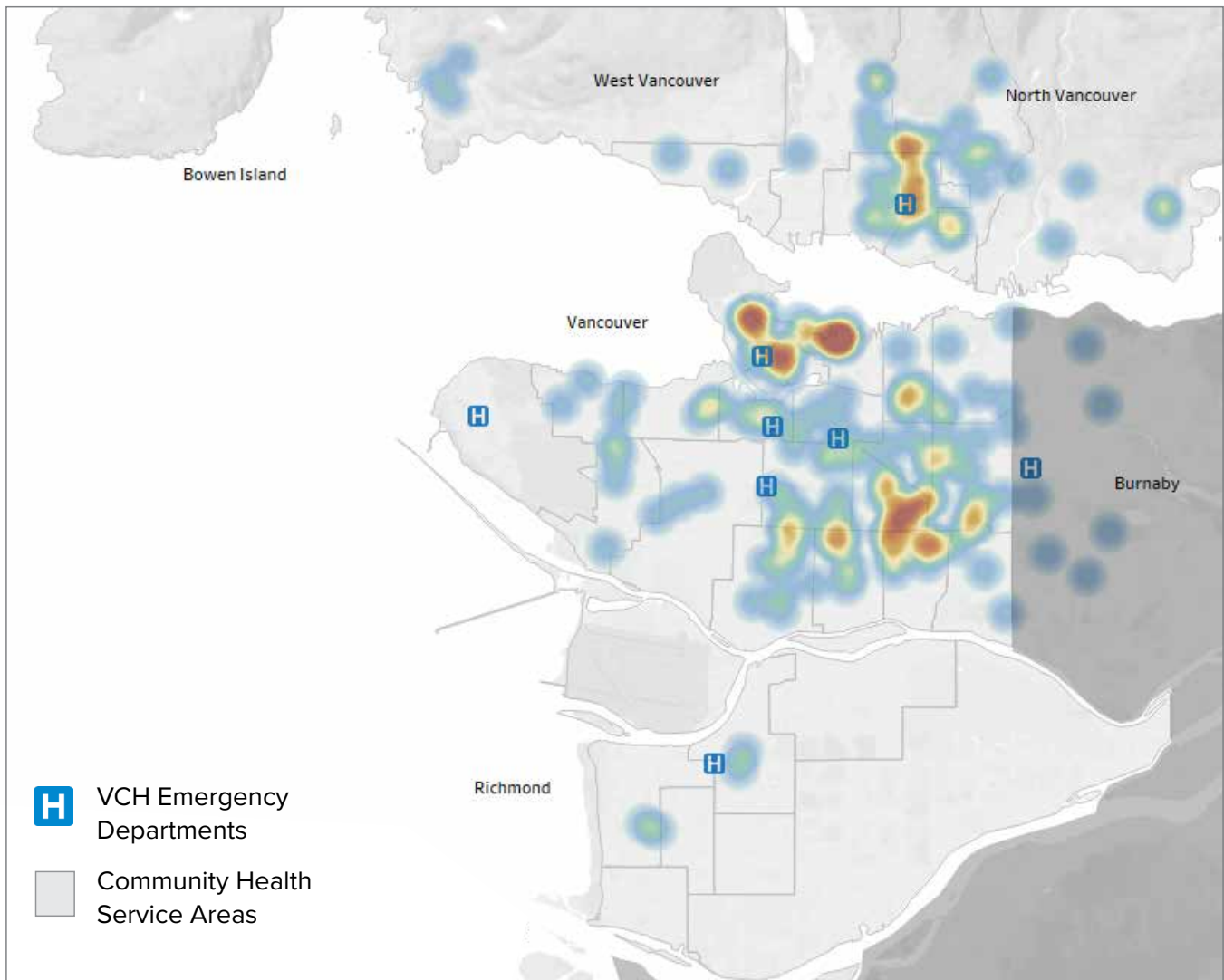
*Sixteen people in the VCH region died due to toxic drugs in the 3 days of June 27-29, 2021, more than any other 3-day period that summer. An Extreme Heat Alert was issued from June 25–July 1, 2021.*

## Place of residence and other social circumstances affect risk from extreme heat

Some people are more vulnerable to heat-related illness and death because of where they live and their social and economic circumstances.<sup>9,10</sup> The BC Coroners Service found that more than half of those who died during the 2021 heat dome lived alone. People living in the least materially and socially advantaged neighbourhoods were over-represented in this group.<sup>5</sup> These neighbourhoods often include urban heat islands, which are areas that lack protective features such as green spaces, shade trees, and large water bodies nearby. They may also be closer to roads or have more concrete surfaces that absorb heat.<sup>11</sup>

The health risks from extreme heat affect some VCH neighbourhoods more than others (Figure 6). The Downtown Eastside Single Room Occupancy (SRO) Collaborative surveyed residents and found that hot weather often drove people to sleep outdoors due to “unbearable” temperatures in their rooms.<sup>12</sup> Heat-related deaths during the 2021 BC heat dome were higher among people who lived in urban heat islands.<sup>5</sup>

**Figure 6. Heat-related VCH emergency department visits by place of residence (June 25–July 2, 2021)**



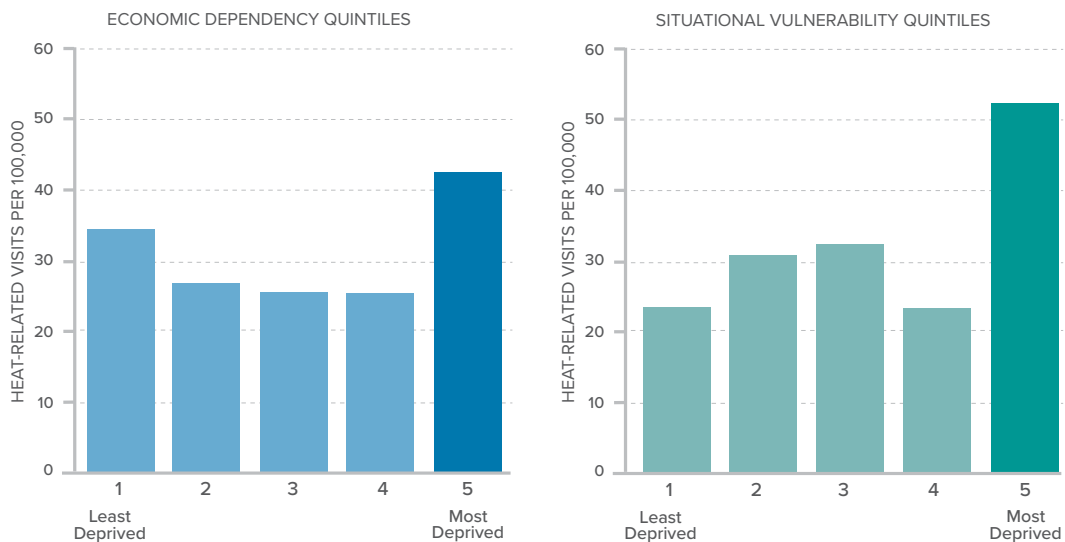
Source: VCH Emergency Department Visits Database

*Rates of heat-related emergency department visits were higher in Downtown Vancouver, the Downtown Eastside, and neighbourhoods in southeastern Vancouver and North Vancouver. The coloured areas represent the number of heat-related emergency department visits from different neighbourhoods. As the colour changes from blue to red, the number of emergency department visits increased for the corresponding area. Residential locations have been concealed to preserve anonymity.*



Emergency department visits during the 2021 BC heat dome varied widely between neighbourhoods in VCH. People living in areas with the most disadvantaged economic or social circumstances were more likely to visit an emergency department for heat-related illness (Figure 7).

**Figure 7. Heat-related VCH emergency department visits by neighbourhood economic and social factors (June 25–July 2, 2021)**



Sources: VCH Emergency Department Visits Database; [Canadian Index of Multiple Deprivation](#) (CIMD)

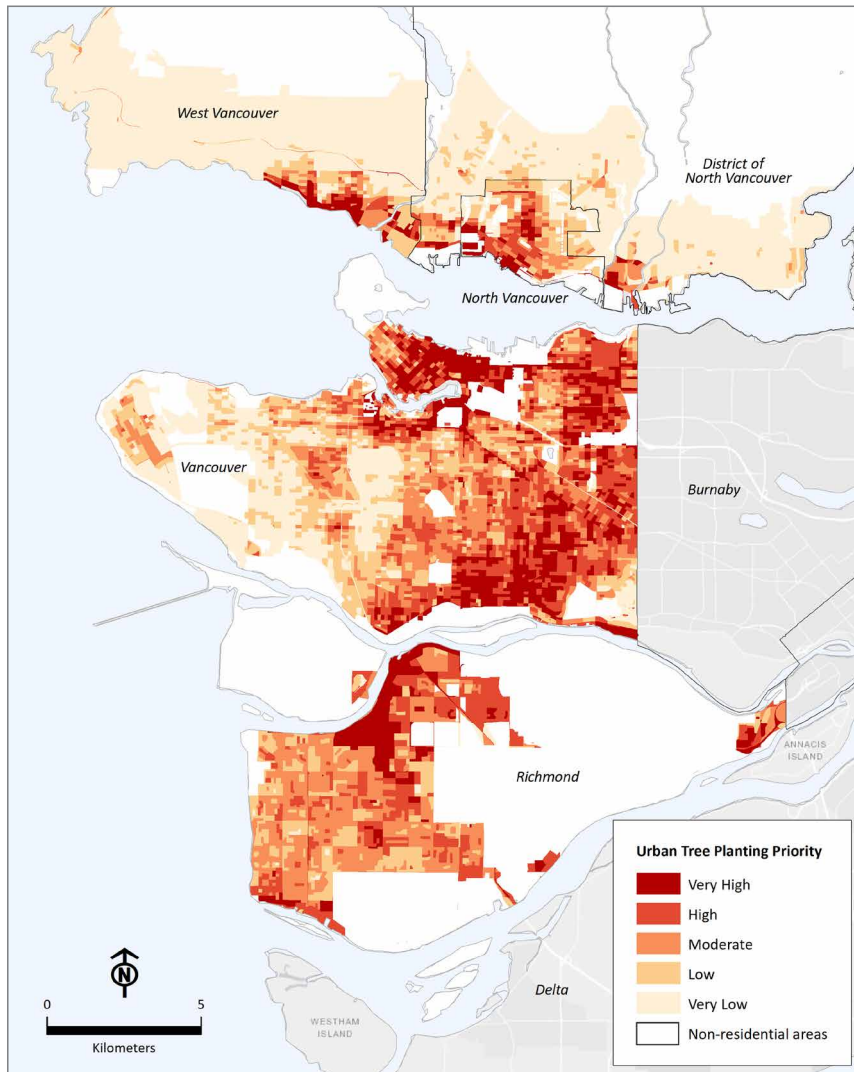
*Situational Vulnerability and Economic Dependency are measures composed of multiple variables drawn from census data; they describe geographic populations rather than individual-level characteristics. Economic dependency reflects employment, labour force participation, and population age makeup. Situational vulnerability reflects socio-demographic conditions related to education, income, ethnicity, housing, and household characteristics.*

The ongoing impacts of colonialism and systemic racism mean that many First Nation communities and Indigenous people, including those living in urban areas, are disproportionately represented in measures of social and economic vulnerability. The intersections of these factors mean that Indigenous people may experience greater risk for extreme heat exposure and heat-related illness.

