



# SHED LIGHT, BUILD RESILIENCE

UNEARTHING EVIDENCE ON CLIMATE CHANGE,  
GENDER, AND LIVELIHOODS IN CANADA

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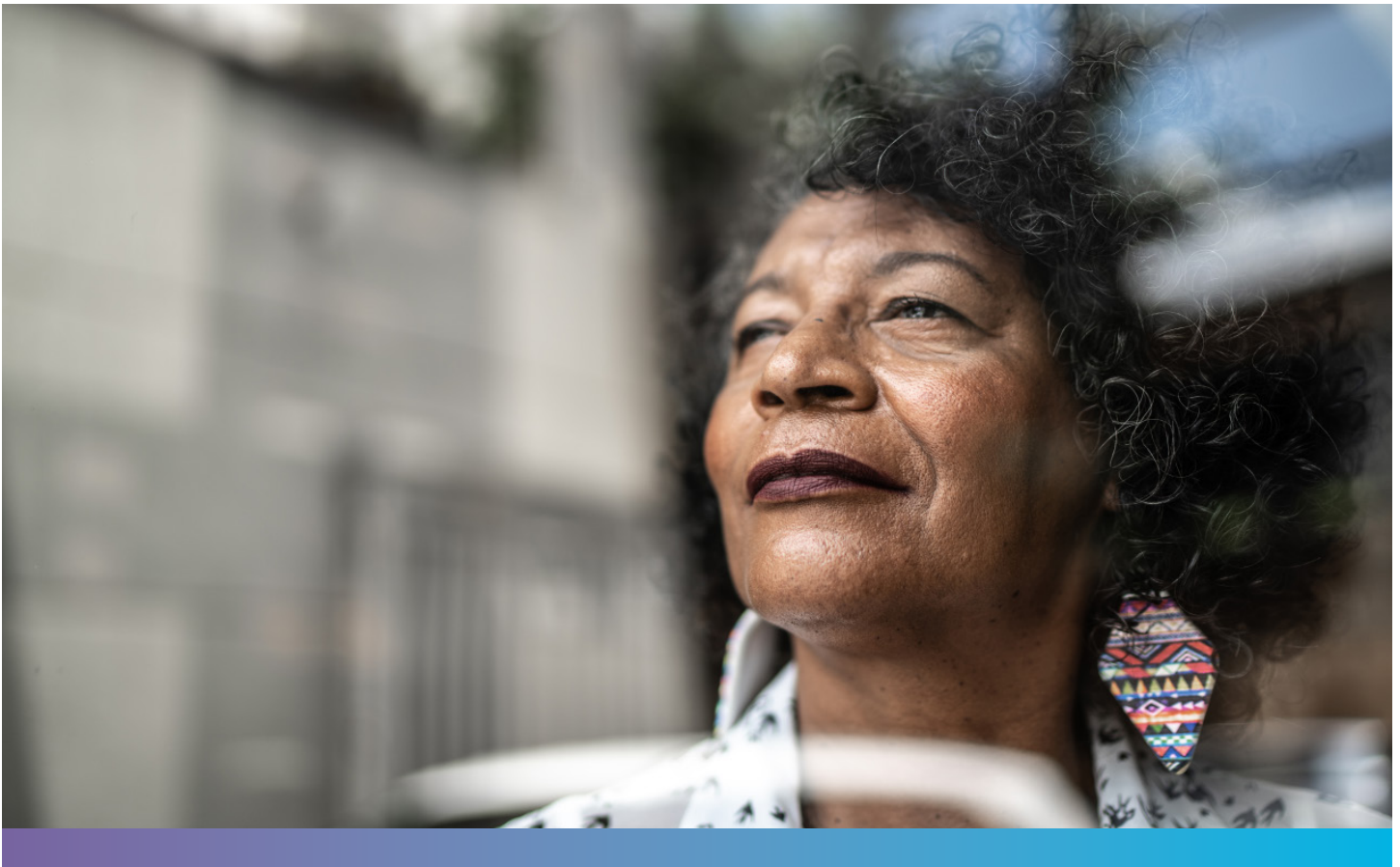
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# EXECUTIVE SUMMARY

## Overview

Climate change affects everybody and will only intensify in the coming years; however, it does not impact all people equally. Existing research around equity and climate change focuses predominantly on Global South contexts, while evidence relevant to the Canadian experience remains sparse. Closing this knowledge gap is critical to help us first understand, and then address, the unique experiences of at-risk groups in a changing climate. In particular, further research is needed to better understand the manner in which different groups are exposed, impacted by, and able to cope with climate risks in Canada. This report is the first in a pair of reports that synthesize the most recent evidence available at the nexus between climate change and gender, with a particular view to identifying implications for diverse groups in Canada. The *Shed Light, Build Resilience* series will unpack the intersectional implications of climate change in the Canadian context. In this first report, evidence is unearthed to answer a vital question:

### ***What are the gendered and intersectional impacts of climate change on livelihoods in Canada?***

To address this question, the report examines health, food security, work, housing, and migration and displacement in a changing climate. Each of these focus areas are explored respectively in Arctic, rural, coastal, and urban communities. While the report examines these distinct contexts, it is critical that issues are not isolated from one another with piecemeal approaches, but rather that they are seen and treated as interconnected, demanding systemic solutions.