## Trees and green spaces help keep neighbourhoods and people cool

Trees and other vegetation provide shade and help mitigate the urban heat island effect. Neighbourhood green space was found to be protective in the Vancouver area during the 2021 BC heat dome.<sup>9</sup> Metro Vancouver uses current tree coverage, risk for extreme heat, building features, and social factors to identify neighbourhoods that will benefit most from additional tree planting (Figure 8).

**Figure 8. Urban tree planting priority in the VCH region (2023)**



Sources: Metro Vancouver, Social Equity in Planning Spatial Analysis Case Studies, 2023; Statistics Canada, Census, 2016

The urban tree planting priority index (0.0–1.0) is calculated for each census dissemination block for the VCH region. It is based on a combination of measures (e.g., current tree canopy cover, extreme heat risk, social disparities, and housing type). Details about specific measures and how they are weighted can be found in the [Social Equity in Planning Spatial Analysis Case Studies Final Report](#). Areas with an index value closer to 1.0 (Very High Priority) have the highest potential to improve heat-related health equity outcomes by planting trees. Non-residential areas include land designated as agricultural, conservation/recreation, industrial, mixed employment, and rural according to the [Metro 2050 Regional Growth Strategy](#).



Photo: Roy Symons

**Cities and towns are planting trees to increase greenness and shade in urban areas.** The District of North Vancouver’s [Urban Tree Canopy Project](#) gives free trees and other plants to residents, and the City of North Vancouver’s [Living City Street Tree Planting Program](#) aims to increase shade trees along urban streets. The City of Vancouver and Vancouver Park Board are planting trees to increase tree canopy and shade in urban areas that experience the hottest temperatures. City crews excavate and install a growing medium and soil underground so they can plant shade trees along paved sidewalks and public spaces. The young trees have space to grow roots below the sidewalk and a permeable layer for water. As they grow larger, the trees will provide much-needed shade in highly developed urban areas. This initiative is part of a larger [Urban Forest Strategy](#). The City of Richmond’s [Public Tree Management Strategy](#) includes regular tracking of tree cover and sets targets to increase tree cover in public spaces. These programs also include strategies to keep trees healthy during hot, dry weather.

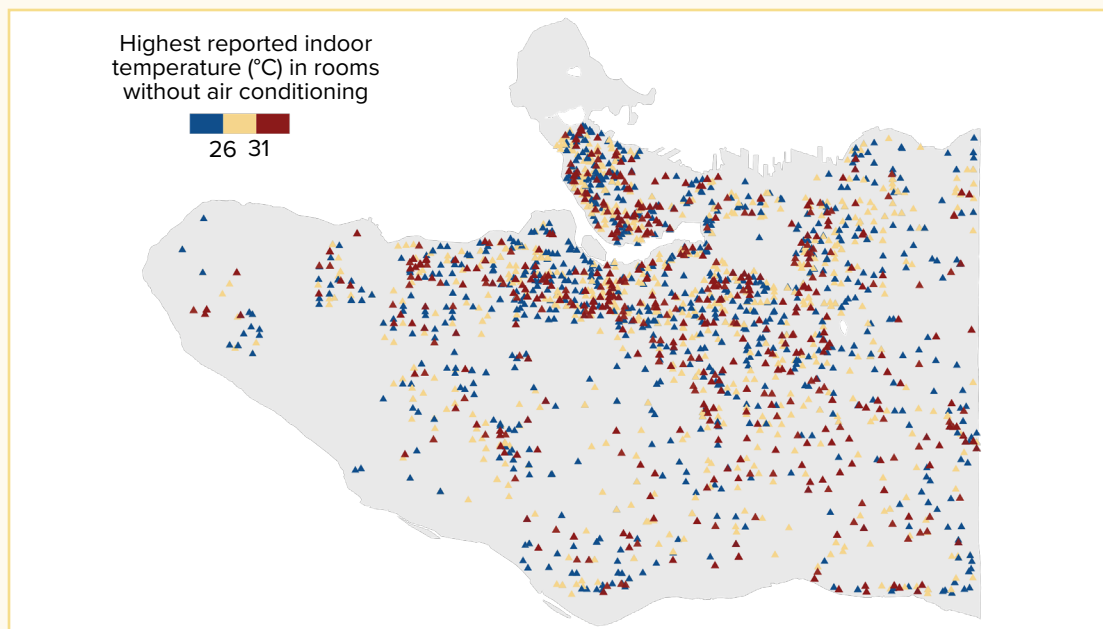
## SPOTLIGHT ON CITIZEN SCIENCE: INDOOR TEMPERATURES

VCH Public Health collaborated with the City of Vancouver and the BC Centre for Disease Control (BCCDC) on a multi-year citizen science project to learn more about high indoor temperatures in Vancouver homes during hot weather.<sup>†</sup> The goal was to find out what factors were associated with high indoor temperatures and how residents were affected.

Most of the people who died due to the 2021 BC heat dome were impacted by heat inside their homes. For people susceptible to heat, the risk increases at indoor temperatures higher than 26°C, and temperatures higher than 31°C can be particularly dangerous.<sup>13</sup>

During the summers of 2021, 2022, and 2023, participating Vancouver residents measured temperatures inside their homes and answered short surveys about their use of cooling measures such as air conditioning, fans, and window coverings. Participants frequently reported indoor temperatures above 26°C and 31°C (Figure 9).

**Figure 9. Daytime maximum indoor temperatures recorded in Vancouver homes (2021–23)**



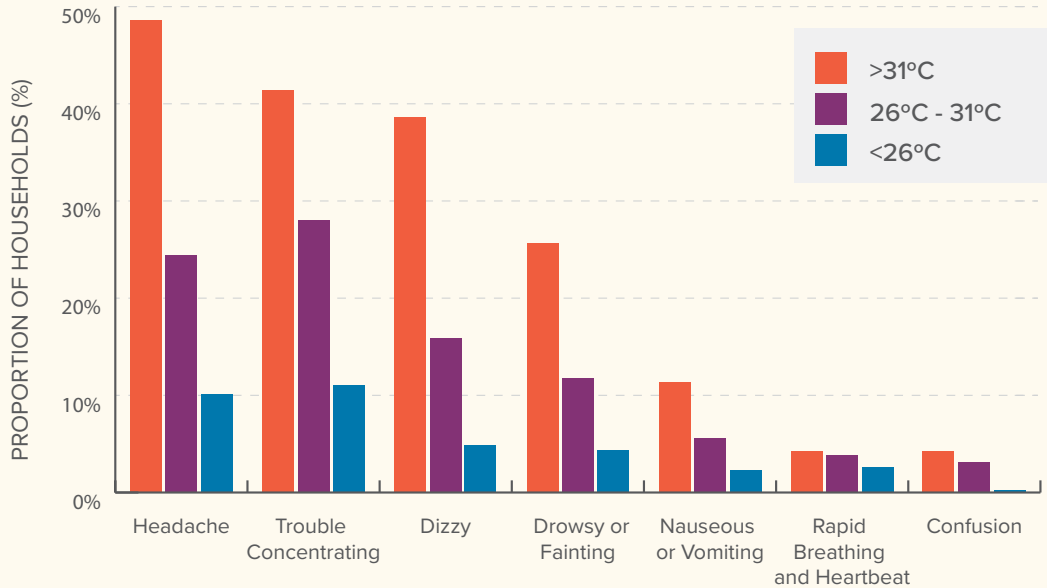
Source: BC Centre for Disease Control, City of Vancouver, and VCH

*The reported temperatures are based on survey responses and may not represent the complete distribution of indoor temperatures. The proportion of higher temperatures was greater in the downtown (where people are more likely to live in multi-story dwellings) and inland areas (that tend to be hotter outdoors and have fewer protective features such as shade trees and coastal breezes). The map also shows that indoor temperatures varied between homes across all areas of the city. This highlights the important role that building factors (such as windows and roof surfaces) and the built environment (such as trees) play in moderating indoor temperatures.*

<sup>†</sup> Additional analysis for this section from Katherine White, PhD student at the UBC School of Population and Public Health, and Shirley Chen, BC Centre for Disease Control.

Residents also reported heat-related symptoms experienced by people in the household (Figure 10).

**Figure 10. Proportion of Vancouver households reporting health outcomes by maximum indoor air temperature (2023)**



Source: BC Centre for Disease Control, City of Vancouver, and VCH

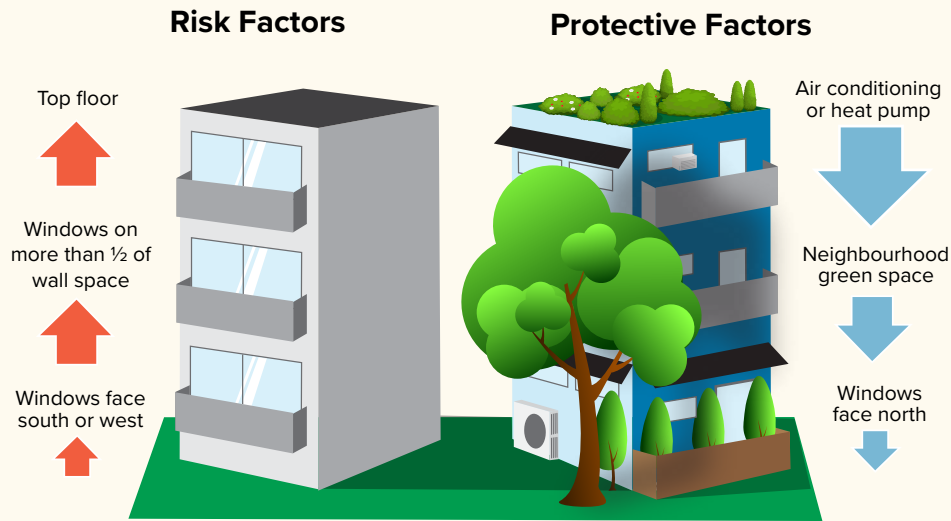
Neighbourhood characteristics, building features, and resident actions have a significant impact on indoor temperatures during hot weather (Figure 11). Residents can't change factors such as window direction or what floor they live on, but tools like window coverings and air conditioners can keep their homes cooler. Project participants with air conditioning were more likely to have a safe temperature of less than 26°C inside their home.

**75%**

of participants without air conditioning reported temperatures of 26°C or above



**Figure 11. Building factors that affect risk for high indoor temperatures**



Source: Data and analyses from BC Centre for Disease Control, City of Vancouver, and VCH.

*Neighbourhood green space is based on the Normalized Difference Vegetation Index (NDVI) with data from the Canadian Urban Environmental Health Research Consortium (CANUE) (<https://www.canuedata.ca/metadata.php>)*

**Air conditioning and heat pumps protect against extreme heat, but most homes in the VCH region don't have a cooling system.**

**In a 2023 survey:**



**1/3**

of renters vs

**1/2**

of home-owners in

Vancouver reported having air conditioning

Only 1/3 of households in BC have air conditioning, less than any other Canadian province. According to BC Hydro, the use of portable air conditioners in the Lower Mainland increased from 1/5 to 1/3 of customers since the 2021 BC heat dome. However, many people at risk for health impacts of heat face barriers to air conditioning at home, including cost and rules set by building owners.