While the understanding of the nexus between gender and climate change in Canada has come a long way in the past decade, intersectional accounts remain sparse *and* scarce – gaps which this report seeks to address. Key takeaways offered from this report include:

1. Climate change is a threat multiplier, an exacerbating factor for many social problems already happening in Canada
2. Current evidence on how some highly vulnerable groups experience and cope with climate change is superficial. Individuals with disabilities and those identifying with LGBTQIA2S+ identities are largely overlooked in the literature
3. Indigenous communities and livelihoods in the Arctic face disproportionate risks due to climate change, given their cultural traditions and relationship with local ecosystems, but most available evidence revolves around health and food security, overlooking implications for work, housing, and climate-induced displacement and migration
4. Gendered and intersectional implications of climate change in non-Arctic rural, coastal, and urban communities are severely understudied
5. Climate-induced disaster research in Canada rarely addresses intersectional vulnerabilities
6. It is time to combine intersectional perspectives with a systems thinking approach to better understand climate impacts

However, key gaps remain and research into the gendered and intersectional implications of climate change in Canada requires both further study and prioritization. This report therefore concludes with a summary of key research priorities which have been identified in order to provide a meaningful evidence-base for how livelihoods in Canada will be affected by a changing climate.

## Key findings

This report explores how climate change impacts livelihoods in Canada, with a particular focus on gendered and intersectional implications. To answer the question: **What are the gendered and intersectional impacts of climate change on livelihoods in Canada?**, the report examines health, food security, work, housing, and migration and displacement in a changing climate. Each of these focus areas are explored respectively in Arctic, rural, coastal, and urban communities. Summaries of key findings across these issues are provided below.

### Health

Climate change poses significant health risks for virtually all communities across Canada, but these risks are unevenly distributed along social and geographical lines. Evidence suggests that, in the Arctic, climate change poses unique threats to the physical and mental health of Indigenous people – caused by threats to water systems, rising frequency of wildfires, and disruptions to traditional food systems. Research suggests these threats may be disproportionately borne by Indigenous women. Health impacts in the Arctic range from gastrointestinal illness caused by disrupted water systems to increased risk of depression, distress, and domestic violence that arises as Indigenous livelihoods and cultural traditions are threatened by climate change.

In rural communities, climate change is expected to increase the frequency and intensity of droughts and wildfires, causing unique challenges and risks, particularly for the elderly, pregnant and nursing individuals, infants and children and low income groups. Natural disasters increase risk factors for violence, placing Indigenous women in rural areas in particularly vulnerable situations. Inadequate access to safe water due to climate change further reinforces gender roles within households as well as reproductive and caregiving roles of women.

In coastal communities, water systems face increasing risks exacerbated by the climate crisis, threatening Indigenous communities experiencing pre-existing water insecurity. Additionally, Black Nova Scotian communities are more likely to live and work near polluting and toxic sites, and increased precipitation and extreme heat heighten the risks of poor mental health in these coastal communities.

In urban communities, flooding and extreme heat are expected to increase in frequency and intensity, with seniors, children, pregnant individuals, those experiencing homelessness, and low-income individuals most vulnerable to the health impacts of climate change.

## Food security

Food insecurity is not a new challenge in Canada. Currently, women-led lone-parent families, low-income groups, Indigenous people, newcomers, and individuals with disabilities report higher levels of food insecurity than the overall population. Climate change further impacts food security and food safety by disrupting food systems, impacting food prices, and affecting the ability to access quality and nutritional food. These impacts vary across regions.

In Arctic communities, climate change is likely to further exacerbate food insecurity and food storage, impacting availability of local food sources on which Indigenous communities rely heavily for food and cultural practices. Research suggests climate change will impact men uniquely by threatening hunting and fishing, and will disproportionately affect the physical and mental health of women and girls through impacts on the availability and accessibility of berry patches. Disruptions to food systems in the Arctic will present particular challenges in securing nourishment for Indigenous low-income, women-led single parent families.

In rural communities, climate change is expected to change precipitation patterns in rural areas, significantly impacting local food production, storage, and distribution. Climate change disrupts the role of Indigenous women in rural food systems. In rural regions of Ontario and Quebec, food insecurity is associated with self-harming behaviour among women, partly due to the inability to feed their children and families.

In coastal communities, food insecurity is particularly prominent in communities along the Atlantic coast, with low-income and lone parent households affected most acutely.

In urban communities, climate-induced heavy precipitation, flooding, heat waves and winter ice storms affect access to local food and the transportation of fresh foods to local grocery stores.

## Work

Characteristics of the Canadian labour market including occupational segregation, wage gaps, and precarization of work shape vulnerability to climate change. Climate change can render entire regions unproductive due to flooding, extreme weather, and wildfires. This in turn can make workplaces unsafe, reduce labour productivity, and slow economic activity. The implications will be felt unevenly across geographic regions and social groups.

In Arctic communities, work consists of a mixture of subsistence work and wage work. Little is known about how climate change impacts wage work in the Arctic, but it is known that Inuit women are already regularly involved with wage work and have taken the responsibility to pay for basic necessities, without changed gendered expectations around childcare and domestic responsibilities.

In rural communities, natural resource sectors are of particular importance for employment and income and impacts of climate change on these sectors make these communities economically vulnerable. Women living in rural areas tend to have lower educational attainment, lower labour force participation rates, and lower employment rates than women living in urban settings – important factors that decrease their adaptive capacity to climate change. In Atlantic Canada, approximately 14% of the region's workforce is employed in agriculture, fisheries, forestry, and mining. Many occupations in these industries entail outdoor work and as temperatures rise, workers in these industries face higher risks of heat stress.

In urban communities, there is limited research on how climate change impacts workers. Evidence from California suggests that the 2017 wildfires deeply endangered the livelihoods and health of undocumented immigrants and Indigenous people from Latin America.

## Housing

A core factor of vulnerability to climate change is homelessness and inadequate housing.

In Arctic communities, there is an ongoing shortage of housing options available, and permafrost thaw is accelerating degradation of infrastructure, worsening housing conditions, and damaging housing structures in Northern communities. Climate change can exacerbate chronic illnesses, physical exposure, and stigmatization among those experiencing homelessness, with Indigenous women and nonbinary individuals particularly vulnerable to housing challenges that are exacerbated by climate change.

In rural communities, high costs of housing are an increasing problem. A long trend in reduction of services and investment in infrastructure in rural communities increases vulnerability of rural residents to climate hazards.

In coastal communities, coastal and inland flooding can lead to failure and even destruction of critical infrastructure systems and houses, while rising sea levels decrease the land base of Indigenous communities and threaten many existing Indigenous cultural and archaeological sites. Low-income and racialized women are also particularly exposed to risks given their overrepresentation in low paying jobs and precarious housing, which can limit their adaptive capacity.

In Canadian urban centres, there is a notable overrepresentation of Indigenous people among those who experience homelessness. Individuals experiencing homelessness have higher vulnerability and lower adaptive capacity to cope with climate hazards.

## Migration and displacement

Across the world and in Canada, extreme weather events are contributing to involuntary displacement and increasing migration.

In Arctic communities, migratory movements are a crucial element of Inuit culture, playing a role in hunting and nomadic living to attain livelihood resources; however, Indigenous mobility is threatened by climate change. Climate change can exacerbate trends of women out-migration from Arctic communities.

In rural communities, as droughts, floods, and extreme weather become more frequent and intense, the rates of rural out-migration increase. This is partly due to the fact that rural livelihoods are highly dependent on agriculture and other natural resource-based sectors, which tend to be more directly impacted by extreme weather events than service sectors or manufacturing. Research suggests that out-migration can erode social networks within communities, which has negative effects on women's lives who are dependent on these networks.

In coastal communities, as climate change impacts both marine and terrestrial systems which rural-coastal communities heavily rely on, out-migration has become an adaptive measure. However, little is known about the gendered and intersectional implications and dimensions associated with climate-induced relocation and displacement in Canadian coastal communities.

In urban communities, there is little evidence of how urban residents in Canada cope with climate-induced displacement, much less through an intersectional perspective.

While these distinct areas and regions are explored, it is critical that these issues are not isolated from one another with piecemeal approaches, but rather that they are seen and treated as interconnected, demanding systemic solutions.

## Foresight for the future



In light of the evidence illuminated in this report, the key takeaways above are offered to guide future work on the gendered and intersectional impacts of climate change in the Canadian context. Recognizing the current dearth of information and the need for rigorous research at the nexus of gender, intersectionality, and climate change, this report brings together the best available evidence to inform the design of inclusive climate adaptation efforts and to improve the resilience of communities and equity-deserving groups. The evidence accordingly allows for better foresight exercises as it sheds light on how problems can evolve in a changing climate, while enabling communities, practitioners, and policymakers to reduce detrimental consequences of climate change and anticipate, prepare, and build resilience to meet future challenges.

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# INTRODUCTION

As human activities lead to an increase in concentrations of greenhouse gases (GHG) in the atmosphere, the average temperatures of the air, ocean, and land also increase.<sup>1</sup> **Climate change** poses the most pressing challenge of the twenty-first century, exacerbating threats to and disrupting ecosystems, lives, and livelihoods. These impacts can be direct or indirect (following climatic events or **climate hazards**, such as droughts, floods, wildfire, heat waves, and severe storms), and occur concurrently or interact in such a way that compound overall risks and implications that are felt unevenly within and across regions.<sup>2</sup> The literature on these social impacts and risks associated with climate change – expressed in terms of damages, harms, economic and non-economic losses – has expanded over the past decade. This report combines the most recent research and evidence to address the following question:

***What are the gendered and intersectional impacts of climate change on livelihoods in Canada?***

There is increasing evidence that climate change is not a gender-neutral threat, and that, globally, women, girls, and gender diverse individuals are particularly vulnerable to the effects of climate related or adjacent hazards.<sup>3</sup> Furthermore, research suggests that different social groups are also impacted unevenly by policies and programs to address climate change.<sup>4</sup> However, the majority of this evidence comes from studies predominantly focused on Global South contexts. Research on the nexus between **gender** and climate change in the Global North, particularly in the Canadian context, is much scarcer.<sup>5</sup>

This report examines the gendered impacts of climate change in Canada, and particularly how these gendered implications intersect with age, race, ethnicity, Indigeneity, citizenship status, physical attributes, and other socioeconomic **identity factors**. The purpose is to combine the most recent evidence available on the nexus between climate change and gender in Canada, particularly through an intersectional lens. This allows policymakers, practitioners, community members, civil society organisations, and researchers to better identify the unequal gendered and intersectional implications of climate change. This report serves as a user-friendly resource that can be readily consulted to inform the design of inclusive climate adaptation efforts and of initiatives to improve the **resilience** of communities and equity-deserving groups.



The evidence gathered in this report also allows for better foresight exercises as it sheds light on how social inequities can evolve in a changing climate. This enables communities, practitioners, and policymakers to anticipate and prepare for future challenges and reduce the detrimental impacts of climate change. The report concludes with recommendations for how to think about the gendered and intersectional impacts of climate change in the Canadian context in light of the evidence presented, and how we can create a more expansive knowledge base given the identified knowledge and data gaps.

### **What is gender, and why is it important to understand the gendered implications of climate change?**

Broadly defined, gender refers to the cultural roles, expectations, norms and behaviours that societies associate with particular **sex**.<sup>6</sup> As such, gender is not the same as sex. While gender refers to social roles, norms, and expectations associated with what is understood as femininity, masculinity, and other expressions within and outside the masculinity and femininity spectrum, sex refers to biological and anatomical differences associated with gonadal hormones, genitals or chromosome variations that characterizes male, female, or **intersex** sexual attributes.