While air conditioning protects against dangerous indoor temperatures, it also increases demand for electricity. Widespread use of air conditioning requires a resilient, low-emission power grid. It should supplement protective building and neighbourhood features such as tree cover, window shading, and heat pumps.

Sources: Statistics Canada ([The prevalence of household air conditioning in Canada](#)); BC Hydro; City of Vancouver

## Protecting residents from increasing temperatures

The 2021 BC heat dome was a call to action to mitigate and prepare for future extreme heat events. VCH Public Health supports a range of actions that make communities more resilient, protect vulnerable people, and reduce regional contributions to global warming.

### **Local governments and community organizations have programs and services to protect people from heat-related illness.**

- Local and regional governments support residents with information and services to support wellbeing during heat events. Many municipalities provide seasonal cooling centres and misting stations where residents can go to cool down during hot weather. The District of West Vancouver distributes donated fans, care kits, and cool meals to isolated seniors through programs such as [Feed the Need](#) and by first responders.
- Governments and organizations are helping communities prepare for higher temperatures. For example, the City of Vancouver and the BC Non-Profit Housing Association created the [Non-Profit Resilient Retrofit Grant](#) program. These grants will support low-carbon resilience work on interventions for up to 30 buildings in Vancouver with retrofits such as replacing gas heating and water systems with new electric heat pumps. North Shore Community Resources, North Shore Emergency Management, the City of North Vancouver, the District of West Vancouver, and local seniors' organizations collaborate to build more resilient communities. Preparedness initiatives such as [Connect & Prepare](#) focus on connections to help older residents and others prepare for and stay healthy during extreme heat.

### **The provincial government is working to protect vulnerable people.**

- Beginning in 2023, the BC Ministry of Health partnered with BC Hydro to distribute portable air conditioning units to residents at high risk from increased heat.
- With support from the BC Ministry of Health, the BC Centre for Disease Control is exploring the potential to identify people at high risk during climate-related emergencies using health care databases. This work will support targeted outreach to those who might otherwise remain at risk before and during hazards such as extreme heat events, wildfires, and flooding.

### **VCH Public Health programs are preparing to protect the VCH population during extreme heat:**

- Participating on the BC Health Effects of Anomalous Temperatures (BC HEAT) Committee that coordinates the [BC Heat Alert Response System](#) (BC HARS).
- Exploring building design and policy options to create heat-resilient housing through the *Climate Ready, Zero Emission Buildings* project, in collaboration with Metro Vancouver and the Cities of Vancouver and North Vancouver.

- Advocating for policies that ensure safer indoor temperatures, such as updates to the *Vancouver Building By-law* that require cooling in new buildings<sup>14</sup> and promotion of denser tree canopies in urban areas.
- Learning from community members at higher risk, and supporting efforts to strengthen community connections and empower people with [resources](#) to check in on vulnerable community members during heat events.

**VCH's Public Health outreach teams focus on overdose prevention, HIV outreach, and immunizing in schools to keep people healthy. They now support clients during hot weather too.**

People living and providing health and social services in Vancouver's Downtown Eastside demonstrated climate resilience during the 2021 BC heat dome. VCH Public Health outreach teams used lessons learned from this experience to create a risk assessment tool to identify people with the highest need. In 2022, these teams provided water and information and checked in on people at higher risk for heat-related illness. They also helped people access health and social services, including offering transportation to and from cooling shelters. It was important that staff also had time and spaces to cool off, which helped them stay safe and able to continue valuable outreach work.

In spring 2023, VCH Public Health teams conducted pre-heat planning to guide outreach and support when hot weather arrived. This builds on work started in 2022 and empowers staff to focus on supporting the most heat-susceptible clients.



# Wildfires and smoke



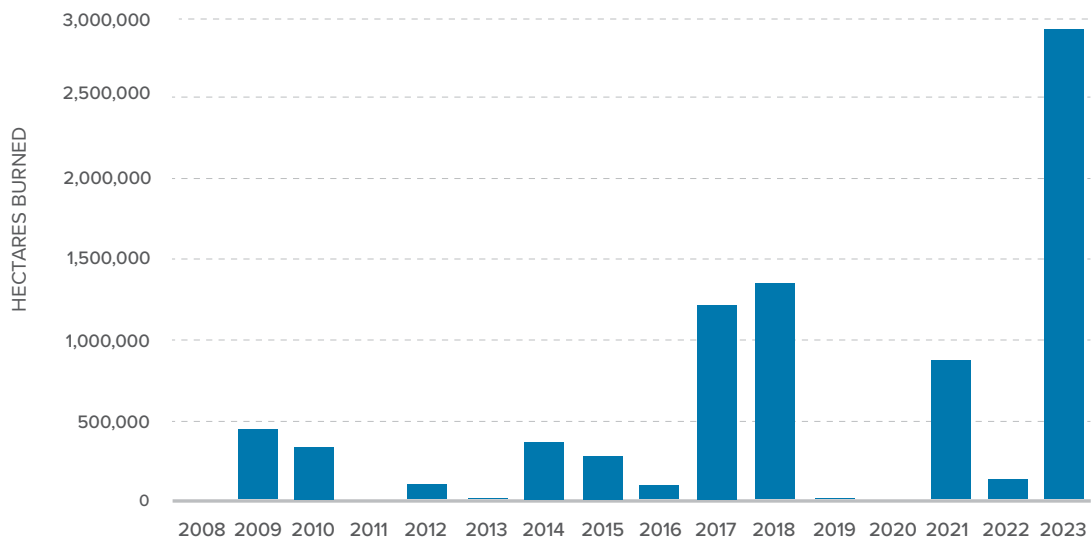
2023 was the worst wildfire season ever recorded in BC. The province declared a state of emergency as thousands of people evacuated their homes and communities. BC has also experienced many significant wildfire seasons over the past decade. In 2015, fires led to evacuation orders in the Pemberton Valley and air quality advisories across the VCH region. Record-setting wildfire seasons in 2017 and 2018 kept the

region under smoky skies for weeks. In 2020 and 2022, VCH communities experienced air quality advisories because of fine particulate matter drifting from wildfires in other parts of Canada or the United States.

## Climate change increases wildfire risk

Wildfires will continue to increase in frequency and severity as the weather gets hotter, drier, and windier (Figure 12).<sup>15</sup> Some fires may directly affect VCH communities that border on forest lands, and many will produce wildfire smoke that impacts population health.

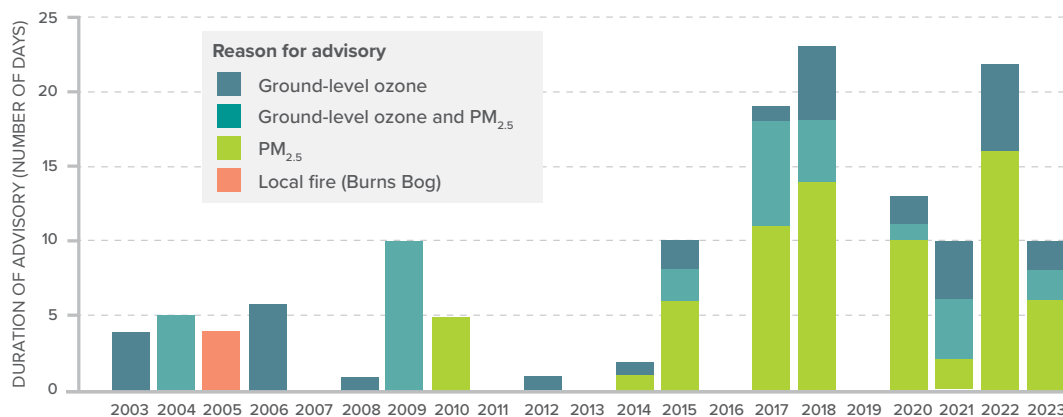
**Figure 12. Hectares burned by wildfires in BC (2008–2023)**



Source: Data from BC Wildfire Service ([Wildfire Averages](#), [Wildfire Status Update](#))

Wildfire smoke is the leading cause of exposure to poor air quality in the VCH region, and exposure can occur even when fires are burning far away. The frequency of air quality advisories has increased over the past 20 years in Metro Vancouver (Figure 13). Communities on the Central Coast, Sunshine Coast, and in the Sea to Sky corridor have experienced similar trends.

**Figure 13. Air quality advisories in Metro Vancouver (2003–2023)**



Source: Metro Vancouver Air Quality Advisory Service, July 2023

*Airborne fine particulate matter (PM<sub>2.5</sub>), a major component of wildfire smoke, has been a significant trigger for air quality advisories in the region since 2010. Fine particulate matter can travel long distances; some air quality advisories (including in 2020 and 2022) were related to wildfires in the western United States.*

## Smoke threatens people’s health

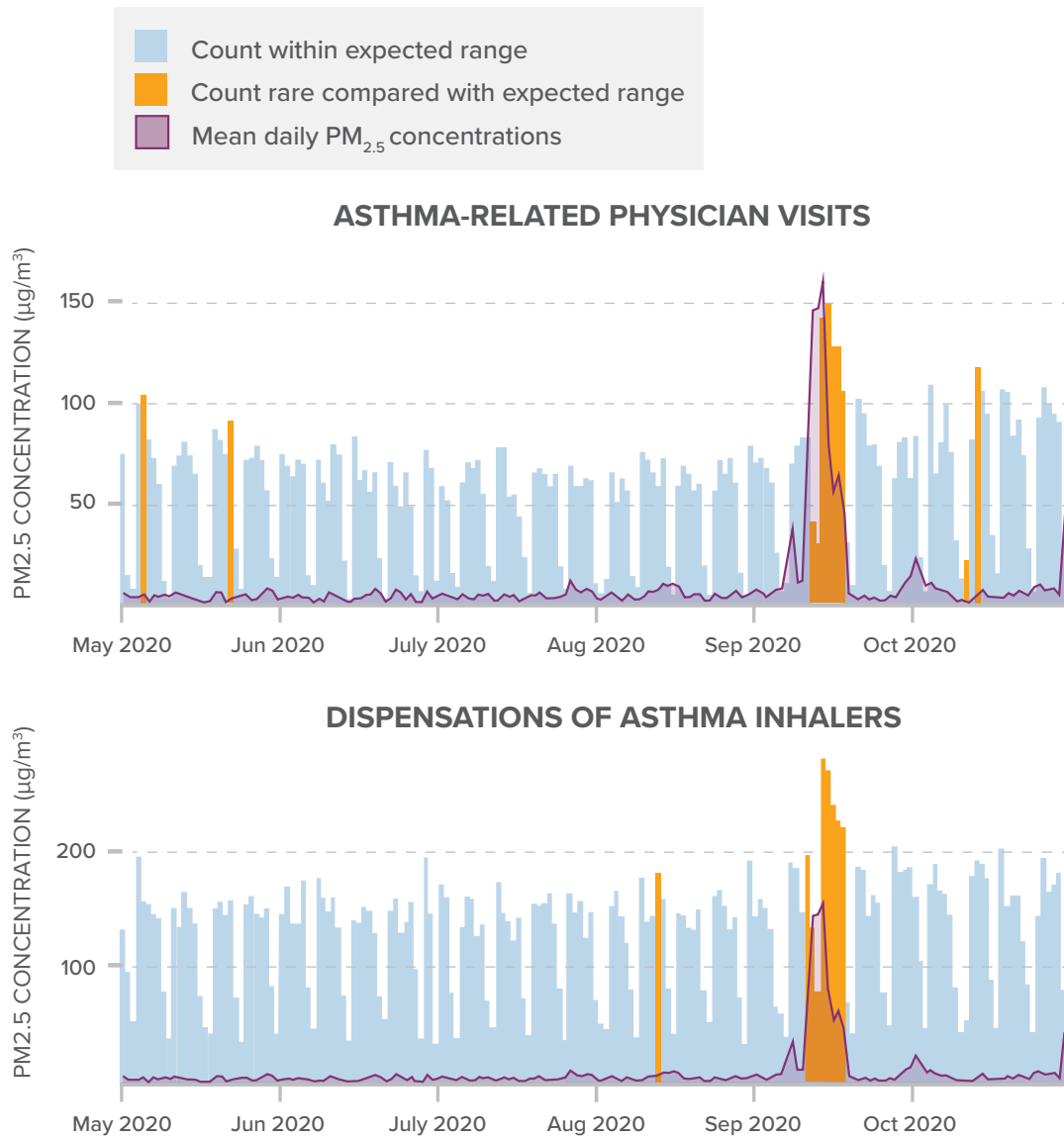
Smoke from wildfires can considerably worsen air quality in BC communities. Wildfire smoke is a complex mixture of particulate matter (including fine particulate matter, known as PM<sub>2.5</sub>) and gases such as carbon monoxide, nitrogen oxides, and volatile organic compounds (VOCs).