The reason why it is important to understand the gendered implications of climate change is because gender is a foundational dimension of social stratification, guiding behaviours and organising the distribution of work, resources, and opportunities. As such, gender is a fundamental aspect of power and inequality dynamics, which are drivers of **vulnerability** to climate change, and thus shape how people experience and cope with uncertainty, risks, and threats posed by a changing climate. In short, gender roles and expectations result in different predispositions which interact with climate change to differentially affect livelihoods and wellbeing. Gender is thus a core driver of vulnerability and capacity to adapt to a changing climate.<sup>7</sup>

### **Taking one step further: Understanding climate change impacts through an intersectional lens**

Climate change poses risks to ecosystems and livelihoods, but impacts and risks are experienced differently across and within communities and social groups.<sup>8</sup> Indeed, as the average temperature rises, hazards such as wildfires, flooding, drought, and other climate-induced extreme situations become more intense and frequent, exposing and amplifying social inequalities.<sup>9</sup> However, despite the fact that discussions about the social impacts and dimensions of climate change have gained increased attention over the years, climate research and adaptation policy remain focused on technological and physical infrastructural implications, as well as economic costs of climate change.<sup>10</sup>

Initial debates that linked gender and climate change mostly portrayed women as either champions of environmental protection or particularly vulnerable to climate change.<sup>11</sup> More

recently, studies have called attention to the fact that peoples' experiences and responses to climate change vary widely depending on their geographical location and socioeconomic context, as well as on the social identity factors at play, such as gender, race, age, marital and citizenship status, physical attributes, and so on.<sup>12,13,14</sup>

The notion of **intersectionality** has been increasingly acknowledged and adopted by research on climate vulnerability.<sup>15</sup> The term derives from anti-racist Black feminist theory. Initially coined by Kimberlé Crenshaw, it broadly refers to a person's multiple and combined identities, which ultimately shape their experiences and life chances, given that social relations and systems of power (e.g., sexism, racism, colonisation) privilege or oppress certain social groups more than others.<sup>16</sup> Accordingly, lived experiences (and hence perspectives on key issues like climate change) significantly differ based on the combination of identity factors, including (but not limited to) race, gender, sexuality, class, marital status, and so on.<sup>17</sup> Intersectionality thus offers a powerful frame to investigate the singular experiences and challenges people face, and how systems, procedures, and institutions impact people differently, depending on their combined identities and the context in which they live and work.

Vulnerability to climate change is a function of **exposure** (risks and impacts of climate change that are currently felt or expected to be felt in future climate variations), **sensitivity** (differential susceptibility to exposures), and **adaptive capacity** (the ability to manage, cope, and respond to exposure sensitivities).<sup>18</sup> As an approach, intersectionality enables a more complex understanding of vulnerability as the outcome of context-specific social, cultural, political, institutional, and economic structures that make some groups and communities disproportionately exposed or at risk to climate change impacts. As such, an intersectional approach to the impacts of climate change pays attention to:

- How climate change impacts people differently, unevenly, and disproportionately<sup>19</sup>;
- How experiences and impacts of climate change are grounded in local realities.<sup>20</sup> This means that gendered and intersectional impacts of climate change are also mediated by the social and environmental context of each region;
- The particular lived experiences of individuals with intersecting identities (gender, race, income, age, body abilities, and so on) within specific contexts.<sup>21</sup> Intersectionality allows us to understand that particular historical, political, and social contexts shape how people experience, perceive, and react to climatic events<sup>22</sup>;
- The factors that drive vulnerability to climate change as well as affect the capacity to respond and adapt, such as social inequality and power relations<sup>23</sup>;
- How cultural norms and worldviews affect how individuals understand and respond to the impacts of climate change.

## How to read this report

The *Shed Light, Build Resilience* series is a pair of reports focused on the nexus between gender and climate change in Canada. This first report focuses on the gendered and intersectional impacts of climate change on livelihoods, particularly pertaining to health, food security, work, housing, and migration. The second, upcoming report focuses on the gendered and intersectional impacts of climate change on natural resource-based economic sectors and communities, particularly in the agricultural, forestry, mining, fisheries, and energy sectors. Taken together, these two reports can help inform climate policy through a gendered and intersectional perspective, providing insights into how climate policy and adaptation efforts are likely to interact with gendered experiences of climate change in different sectors.

The research combined and presented in the *Shed Light, Build Resilience* series is not exhaustive. However, the series synthesises and discusses key evidence on the gendered and intersectional differences in climate change impacts. It allows, at a high level, to identify *what is known* about the nexus between climate change and gender in Canada, as well as *what remains to be known*.



# CLIMATE CHANGE AND LIVELIHOODS

***There is robust evidence and scientific consensus that climate change will impact livelihoods and well-being across the world, though the majority of studies tend to concentrate on Global South contexts. Livelihoods in Canada already withstand the shocks of climatic changes, and evidence mounts that these impacts are felt unevenly across communities and social groups.***

How does climate change impact the livelihoods of different social groups in Canada? To answer this question, the report examines health, food security, work, housing, and migration and displacement in a changing climate through an intersectional lens, investigating the factors that drive vulnerability to climate change and how different groups experience the impacts of climatic events. Each of these focus areas are explored respectively in Arctic, rural, coastal, and urban communities.

# HEALTH IN A CHANGING CLIMATE

## Key findings and takeaways:

Climate change poses significant health risks for virtually all communities across Canada, but these risks are unevenly distributed along social and geographical lines.

Social, economic, and environmental factors drive vulnerability to adverse impacts of climate change on health.

Vulnerability to adverse health outcomes due to climate change varies across regions and along gender and intersectional lines.



### Arctic communities

- Climate change increases the risk of exposure to toxins and waterborne diseases as well as zoonotic diseases, disrupts local water retrieval systems, and increases the frequency and severity of wildfires.
- These changes threaten Indigenous livelihoods and cultural traditions.
- Gender and Indigeneity shape vulnerability to climate changes in the Arctic. For example, Indigenous communities are particularly vulnerable to zoonotic diseases given their reliance on traditional food systems.
- Gender-based violence is a serious issue in the Arctic, impacting men, women, and Two-Spirit people differently. Climatic changes may exacerbate the risk factors of gender-based violence.



### Urban communities

- Urban flooding is expected to increase in frequency and intensity. Natural disasters are more likely to kill women and lower their life expectancy compared to men, partly due to women's socioeconomic status.
- Extreme heat is expected to become more frequent. Seniors, children, pregnant individuals, and those experiencing homelessness are more vulnerable to adverse health effects due to heat stress. Low-income individuals are also more likely to live in neighbourhoods with high intensity urban heat islands.

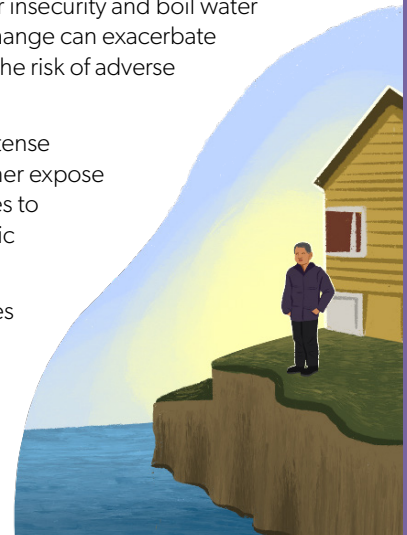
### Rural communities

- Climate change is expected to increase the frequency and intensity of droughts and wildfires.
- The elderly, pregnant and nursing individuals, infants and children, and low income groups face higher risks of adverse health effects from droughts.
- Men face higher risk of injury and death from wildfires.
- Breastfeeding evacuees may give up on nursing due to stress, inadequate rescue facilities, and difficulties in accessing support.
- Natural disasters increase the risk factors for violence. Indigenous women living in rural areas are particularly vulnerable.



### Coastal communities

- Water systems in coastal communities face increasing risks of contact with saltwater, and contamination driven by warmer temperatures. Indigenous communities have long faced water insecurity and boil water advisories. Climate change can exacerbate this crisis, increasing the risk of adverse health outcomes.
- More frequent and intense precipitation can further expose racialized communities to contaminants and toxic substances.
- Extreme heat increases the risk of climate change anxiety and other mental health disorders.





# 1 Health in a changing climate

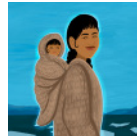
A changing climate poses significant health risks for virtually all communities across Canada. Broadly, climate change affects population health through three pathways<sup>24</sup>:

1. Direct health implications associated with climate hazards, such as flooding, droughts, extreme weather, storms;
2. Indirect health outcomes due to disturbances in natural systems, such as increased air pollution and higher incidence of vector-, food-, and waterborne diseases;
3. Indirect health outcomes due to disturbances in social systems, such as climate-induced internal displacement and migration, exacerbation of food insecurity, job losses, exacerbation of housing crisis, and failure or damage to infrastructure, among others.

As the average temperature rises in the air, land, and sea, extreme weather events and disasters – like heat waves, heavy precipitation, droughts – and severe storms become more frequent and intense.<sup>25</sup> These observed climatic changes as well as climate-induced spread of pathogens and associated diseases present direct risks to the health and wellbeing of communities in Canada.<sup>26</sup>

Extreme weather and disasters also increase the risk of non-communicable diseases (e.g., cardiovascular diseases), injuries, and death. There is emerging evidence suggesting that climate change also impacts mental health, increasing episodes of ecological grief and loss, depression and anxiety, suicide ideation, drug and alcohol abuse, as well as domestic violence.<sup>27,28</sup> Climate change is also expected to increase vector borne diseases, exposure to air and water pollution, and food insecurity, given the significant disturbances to ecosystems.<sup>29</sup> These health impacts will be felt unevenly, depending on factors like impoverishment, undernutrition, housing security, disability, access to health and social infrastructure, among others.<sup>30</sup>

Social, economic, and environmental factors shape individual and population health.<sup>31</sup> These are called determinants of health. **Social determinants of health**, in particular, are social or cultural conditions and circumstances that shape health<sup>32</sup>; these can range from access to housing to gender norms and expectations.<sup>33</sup> Determinants of health, like income and regional location, overlap and interact, creating health inequities and vulnerabilities for communities and social groups. Experiences of discrimination, racism, and historical trauma are also important social determinants of health for certain groups such as Indigenous Peoples, **LGBTQIA2S+** and Black Canadians. Gender intersects with many determinants of health, like geographical location or social status, which creates unique gendered vulnerabilities to climate change.<sup>34</sup> This section focuses on unpacking the intersectional health implications of climate change across different regional contexts in Canada.



## 1.1 HEALTH IN ARCTIC COMMUNITIES

Rising temperatures affect permafrost, ground snow cover, sea ice, sea levels, and weather patterns in the Arctic. This results in changes to the ecosystem, social relations, food systems, and livelihoods,<sup>35</sup> all of which can contribute to adverse health outcomes.<sup>36</sup>

### Indigenous people experience heightened exposure to unsafe water resources

The Canadian Arctic has long faced **water security** challenges. The built infrastructure does not always reflect the local environmental conditions nor the preferences and cultural practices of Indigenous communities.<sup>37</sup> Community water infrastructure is obsolete and deteriorated, challenged by unreliable sewer systems, trucked water, and boil water advisories. This creates **precarity** in access to safe and potable water in Inuit communities.<sup>38</sup> Climate change is exacerbating existing water quality and quantity management challenges.<sup>39</sup> Permafrost thaw and changes in precipitation and evaporation patterns are contributing to reduction in the size of freshwater lakes and surface area in places like Inuit Nunangat.<sup>40</sup>