Any exposure to PM<sub>2.5</sub> can have risks for human health. These extremely small airborne particles travel deep into the airways, are absorbed into the blood stream, and lead to inflammation throughout the body, including in airways and blood vessels. Research shows that short-term exposure to PM<sub>2.5</sub> can cause flare-ups of asthma and other respiratory diseases, worsen heart disease, and increase the risk of heart attack and stroke.<sup>16</sup> One study of severe wildfire seasons from 2013 to 2018 estimated that during this time 100 or more acute premature deaths could be attributed to wildfire-related PM<sub>2.5</sub> exposure in BC.<sup>17</sup>

Deteriorating air quality has been associated with increased use of health care services in the VCH region. University of British Columbia (UBC) researchers found that emergency department visits for respiratory causes in Vancouver increased in connection with increases in local PM<sub>2.5</sub> levels due to wildfires during the summers of 2009–2019.<sup>18</sup> People living

with asthma are also more likely to seek medical attention and fill prescriptions for inhaler medications when  $PM_{2.5}$  levels are high. Data on physician visits and dispensation of asthma inhalers showed that very high rates of these health-seeking behaviours occurred during times with increased  $PM_{2.5}$  due to wildfires (Figure 14).

**Figure 14. Association of local fine particulate matter ( $PM_{2.5}$ ) concentration with asthma-related health care (Vancouver, 2020)**

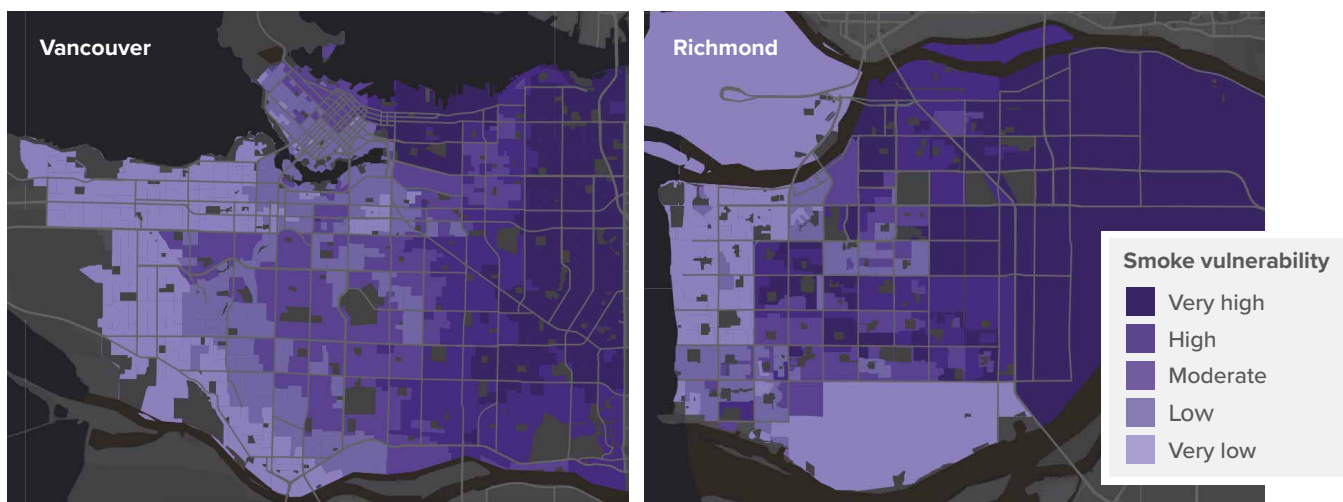


Source: BC Centre for Disease Control (using data on physician visits for asthma from the BC Ministry of Health Medical Services Plan billings data, dispensations of salbutamol sulfate from the BC Ministry of Health PharmaNet data, and  $PM_{2.5}$  concentrations from the BC Ministry of Environment regulatory monitoring network)

## Health risks from wildfire smoke vary across VCH

Working in partnership with UBC, Fraser Health, and Metro Vancouver, VCH Public Health created a series of maps showing population vulnerability to the health impacts of wildfire smoke across the VCH and Fraser regions (Figure 15).<sup>19</sup> Although people across VCH can experience health impacts associated with smoke, the darker areas are those where smoke exposure is higher, where the population is more susceptible to the health impacts of smoke because of age or chronic health conditions, and where people are less protected by factors such as income, housing, or social supports.

**Figure 15. Wildfire smoke vulnerability in Vancouver and Richmond**



Source: [Community Health and Climate Change Maps](#) (Vancouver Coastal Health, Fraser Health, and University of British Columbia)

## Wildfires disrupt communities

Direct health impacts from smoke are not the only way that wildfires affect population health. Fires can cause injuries, damage community infrastructure, and interrupt health care and other essential services. Fire retardants, ash, and debris contaminate natural ecosystems and can affect drinking water quality.<sup>20</sup> Evacuation disrupts livelihoods and displaces people.<sup>21</sup> In 2021 and 2023, VCH temporarily housed residents of long-term care facilities evacuated from other regions of the province. The increasing presence of smoke and fires can lead to stress, fear, and anxiety about the future.<sup>22</sup>

## Wildfire impacts and Indigenous communities

Wildfires have had significant impacts on many of the 14 First Nations in the VCH region. Historical and ongoing colonialism, economic marginalization, and land dispossession have already undermined First Nations' livelihoods and land-based activities.<sup>23</sup> Wildfires can further harm or destroy places with cultural or spiritual significance for First Nations. Damage to lands and waters affects food security and disrupts economic activities related to forestry, fishing, and food harvesting.<sup>24</sup> Such changes also affect important cultural practices and traditional knowledge-sharing activities.

Climate-driven disruptions like wildfires can affect the mental, emotional, and spiritual wellbeing of Indigenous people, who may already be dealing with personal or intergenerational trauma. Wildfire smoke can also worsen existing health disparities affecting Indigenous people.

***“Evacuation orders from fires and floods force First Nations to move away from their territories, and often without culturally appropriate assistance and support, and especially impact Elders, women and those with special needs.”***

BC Assembly of First Nations<sup>25</sup>

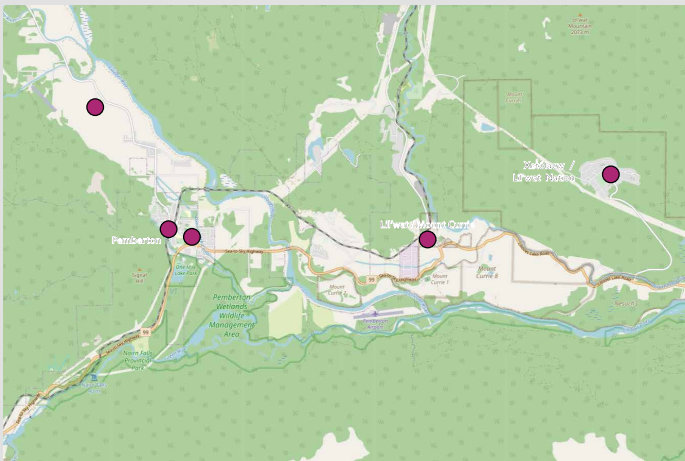


## SPOTLIGHT ON AIR QUALITY MONITORING: SMALLER COMMUNITIES

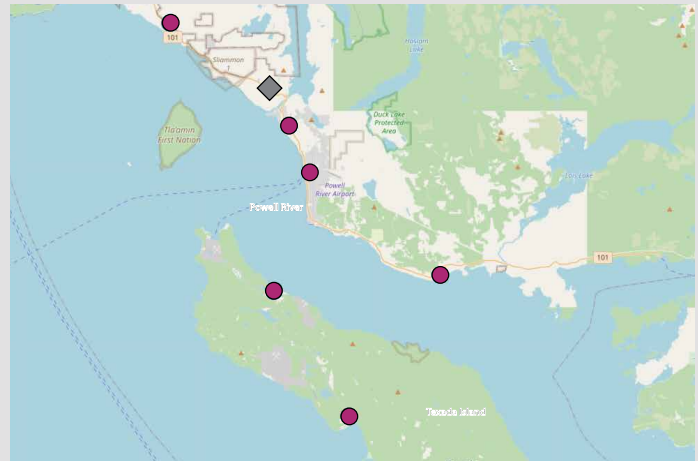
Many Vancouver Coastal Health (VCH) communities don't have full-scale government air quality monitoring stations to measure local exposure to contaminants from wildfire smoke. In 2022, VCH Environmental Health Officers worked with community partners to install lower-cost air quality monitors for fine particulate matter (PM<sub>2.5</sub>) with a focus on rural, remote, and smaller communities (Figure 16). Community members will learn how to use meaningful local air quality information to protect their health during smoke events. Monitors have been installed in Pemberton, Squamish, Whistler, Powell River, across the qathet Regional District, and within the Lil'wat, Musqueam, and Squamish Nations.