Changing patterns in precipitation also increase the risk of water-borne diseases. In Iqaluit, Nunavut, residents prefer to access water through traditional methods, such as fetching water from ponds, rivers, streams, lakes, sea ice, or icebergs. This further increases the risk of water-borne diseases as many of these freshwater sources are not treated and are particularly exposed to toxins from thawing permafrost.<sup>41</sup> There is evidence suggesting that Indigenous women experience more severe symptoms of gastrointestinal illnesses caused by person-to-person contact or contaminated food/water in Rigolet and Iqaluit.<sup>42</sup> Studies from Alaska also suggest that a lack of in-home water services in conjunction with warmer and wetter summers in the Arctic is associated with higher incidences of respiratory and skin infection, and higher incidences of waterborne diseases such as amebiasis and giardiasis.<sup>43</sup>

Gender norms shape vulnerability to water insecurity. Traditionally, Inuit households rely on men to collect water, a labour-intensive task.<sup>44,45</sup> This is in contrast to gendered dynamics observed in the Global South, in which women and girls are often tasked with fetching water.<sup>46,47</sup> With changes to the local economy requiring men to be absent during the summer months from their community, the burden of water collection shifts to women in Inuit communities. Access to water is a particular challenge for single women and widows, due to the gendered division of labour around water retrieval.<sup>48</sup> This contributes to increased mental and physical stress that comes with the physically demanding labour of water retrieval added to managing existing household duties experienced by Indigenous women.<sup>49</sup>

The changing climate contributes to changes in seasonal patterns, impacting freshwater systems that communities rely upon.<sup>50</sup> Further research is necessary to better understand how a changing climate in the Arctic affects water security and the associated gendered implications of these changes.

**Indigenous communities are particularly exposed to seafood-associated pathogens**

There is increasing evidence that climate change also impacts the spread of pathogens among Arctic animals.<sup>51</sup> Climate conditions affect rodents, deer, flies, and beetles which contributes to the transmission and spread of pathogens. Warming temperatures can also increase the incidence of seafood contamination, and the prevalence of bacteria in oysters and shellfish. Thus, climate change has implications for **food safety** – the access to food that is free from pathogens or chemical contaminants at levels that are detrimental to human health.<sup>52</sup> In Canada, five pathogens account for over 90% of all food-borne illnesses for which a cause is known (Table 1), to which Inuit communities face a disproportionate risk of exposure due to traditional food practices such as consumption of raw meat.<sup>53</sup>

**Wildfires contribute to adverse mental health and respiratory impacts among Indigenous communities**

Wildfires’ occurrence and severity are expected to increase in the Arctic region as a result of climatic changes in the region,<sup>54</sup> creating air pollution and adversely impacting human health.<sup>55</sup> The Canadian northern and subarctic regions are already experiencing wildfire seasons, disrupting the flow of goods and people, and impacting community and individual wellbeing and livelihoods.<sup>56</sup>

Wildfires increase exposure to ambient fine particles which cause inflammation and oxidative stress and suppress immune responses. Particulate matter from wildfires also increases the risk of respiratory diseases, especially asthma, bronchitis,

chronic obstructive pulmonary disease and pneumonia, and even premature death. Finally, psychosocial impacts of wildfire include depression, anxiety, feelings of fear, stress, uncertainty, and loneliness.<sup>57</sup>

A qualitative study in the Northwest Territories suggests that Arctic wildfires have adverse health impacts on Indigenous communities. Affected communities report impacts on mental health and emotional toll from prolonged exposure to smoke, expressing feelings of stress, isolation, fear, and uncertainty. Persistent smoke also contributes to physical symptoms like headaches, sore throats, issues with respiratory functioning, impediments to wellbeing and activity levels, and itchy eyes.<sup>58</sup>

While health impacts are varying, it is important to recognize why they disproportionately affect Indigenous people.<sup>59</sup> Existing structural, social, and economic inequities, historical trauma, and factors such as reduced access to healthcare place Indigenous communities in a position of vulnerability after wildfire events.<sup>60</sup> Further research is required to better understand how the health implications of worsening wildfires in the Arctic region differ by gender and other identity factors.

***Existing structural, social, and economic inequities, historical trauma, and factors such as reduced access to healthcare place Indigenous communities in a position of vulnerability after wildfire events.***

**Table 1: Food-borne pathogens and health impacts**

| Pathogen                | Symptoms   |
|-------------------------|--|
| Norovirus               | Nausea, vomiting, diarrhoea, stomach cramps, low-grade fever, chills, headache, muscle aches, fatigue  |
| Clostridium perfringens | Diarrhoea, pain and cramps, stomach bloating, increased gas, nausea, weight loss, loss of appetite, muscle aches, fatigue. In rare cases, severe dehydration, hospitalisation, death |
| Campylobacter spp.      | Fever, nausea, vomiting, stomach pain, diarrhoea. In rare cases, hospitalisation, long-lasting health effects, death   |
| Salmonella              | Chills, fever, nausea, diarrhoea, vomiting, stomach cramps, headache. In rare cases, hospitalisation, long-lasting health effects, death   |
| Bacillus cereus         | Diarrhoea, vomiting. In rare cases, hospitalisation, long lasting health effects, death  |

Table adapted from: Harper, S., Schnitter, R., Fazil, a, Fleury, M., Ford, J., King, N., Lesnikowski, A., McGregor, D., Paterson, J., Smith, B., & Neufeld, H. (2022). *Food Security and Food Safety—Chapter 8*. In P. Berry & R. Schnitter (Eds.), *Health of Canadians in a Changing Climate: Advancing our Knowledge for Action*. Government of Canada.

## Climate change increases human-animal conflicts

In the Canadian Arctic, climate change increases the risk of human-bear conflicts as well as increasing predatory pressures on livestock and game on which Indigenous people depend for food and cultural practices.<sup>61</sup>

Climate change impacts hunting and travelling on land and ice, which are traditionally male-centred activities in Inuit communities.<sup>62</sup> Members from the Black Tickle community indicate an increased frequency of bear sightings within the community, which has contributed to heightened emotional stress.<sup>63</sup> Increasing number of sightings of polar bears and orcas in areas where they were previously less common leads to concerns about safety while on the land.<sup>64</sup>

Further research is required to understand the scale of human-animal conflicts, the extent to which they pose physical and emotional risks, and how they impact and change gendered behaviours. In particular, much of the social sciences literature on climate change in Arctic Canada has focused on men's knowledge and experiences,<sup>65</sup> pointing to a need to centre the experiences of women and gender diverse individuals in this region.