**Figure 16. Low-cost air quality monitors to provide local information in rural, remote, and smaller communities**

### Pemberton and Lil'wat Nation area

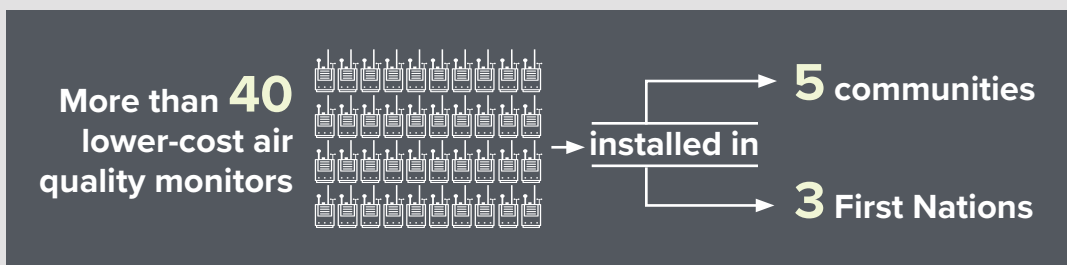


### Powell River and qathet Regional District



Source: [AQmap](#)

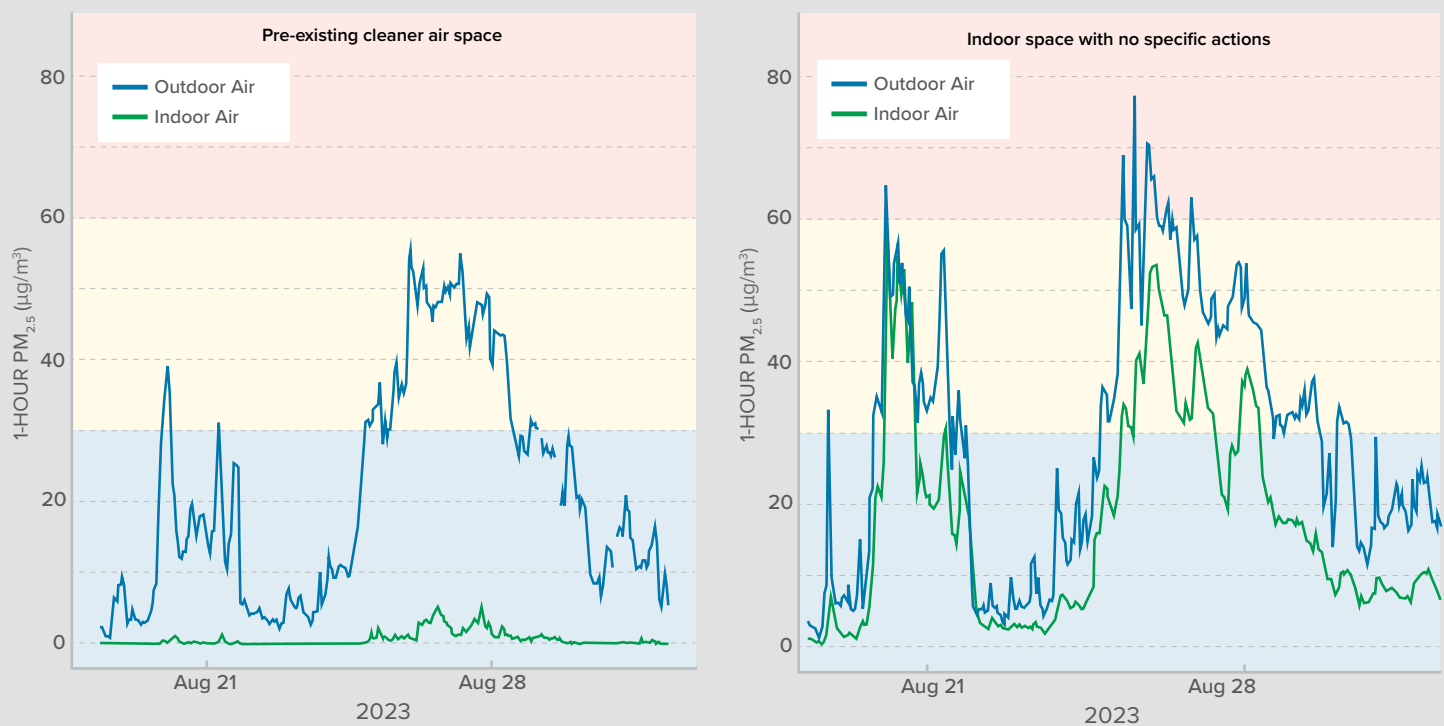
Maps showing a government monitoring station  (diamond) and lower-cost air quality monitors  (circle).



When outdoor air quality is poor, Medical Health Officers advise people to seek cleaner air by staying indoors with windows closed (when temperature allows), using air filters in homes,<sup>26</sup> or going to cleaner air spaces such as community centres with air filtration. VCH Public Health worked with community-based organizations and local government partners to measure PM<sub>2.5</sub> outdoors, inside pre-existing cleaner air spaces such as municipal community centres, and inside other spaces that did not previously conduct specific actions to improve indoor air quality. With feedback from real-time air quality monitoring, these spaces can reduce exposure to PM<sub>2.5</sub>.

In tests of 20 buildings, PM<sub>2.5</sub> levels were low inside many of the pre-existing cleaner air spaces, even when levels outside were very high. Indoor spaces that did not have intentional actions to improve indoor air were not as protective, but the air quality was often somewhat better than outside (Figure 17).

**Figure 17. Impact of different types of indoor spaces on exposure to fine particulate matter (PM<sub>2.5</sub>)**



Source: [PurpleAir](#)

*The blue, yellow, and red shading indicates the Air Quality Health Index (AQHI) categories of Low, Moderate, and High risk.*

## Protecting the health of VCH residents during wildfire seasons

It is essential to protect people and health-promoting infrastructure from wildfires and related smoke. This will require the efforts and cooperation of multiple sectors and partners.

**Provincial and regional coordination is key.** The BC Wildfire Service is making investments and supporting partners to reduce wildfire risk and support community resilience.<sup>27</sup> Provincial and local agencies monitor and regulate air quality, and intersectoral provincial and regional committees strategize and examine ways to improve air quality in the region.

### **VCH Public Health programs support community resilience:**

- Providing guidance to facilities and schools to reduce smoke exposure from wildfires.
- Supporting community organizations to increase capacity for planning and response to smoke and heat events.
- Evaluating indoor air spaces for use as cleaner air spaces and providing advice to managers of cleaner air spaces.
- Partnering with municipalities, regional districts, First Nations, and school districts to improve access to local air quality data and support evidence-based decisions.



# Drought, flooding, and storms

The Sunshine Coast experienced a severe and prolonged drought in the summer and fall of 2022. The region was under a State of Local Emergency and access to water was restricted for the region's 22,000 people. Local farms and businesses faced extreme water restrictions.

***“Our staff dealt with scenarios we had not had to consider in the past. In October, dry weather quickly made way for snow which caused freezing temperatures in the Chapman Watershed, affecting the amount of water we could access.”***

Leonard Lee, Board Chair of the Sunshine Coast Regional District<sup>28</sup>

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***“It’s not surprising that climate events are hitting businesses like ours hard. The more important piece is to recognize that climate change is very real, and it’s coming at us fast. If farmers are the first victims of it, then small businesses like ours are perhaps the next victims.”***

Brian Smith, Persephone Brewing Company, Gibsons<sup>29</sup>



## Weather is less predictable on a warming planet

As the climate changes, so does the weather. It can be too wet, too dry, too hot, or too cold, often in close succession.<sup>30</sup> Changing weather with less predictable timing is a major challenge of climate change.

**Drought** occurs periodically due to hot and dry weather, low snow accumulation, or delayed rains.<sup>31</sup> It can cause more frequent and more severe water shortages.<sup>32</sup> Drought can reduce the availability of safe drinking water and threatens food sources.

**High water** levels will continue to affect rivers, creeks, and coastlines as annual rainfall increases, seasonal snowmelt speeds up, and sea levels rise. There can be larger storm surges, bigger waves, and higher tides.<sup>33</sup> Flooding and landslides from high water can endanger life, contaminate drinking water, and damage infrastructure.<sup>34</sup> Flooded sewer systems can expose people to microorganisms that cause gastrointestinal illness.<sup>‡</sup> Floods that affect people's homes can be stressful and traumatic.<sup>35</sup>

**Storms** are expected to be more frequent and more severe. This includes intense rainfall events such as atmospheric rivers and snowstorms that disrupt daily life and essential health services.<sup>30</sup> It is difficult to predict how the typical pattern of winter windstorms, which can topple trees onto electrical lines and other utility infrastructure, might change.<sup>36,37</sup>

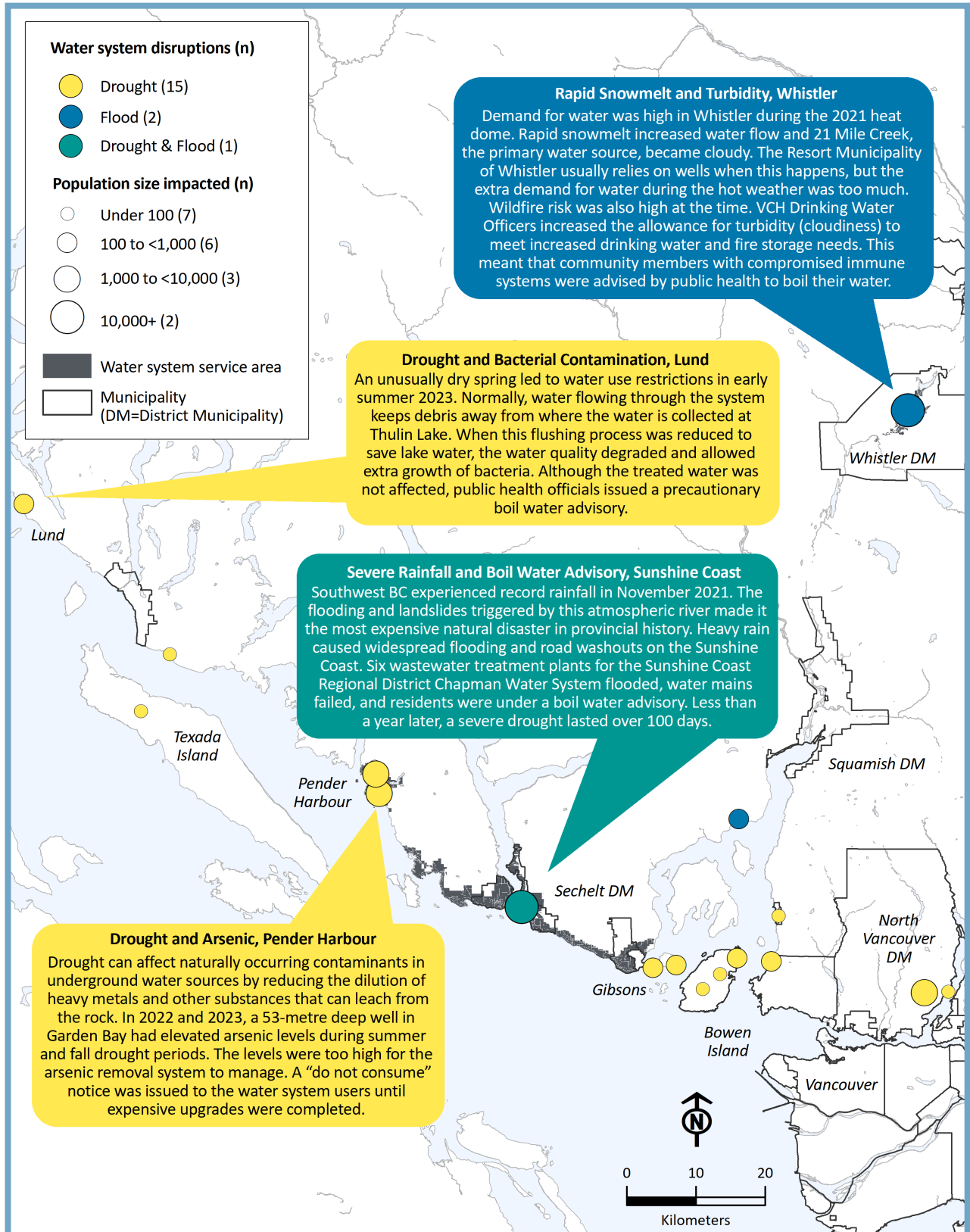
## VCH residents are increasingly impacted by extreme weather

Drought and flooding have already affected drinking water systems across the region. Extremely dry conditions, high water, and excess precipitation can directly impact water sources, damage infrastructure, or create treatment challenges. Small drinking water systems are at higher risk, especially where there are limited resources to maintain and protect them. VCH Drinking Water Officers and epidemiologists worked to identify drinking water systems that have been impacted by drought or flooding during the years 2021 to 2023. These effects have occurred across the region, and firsthand accounts highlight a variety of climate-related disruptions (Figure 18).<sup>38–41</sup>

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‡ Metro Vancouver reports real-time and previous year sewer overflows on a [map](#) for public awareness during flood events, showing that overflows do occur with some regularity in the VCH communities within Metro Vancouver.

**Figure 18. Climate impacts on drinking water in the VCH region (2021-2023)**



Source: Vancouver Coastal Health, Health Protection, November 2023

Storms have disrupted daily life and damaged critical infrastructure in VCH. Flooding due to heavy rain in November 2021 directly impacted health services and facilities in the region. Damage to transportation networks affected critical supply chains and damaged homes and farms in the Fraser Valley.<sup>42</sup> Localized storm damage has impacted access to health and social services and damaged spaces used for social connection and physical activity. Power outages can impact health in many ways including damage to pumps for well water, food safety risks or loss of food when refrigeration fails, or inability to use vital electronic home health care equipment.

Most of the VCH region experienced drought conditions in summer 2022 and 2023. Chapman Lake, which provides drinking water to many communities on the Sunshine Coast, reached extremely low levels.



Photo: Suzanne Senger

High winds and heavy rain caused the most damaging windstorm in BC history in December 2018. Nearly half a million people in the Lower Mainland and Fraser Valley lost power, some for up to 4 days.<sup>40</sup>

A sudden heavy snowfall in November 2022 left people stranded overnight in vehicles on a highway between Vancouver and Richmond.



Photo: TransLink

High tides, rain, and storm surges in November 2021 and January 2022 caused extensive damage to Vancouver's Kitsilano Pool and the Stanley Park Seawall. These popular spaces for outdoor physical activity and social connection were closed for months.

High water and storms can also damage beaches and other oceanfront sites that people use for recreation.

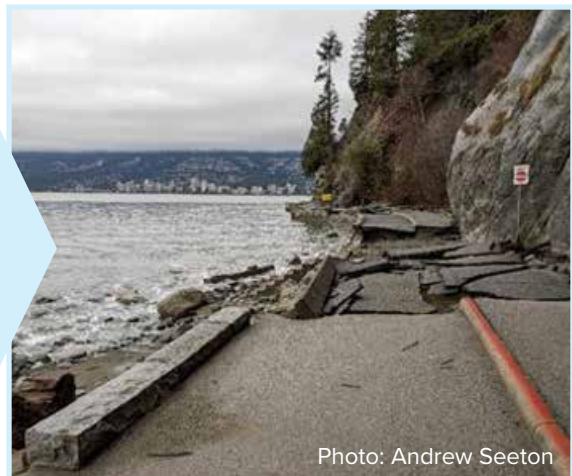


Photo: Andrew Seeton

## Protecting the health of VCH residents and ensuring safe drinking water

### The provincial government provides tools to guide planning.

- BC's River Forecast Centre is producing updated flood hazard maps.
- The Ministry of Health developed new [Design Guidelines for Drinking Water Systems in British Columbia](#). VCH Public Health collaborated with the Ministry to include information about climate change impacts and design-stage actions to protect the quantity and safety of drinking water.
- The Ministry of Transportation and Infrastructure requires “an adequate supply of potable water suitable for the proposed land use” in its [Guide to Rural Subdivision Approvals](#).

### Municipalities plan for drought and build in resilience to extreme weather events.

- Most communities in VCH understand how floods have affected them in the past, and they have plans in place to manage these risks in the coming years. Some communities have modelled their future flood risk using climate change projections, but more work is needed in all these areas. The City of Richmond's [Flood Protection](#) system has been designed to reduce the risks associated with sea level rise and flooding in the Fraser River. This includes upgrades to the city's extensive dykes and other drainage infrastructure based on estimates of future climate change, including the possibility of one metre of sea level rise.
- Water system operators are planning for drought conditions. Bowen Island Municipality is conducting engineering studies and making changes to wells and other infrastructure to ensure the water supply is prepared for climate change and population growth. This includes finding new ways to share available water resources across the island's three water service areas. The Town of Gibsons is focused on sustaining its groundwater source, the Gibsons Aquifer. An [Aquifer Mapping Study](#) simulated several climate change scenarios and predicted that the aquifer can support up to double the town's current population.<sup>43</sup> Metro Vancouver has a long-range plan to avoid water shortages as the climate changes. The regional [Water Supply Outlook 2120](#) includes upgrades to water treatment facilities.
- Many municipalities are building rainwater collection systems and reusing grey water. The [City of Richmond Recycling Depot](#) sells low-cost rain barrels. The Sunshine Coast Regional District has a [Rainwater Harvesting Rebate Program](#) for residents who install rainwater storage systems. The City of Vancouver plans to manage and use rainwater as a sustainable resource through a combination of [green rainwater infrastructure](#) throughout the city and rainwater management on residential properties.

**VCH Public Health programs provide public health services and work with partners to increase community resilience:**

- VCH Public Health and the Public Health Association of BC (PHABC) are working with small community-based organizations to create and help implement climate resilience plans. The VCH *Climate Change Adaptation with Non-Profit Community Partners* (CCANPP) project will help enable organizations to provide direct support to people at highest risk during extreme weather events.
- VCH Environmental Health Officers and engineering experts provide direct support to drinking water system operators and governments before, during, and after flooding and drought events.

# Ecosystems and society

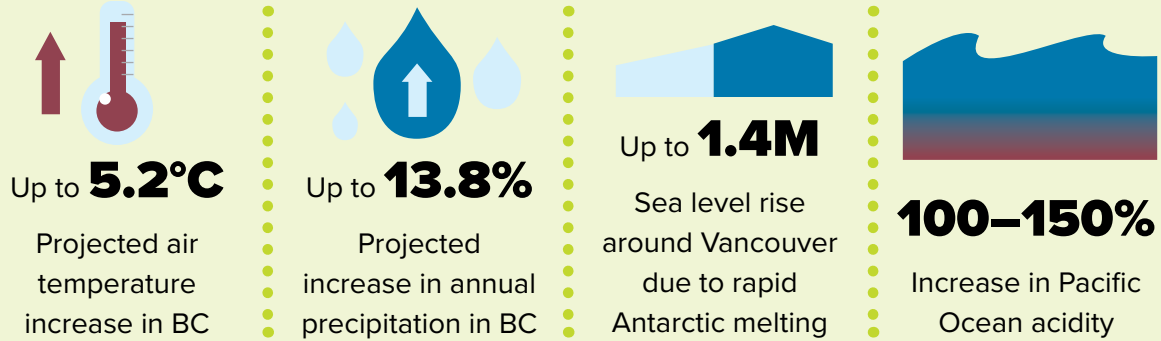
***“There are so many fires going on, and there are so many floods. Growing up, there was snow on the mountains all year round, and now around this time you barely see any. So a lot of creeks dry up, and a lot of plants die. I remember seeing a bunch of cedar trees dying, and a bunch of salal dying along the coast. One winter there were landslides everywhere. In one inlet alone, we counted over 50 different landslides. There was this one inlet where from the top of the mountain all the way down, stretching across around 10 km, the mountain just fell onto the estuary. Our fish are being depleted and there’s not enough fish to support our people. How do we safely harvest herring eggs when we don’t get herring as far in? How do we safely harvest abalone? There’s barely any abalone. Everything seems to be off calendar. It’s all shifted – the dog salmon, stinging nettle, the raspberries. Some things are coming early. Other things are coming late. It’s getting too hot or too cold at certain points. It’s getting harder and it feels dire. Climate change in general really affects our mental wellbeing. How are we going to adapt to what’s potentially coming?”***