## Indigenous communities face increased risks of exposure to zoonotic diseases

Ticks can transmit bacterial, viral, and protozoan pathogens.<sup>66</sup> As temperatures rise, the geographic range of ticks expands.<sup>67</sup> In the Arctic, ticks and tick-borne diseases are beginning to increase due to warming temperatures.<sup>68</sup> Ticks can infect animals, including large mammals such as moose and deer, causing them to carry the disease and increase risk of infection for humans.<sup>69,70</sup>

Available research evidence suggests that climate change will increase exposure to **zoonotic diseases** – those transmitted from animals to humans – and toxins that affect pregnant individuals, foetuses, and small children.<sup>71</sup> Indigenous communities in the Arctic are particularly vulnerable to zoonotic diseases given their reliance on local fish, game, and berries for subsistence.<sup>72</sup> However, further studies are needed to shed light on the gendered differences of exposure to zoonotic diseases due to climate change.

## Climate change can exacerbate gender-based violence in the Arctic

Colonial policies disrupted the social and cultural fabric of Indigenous communities in the Arctic, resulting in intergenerational trauma and social challenges, such as disturbances in food systems and housing access. Changing ice conditions and unpredictable weather patterns further threaten Indigenous livelihoods and cultural traditions, contributing to depression, distress, and higher incidences of domestic violence.<sup>73,74</sup>

Inuit women experience high rates of gender-based violence, estimated at 13 times higher than other women in Canada.<sup>75</sup> Research indicates that climate-induced stress is associated

with an increase in gender-based violence. Furthermore, **climate-induced displacement** also increases the vulnerability of women and young girls to sexual assault, sexually transmitted diseases, and mental-health issues.<sup>76</sup> Research on intergenerational trauma indicates that traumatic experiences of emasculation and humiliation is linked to men perpetuating emotional, physical, or sexual violence. Stigmatization discourages many young men from coming forward to disclose or discuss experiences with sexual abuse experienced as a child, instead often opting to deny or suppress sexual trauma.<sup>77</sup> Little is known about how climate-induced stress interacts with intergenerational trauma experienced by boys and men, and the implications for gender-based violence in the Arctic.

***Research indicates that climate-induced stress is associated with an increase in gender-based violence. Furthermore, climate-induced displacement also increases the vulnerability of women and young girls to sexual assault, sexually transmitted diseases, and mental-health issues***

Further studies are necessary to increase understanding on the nexus between gender-based violence and climate change in Arctic communities.

## The impacts of climate change on Indigenous wellbeing are intersectional

Environmental and climate change are likely to increase environmental distress among Indigenous people. Older persons, having spent more time on the land, are observed to feel more of the impacts perhaps due to responsibilities tied to land.<sup>78</sup>

Direct and indirect climate related stressors, including decreased land access and fewer opportunities to pass on Traditional Knowledge, is leading to substance abuse and violence in Rigolet Canada. Youth face particular mental health challenges in this community. Climate change has increased travel restrictions; in turn, youth are turning to alcohol and substances to curb boredom and cope with disruptions of cultural activities. Elders and seniors are expressing concerns and facing fears related to their connection to the land and their culture, which are compounded by multiple risks of rapid changes in technology and culture and reduced access to the land.<sup>79</sup>

As warming temperatures reduce time spent on the land and hunting expeditions, Inuit men experience stress and frustration, which in turn causes stress among other family members.<sup>80</sup> Hunting plays a key role in Inuit masculinity. A good hunter earns respect and maintains a high status in the community; barriers

to hunting, by way of expensive equipment or lack of time for hunting is linked to suicide amongst younger men.<sup>81</sup> Given how culturally significant hunting is, ecological changes are causing **ecological grief** among Indigenous men. NunatuKavut members express an anticipatory grief due to declining caribou, and the accompanying loss of cultural connections.<sup>82</sup> Due to gender roles and expectations, women are more likely to share their feelings with family and friends, while Inuit men do not readily share their frustrations and anxieties.<sup>83,84</sup> Vulnerability is still stigmatised, and counters masculine ideals, thus discouraging help-seeking behaviours for mental health challenges. Inuit men, specifically young men, face a heightened risk of suicide, shaped by colonisation, cultural loss, job and financial insecurity, and lack of targeted social support and mental health services,<sup>85</sup> which can be exacerbated by climatic changes.

***Vulnerability is still stigmatised, and counters masculine ideals, thus discouraging help-seeking behaviours for mental health challenges. Inuit men, specifically young men, face a heightened risk of suicide, shaped by colonisation, cultural loss, job and financial insecurity, and lack of targeted social support and mental health services, which can be exacerbated by climatic changes.***

In the context of mental wellbeing, it is also important to consider resilience. Emerging evidence suggests that there is a relationship between resilience to climate change (that is, the capacity to prepare for and manage disruptions) and feeling its impacts. Those who regularly go onto the land perceive more changes and are more exposed to the impacts of these changes, developing higher resilience. Those with high resilience usually have better adaptive capacity to cope with changes, while those with lower resilience might cease to interact with the land, as they may be unable to cope with changes.<sup>86</sup> Coping strategies also come in the form of adapting cultural practices. For example, in Rigolet, Inuit youth and Elders are sourcing alternative wild food, such as moose, to retain caribou hunting culture, and have reduced travelling distances as well as increasing activities that are not as dependent on the land.<sup>87</sup>