Wapat (Alec Willie), Nuxalk Nation Food Security Coordinator

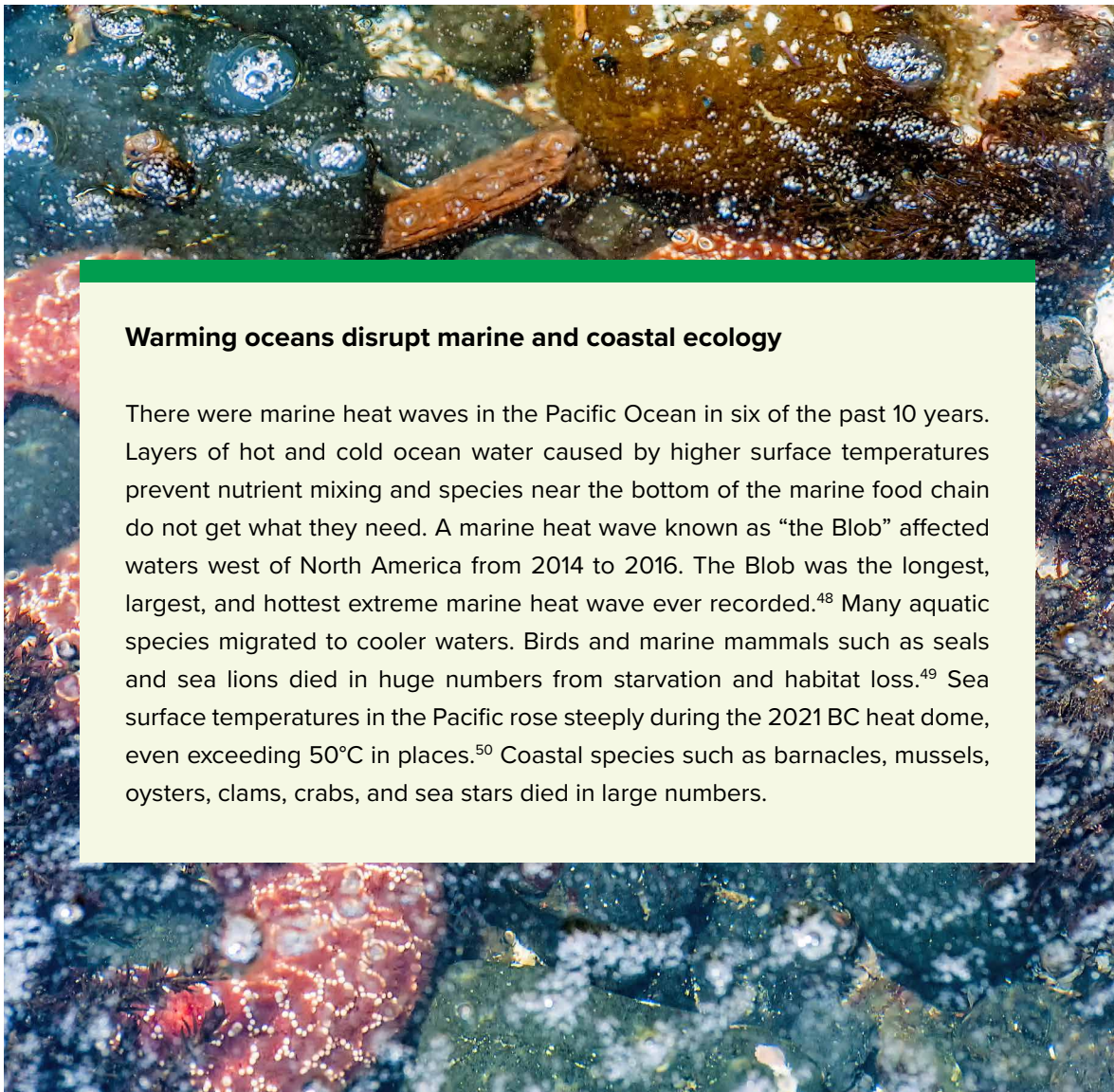
## Climate change disrupts ecosystems

The VCH region benefits from a rich and dynamic ecosystem, including forests, mountains, and coastal marine areas. The lands and water are home to many plant and animal species. People live in diverse rural, urban, suburban, and First Nation communities. Everything in this ecosystem is interdependent. The population relies on the natural environment for food, water, work, play, and connections with nature that support health and wellbeing in many ways. These connections are well-recognized and important among First Nations. Ecosystems are impacted by climate change, and they can also help to moderate the impacts of climate change.<sup>44</sup>

Long-term ecosystem changes are projected by 2100, based on current emissions<sup>32,45–48</sup>



The Pacific Ocean will be warmer, more acidic, and less rich in oxygen. Streams and rivers will have higher water temperatures and longer periods of low water flow.



### Warming oceans disrupt marine and coastal ecology

There were marine heat waves in the Pacific Ocean in six of the past 10 years. Layers of hot and cold ocean water caused by higher surface temperatures prevent nutrient mixing and species near the bottom of the marine food chain do not get what they need. A marine heat wave known as “the Blob” affected waters west of North America from 2014 to 2016. The Blob was the longest, largest, and hottest extreme marine heat wave ever recorded.<sup>48</sup> Many aquatic species migrated to cooler waters. Birds and marine mammals such as seals and sea lions died in huge numbers from starvation and habitat loss.<sup>49</sup> Sea surface temperatures in the Pacific rose steeply during the 2021 BC heat dome, even exceeding 50°C in places.<sup>50</sup> Coastal species such as barnacles, mussels, oysters, clams, crabs, and sea stars died in large numbers.



## Ecosystem changes affect transmission of illness and disease

Warmer water is more hospitable to a variety of microorganisms that cause infectious diseases. In the VCH region this could lead to more frequent foodborne infections related to shellfish (such as *Vibrio parahaemolyticus*) and increases in acute illness due to freshwater and marine harmful algal blooms (HABs) or other microorganisms.<sup>1</sup> Oysters harvested from BC waters in 2015 caused a Canada-wide *Vibrio* outbreak. The illnesses occurred while the sea surface was warmer than normal.<sup>51</sup> VCH and BC public health experts advise shellfish harvesters and consumers about ways to decrease risk of foodborne illness. Federal agencies such as the Canadian Food Inspection Agency and Fisheries and Oceans Canada monitor for marine toxins. Some of these pathogens can negatively impact fisheries or lead to closure of beaches used for swimming. Further regulation and other actions may be needed to prevent these illnesses as the climate changes.<sup>52</sup>

Evidence about the health impacts of climate change points to future increases in the spread of many infectious diseases. Changing climate and ecosystem conditions could affect the risk for diseases transmitted to people from insects and animals. For example, while the incidence of locally acquired Lyme disease is currently very low in the VCH region, the risk for this infection could change in the medium to long term.

## Ecosystem changes affect food systems

Climate and ecosystem changes can affect the availability, accessibility, safety, and quality of food.<sup>53</sup> Rural, remote, and Indigenous communities can experience disproportionate impacts, particularly with respect to traditional seafood harvesting, hunting, and gathering practices.<sup>54</sup>

**Food systems are central to health for First Nations.** Food sovereignty is “an approach to food security based on principles of self-determination, autonomy and democratic and collective approaches across the food system.”<sup>55</sup> Changes to the climate in the VCH region are now impacting many First Nations’ ability to access traditional foods and medicines, including animals, fish, berries, and roots.<sup>23,24</sup> Wildfires and other hazards have damaged hunting and fishing grounds, trap lines, and trappers’ cabins, as well as burial grounds and other sacred sites. All these changes make it difficult for many First Nations people to engage in cultural practices, compromising nutritional and spiritual health and wellbeing.<sup>56</sup>

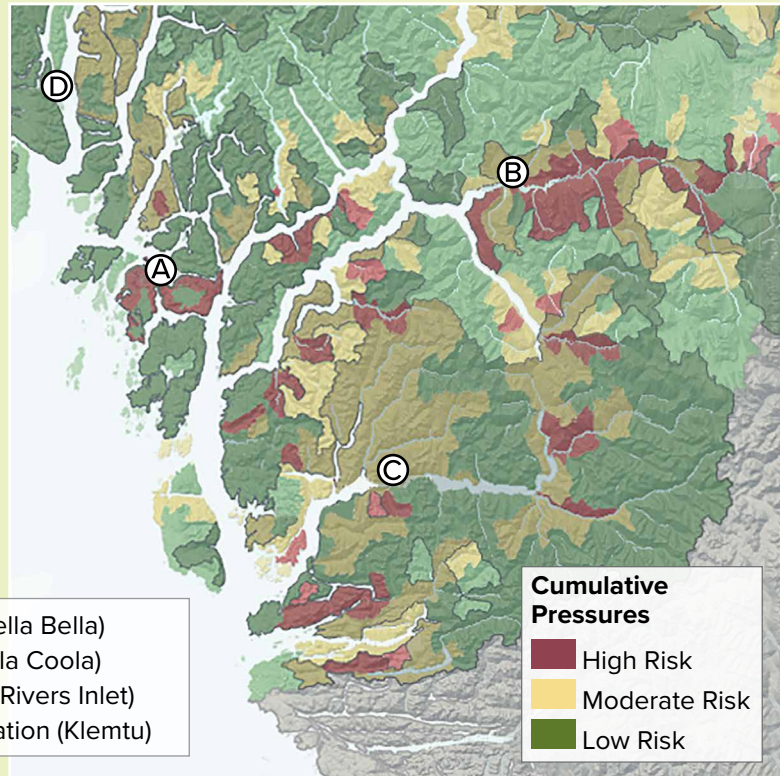
Climate change is also impacting the Métis. In 2022, the Métis Nation BC conducted a survey of Métis people to gain insights into the connections between climate change and access to nutritional and traditional foods. Ninety percent of respondents stated that they had observed the impact of climate change. The most significant impacts identified were increase in extreme weather events, increasing temperatures, and unpredictable weather affecting food planting, gathering, hunting, and fishing.<sup>57</sup>

In BC, salmon play a particularly important cultural role and are an important source of food in many First Nations.<sup>48</sup> Habitat pressures from climate change and human activities have led to declines in salmon populations (Figure 19).<sup>58</sup>

Salmon population pressures have impacted nutrition and culture in the Wuikinuxv Nation, which closed its sockeye food fishery in 4 of the past 5 years.<sup>59</sup>

Consumption of salmon, eulachon, and wild berries in the Nuxalk Nation dramatically declined between 1981 and 2009.<sup>60</sup> Climate change will likely result in a decrease of traditionally harvested seafood in the Nuxalk territory and for other coastal First Nations.<sup>58</sup>

**Figure 19. Current pressures on salmon habitat (Central Coast)**



- (A) Heiltsuk Nation (Bella Bella)
- (B) Nuxalk Nation (Bella Coola)
- (C) Wuikinuxv Nation (Rivers Inlet)
- (D) Kitasoo Xai'xais Nation (Klemtu)

Adapted from: Pacific Salmon Foundation, Salmon Watersheds Program, [SalmonExplorer.ca](http://SalmonExplorer.ca)



The [Salish Seas Regenerative Farm Society](#) is transforming a barren 7-acre plot behind Sechelt Hospital into a regenerative farm through a 3-year lease agreement with shíshálh Nation. The community organization aims to demonstrate how agriculture focused on ecosystem health can enhance local food self-sufficiency, create habitat for pollinating insects, and reduce greenhouse gas emissions. The project provides produce to the hospital, contributes to reconciliation, and offers volunteers an opportunity to make meaningful contributions to their community.

Image: Salish Seas Regenerative Farm Society





## SPOTLIGHT ON PLANETARY HEALTH AT VCH: MITIGATION AND ADAPTATION

**Planetary health refers to the interdependent relationship between the health of the environment and the health of communities.**

The effects of climate change on human health and care delivery are clear. The health care system also contributes to climate change. Vancouver Coastal Health (VCH) is adapting to ensure high-quality care delivery through climate events while reducing the health care system's environmental footprint.

VCH was the first health organization in BC to integrate Planetary Health as a strategic priority and is working to build a sustainable, low-carbon, and resilient health system.

In collaboration with staff, other health authorities, the Ministry of Health, and other provincial and national health organizations, VCH is working to embed planetary health principles and best practices throughout the entire organization. VCH's Planetary Health strategy outlines key areas for action.

- **Service design and delivery:** Implement use of sustainable products and improve processes to limit environmental impacts.
- **Food and nutrition:** Reduce food-related emissions and waste and provide healthy, sustainable meal options for patients.
- **Facilities, infrastructure, and land use:** Reduce resource use, waste, and emissions and operate climate-resilient and environmentally sustainable facilities.
- **Procurement, supply chain, and business practices:** Partner with other health authorities to transition towards low-carbon, sustainable products, services, and processes.
- **Community mitigation and adaptation:** Collaborate on climate change mitigation efforts and support communities to plan, respond, and adapt to climate change.

Following the 2021 BC heat dome, VCH and Health Emergency Management BC (HEMBC) established the Seasonal Readiness Planning Committee to plan across all service areas. For example, during hot weather events, VCH Home Health Care and Home Support teams prioritize clients who are most vulnerable, share information about how to stay safe, and ensure someone checks in with each client.

VCH facilities need to be ready for climate-related changes and protect the wellbeing of the population, communities, and ecosystems. VCH Facilities completed a vulnerability assessment for 47 sites and developed a Regional Cooling Strategy for care facilities. VCH Facilities is developing a regional water management plan for drought resilience across all facilities. As an example, the Sechelt Hospital and HEMBC developed a drought plan in 2022 to ensure their ability to deliver care during severe droughts.

These actions help VCH deliver resilient and environmentally sustainable care that supports the health of people and the planet.

## Indigenous knowledge supports climate change mitigation and adaptation

Knowledge among Indigenous communities is crucial to effective action on climate change. Community expertise and place-based knowledge helps ensure effective implementation of actions.<sup>370</sup> Indigenous knowledge and leadership are essential to understand and respond to climate change-induced ecosystem changes. A two-eyed seeing approach that brings together Indigenous knowledge and Western ways of knowing can provide guidance to learn and act collaboratively to face the challenges of climate change.<sup>71</sup> Many First Nations have initiated climate-related activities to both mitigate and adapt to climate change.

### First Nation and Métis initiatives

*First Nations are supported by umbrella organizations such as the First Nations Leadership Council, First Nations Health Authority (FNHA), and First Nations Emergency Services Society. Métis Nation BC (MNBC) represents 40 Métis Chartered Communities in BC, including the Chartered Communities of the Sea to Sky Métis Association, Métis Nation Powell River, and North Fraser Métis Association.*

The **Haítzaqv (Heiltsuk)** *Community Energy Plan* assesses the current state of energy use, needs, and local climate change impacts. The plan “charts a path to more efficient, higher quality, and lower emission energy sources.” Implementation is underway, with electric heat pumps installed in 75% of homes in Bella Bella by December 2022.<sup>72</sup>

**Tsleil-Waututh Nation’s** *Climate Change and Community Health Action Plan* provides a community health framework for local health vulnerabilities to climate change. The plan includes desired health outcomes and actions to build community resilience to climate change that are grounded in səliłwətał (Tsleil-Waututh People) Indigenous knowledge, history, and values.

**Tla’amin Nation** is working in partnership with the qathet Regional District to create a heat and smoke response plan to prepare for the 2024 heat and smoke season (with support from VCH and FNHA).

The **Nuxalk** and **Tla’amin Nations** participate in the *Climate Change and Food Security for First Nations* project. First Nations, FNHA, and university researchers are studying the impacts of climate change on food to help plan for adaptation.<sup>73</sup>

**Métis Nation BC** is conducting research, developing tools, and engaging in outreach to better understand and address the perspectives and knowledge of the Métis about the changing climate.

The province of BC supports Indigenous food sovereignty initiatives through a new *Indigenous Food Sovereignty Program* that was informed by an Indigenous-led engagement process.<sup>74</sup> BC’s *Climate Preparedness and Adaptation Strategy* and the forthcoming *Disaster and Climate Risk and Resilience Assessment (2024)* reflect the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP) within the BC legal context.



## Local action can build climate-resilient communities

Reducing the health impacts of climate change requires committed and concerted efforts by all levels of government, across public and private sectors, and by members of the public. These measures have myriad “co-benefits” in that they mitigate and adapt to climate change, promote health, and provide social benefits. Local and regional governments and communities are key to planning and implementation for climate change mitigation and adaptation.

### Local government initiatives

*Local and regional governments have jurisdiction over sectors such as water, waste, transportation, housing, and land use and are ideally suited to test and adapt innovative solutions.<sup>75</sup> Most municipalities in the VCH region have initiated concrete climate action and many are leaders in advancing equitable and climate-resilient policies.*

The Town of Gibsons has incorporated the value of ecosystems into financial planning and accounting. Municipalities across Canada now use their *Municipal Natural Assets* process to allocate funds for protection and restoration of ecosystems to ensure they continue to benefit the community.<sup>76</sup>

The City of Richmond’s *Community Energy and Emissions Plan 2050* requires low-carbon systems in new buildings and includes strategies to retrofit existing buildings, expand active transportation, and promote electric vehicles.

The City of Vancouver is working toward low-carbon climate resilience with its *Climate Change Adaptation Strategy*, *Resilient Vancouver* strategy, *Climate Emergency Response* report, and *Climate Emergency Action Plan*. These plans and strategies promote sustainable and active transportation, lower emissions, protect urban ecosystems, and strengthen infrastructure.

Whistler reflects its unique geography with a strategic approach to minimize wildfire and storm threats and protect natural assets and biodiversity. The *Climate Action Big Moves Strategy* and *Implementation Plan* also promote active and public transportation and energy efficient homes and buildings.

## VCH works in partnership with local governments to mitigate emerging climate-related risks and protect the population's health:

**Legionnaires' disease** is a potentially fatal type of pneumonia caused by bacteria that grows in warm, stagnant water. The disease is rare, but a warmer climate increases the risk for future outbreaks. Most local outbreaks are related to contaminated water from cooling towers (a type of air-cooling system) when bacteria in the water is dispersed into the air. The City of Vancouver introduced a permit program for cooling towers in 2021 to require regular maintenance, testing of water, and reporting of positive tests for Legionella bacteria. VCH and city staff inspected 557 cooling towers in 2021 and disinfected those with dangerous levels of bacteria.<sup>77</sup> This collaboration between VCH and a large local government recognizes the role of water system operators in preventing a disease that could become a greater risk as the climate warms and people rely more heavily on air conditioning to maintain safe indoor temperatures.

## Community-based organizations

*While large organizations such as the Red Cross are key to the kind of coordinated response required for emergencies, people often rely on community-based organizations for support during climate-related weather events. Community organizations are trusted and have strong local relationships with groups that may have limited access to support and resources. Locally established organizations are able to pivot quickly and provide immediate support during emergencies.<sup>78</sup>*

Organizations working in the housing sector have played a crucial role to protect community health during extreme weather. The [Aboriginal Housing Management Association](#), [BC Housing](#), and the [Downtown Eastside SRO Collaborative](#) each have programs to protect occupants during extreme heat and wildfire smoke events.

Community organizations can help build social connection, which is a protective factor during extreme events.<sup>79</sup> The [Hey Neighbour Collective](#) brings together housing operators, researchers, and other organizations including governments and health authorities to build social connection and resilience among residents of multi-unit rental housing.

Groups such as [Be the Change Earth Alliance](#) support youth through programs designed to build agency and resilience (CARE: *Climate Action, Resilience & Emotions*) and address climate anxiety (Y4CJ: *Youth For Climate Justice*).

**VCH Public Health supports community-based initiatives through [Health Promotion Community Investments grants](#). Public Health teams develop tools and resources such as guidance for volunteer wellness checks during extreme heat events. Public Health works with partner organizations to implement programs and share information with the public.**

# Recommendations

This report describes how climate change is impacting population health within the VCH region. Communities in the region have experienced extreme heat and other weather events, exposure to wildfire smoke, and ecosystem changes. Evidence of adverse effects is increasing, as is information about population inequities, including differences in exposure, susceptibility, and protective capacity.

Communities have already initiated activities to support climate change adaptation, building resilience to the threats and impacts of climate change. This work needs to be accelerated with support from institutional partners, including Public Health, with attention to pre-existing disparities in the social and economic factors that influence health. This report highlights some of the ways that climate change affects populations in different ways. Climate change mitigation and adaptation efforts provide opportunities to advance health equity.

The action-based recommendations below are organized thematically by the nature of the activities. Implementation of these recommendations will require partnership across sectors and levels of government, along with other community organizations. VCH Public Health programs are central to several of the recommendations and are prepared to support partners in an all-of-society response to climate change in the region.

## PROTECT AT-RISK POPULATIONS

- **Provide infrastructure to establish cool housing spaces.**  
Provide air conditioning equipment or funding for people receiving income or disability assistance who are at high risk for heat-related illness. Expand equitable rebates to improve access to heat pumps, window shades, and other sustainable tools to reduce indoor temperatures.
- **Strengthen direct supports for those at highest risk from extreme heat.**  
Focus on older adults living alone and people living with disabilities or mental health conditions. When temperature thresholds are met, offer wellbeing checks by community organizations and neighbours, help people get to cool spaces, and to access health care as needed.
- **Promote youth-led efforts to address climate change and climate anxiety.**  
Invest in school, community, and grassroots programs to help young people discuss and address concerns about climate change. Create opportunities and empower youth to play active roles in climate change mitigation and adaptation.
- **Support First Nation-led efforts to improve climate resilience.**  
Empower First Nations to protect food security and sovereignty through access to land and waters, the exercise of inherent rights, and supportive infrastructure such as smoke houses, storage cellars, and boats.



## ADAPT TO A CHANGING CLIMATE

- **Implement policies to protect building residents during extreme heat events.**  
Update municipal and provincial building codes, bylaws, and rental standards to require cooling features in new buildings and enable modifications to existing homes. Promote low-carbon protective features such as shading, green space, and heat pumps. Ensure policies benefit everyone, with attention to groups who experienced the highest risks during the 2021 BC heat dome.
- **Protect indoor air from wildfire smoke.**  
Update building standards and enable retrofits to existing buildings to support enhanced air filtration. Provide information on lower-cost and do-it-yourself air cleaners.
- **Create cooler outdoor urban environments.**  
Identify nature-based solutions to cool urban areas, starting with urban areas shown to be at high risk during the 2021 BC heat dome.
- **Protect drinking water systems from flooding and drought.**  
Invest in drinking water systems and support water system operators, with a focus on smaller systems at higher risk.
- **Improve planning to prevent and manage flooding.**  
Ensure all communities have a flood risk management plan. Incorporate projections for climate related changes, including sea level rise, into all plans.

## LEARN THROUGH MONITORING AND RESEARCH

- **Incorporate Indigenous knowledge into climate change research and surveillance.**  
Use approaches such as two-eyed seeing to draw on Indigenous and Western ways of knowing. Assess the impacts of climate change through an ecosystem lens that reflects the interconnection and interdependence between healthy environments and healthy people.
- **Identify underlying causes that put populations at higher risk from climate change.**  
Gather data to better understand how different factors and circumstances affect exposure and vulnerability to climate hazards, particularly for people at higher risk. Use this information to address root causes and build resilience where it is most needed.
- **Enhance population-level climate and health surveillance.**  
Facilitate efforts to share data and create shared tools to monitor the population health impacts of climate change. Draw on quantitative (numerical) data, lived experience, and traditional knowledge to give a more complete picture of how the changing climate is impacting population health.

- **Enable community-based air quality monitoring.**  
Provide lower-cost local air quality monitors that produce real-time local data and help communities use the information for decision-making. Start in rural and remote communities that are not well covered by existing government monitors.
- **Document impacts of climate change on urban and away-from-home Indigenous populations.**  
Create partnerships to better understand and act on the specific climate risks these populations face. Work with Indigenous populations and organizations to increase resilience.

## MITIGATE FURTHER CLIMATE CHANGE

- **Reduce greenhouse gas emissions from major sources.**  
Restrict natural gas connections in existing and new buildings and houses. Reduce reliance on gas-powered motor vehicles for transportation.
- **Increase funding for and availability of active and low-carbon transportation options.**  
Expand infrastructure for active transportation and high-quality public transit throughout the region. Use targeted initiatives such as free public transit for youth and people with low incomes, and transit connections between urban centres and traditional territories. Support regional strategies such as Metro Vancouver's *Transport 2050*.
- **Decrease the carbon footprint of health care facilities and services.**  
Reduce waste and greenhouse gas emissions in health care facilities and services. Support health care staff to reduce work-related emissions.

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