Further research can improve understanding on how Indigenous people with intersecting identity factors respond and adapt to a changing Arctic environment, and the implications on their wellbeing. Ecological grief, as it relates to a changing landscape, is still an emerging field; further research is required to uncover the nuances of how grief manifests across demographics, cultures, and geographies, as well as its long-term effects.<sup>88</sup>



## 1.2 HEALTH IN RURAL COMMUNITIES

**Rural communities**, broadly defined as communities located in areas outside of the **census metropolitan areas** (areas with a population of at least 100,000 and a core population of 50,000) and **census agglomerations** (areas with a core population of at least 10,000), are particularly vulnerable to adverse health impacts due to climate change. Social factors influence such vulnerability, namely, Indigeneity, gender, age, and socioeconomic status.<sup>89</sup>

### **Extreme weather events have gendered health impacts**

Climate change increases the frequency and duration of droughts, and these have health impacts. Droughts increase the risk of respiratory diseases due to dust and waterborne diseases should the quality of local freshwater water systems change. Coupled with rising temperatures and humidity in the summer, droughts can also lead to heat stress or heat strokes. The elderly, pregnant and nursing individuals, infants and children, and low-income groups face higher risks of adverse health effects from droughts.<sup>90</sup>

Extreme weather events also challenge water security in rural areas in the Prairies.<sup>91</sup> Lack of water or inadequate access to safe water induced by climate change can further reinforce gender roles within households as well as reproductive and caregiving roles of women.<sup>92</sup> However, little is known about how these dynamics take shape in rural Canada.

More research is required to better understand the challenges to water security in rural Canada, as well as their social and health impacts on different groups.

### **Wildfires have gendered health impacts**

Rural and remote communities experience unique challenges to respond to public health impacts of wildfire and other extreme weather events. For example, access to ambulances, paramedics, and other first responders may be challenged due to availability, cost, or even unreliable internet and telephone services.<sup>93</sup>

Experiences with wildfires differ by age, gender, location, income, and Indigeneity. During the 2015 wildfires across northern Saskatchewan, different groups experienced varied health and safety impacts.<sup>94</sup> Access to social networks and financial resources dictate who has access to transport or connections in other regions to facilitate relocation. During the Fort McMurray wildfires in 2016, approximately 70% of pregnant and postpartum evacuees experienced post-traumatic stress disorder. Due to stress, inadequate rescue facilities, and difficulties in accessing help and support, the number of breastfeeding evacuees fell by half (from 64% to 36%).<sup>95</sup>



Research evidence indicates that, partly due to traditional gender roles, men face higher risk of injury and death from wildfires than women. That is because gendered norms compel men to stay and protect physical property, while women tend to evacuate given stereotypically feminised roles, such as caregiving.<sup>96</sup>

Income disparities between Indigenous and non-Indigenous groups are shaped by historical inequities, deeply impacting Indigenous access to financial resources, and ultimately, capacity for safe evacuations.<sup>97</sup> Generally, wildfires cause mental stress for those who are displaced as well as increase the risk of respiratory illnesses due to smoke exposure.<sup>98</sup> Indigenous women with children face additional stress in urban evacuation centres due to concerns of child apprehension and forced separation by child welfare systems.<sup>99</sup>

**Generally, wildfires cause mental stress for those who are displaced as well as increase the risk of respiratory illnesses due to smoke exposure. Indigenous women with children face additional stress in urban evacuation centres due to concerns of child apprehension and forced separation by child welfare systems.**

Future research can improve understanding of the gendered experiences and health implications of wildfires in rural Canada, including the specific health experiences of Indigenous women and how disaster-risk management responses differ.

### **Natural disasters increase risk factors for gender-based violence**

Rural contexts create unique circumstances for experiencing gender-based and **intimate partner violence**. Rural women experience the highest rates of intimate partner violence in Canada. Rural and remote areas have fewer resources for those who are experiencing violence. Isolation and lack of adequate public transportation can further hinder escaping from abusive situations.<sup>100,101</sup> As climate change poses increasing risks to built infrastructure, public transportation can experience delays, disruptions, or outages.<sup>102</sup> Evidence from North Texas suggests that transportation is used as a source of control and coercion among perpetrators of intimate partner violence.<sup>103</sup>

Natural disasters increase the risk factors for violence, such as homelessness, economic precarity, and trauma.<sup>104</sup> Following the 2013 floods in southern Alberta, there was a rise in sexual assault against women. Women are also more likely to experience disruptions to their sense of security following disasters.<sup>105</sup>

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Within resource extraction communities, the risk of gender-based and intimate partner violence is elevated, especially among Indigenous women, girls, and non-binary individuals. Indigenous women living in rural and remote communities experience the highest rates of intimate partner violence, and these cases tend to be more severe.<sup>106</sup> Extractive communities in northern Ontario and the Great Lakes regions have the highest rates of violent crime or rape against Indigenous women, children and **Two-Spirit people**. There is also higher rates of sex trafficking of Indigenous women and girls in these regions. Indeed, Ontario has the highest rates of sex trafficking in all of Canada.<sup>107</sup> Further research can identify how climate hazards affect gendered vulnerabilities in these communities.

### **Climate change can exacerbate inequities in healthcare access**

Climate change not only exacerbates existing inequities in access to healthcare, but also creates new challenges by way of disrupting health facility functions through infrastructure damage, reducing access to medical products and supplies, and reducing access to critical support services.<sup>108</sup>

Rural communities have fewer medical resources such as hospitals and reproductive clinics than urban settings.<sup>109</sup> In general, women living in rural or remote areas of Canada face more barriers to access specialised health care services. The Covid-19 pandemic has exacerbated these challenges with a shift to virtual services. Inadequate digital infrastructure and unreliable Internet can make it difficult to obtain or attend virtual healthcare appointments.<sup>110</sup>

Indigenous communities face unique challenges including geographic remoteness, high travel costs, inadequate healthcare resources, and a lack of information on Indigenous Peoples' health. Often in rural and remote communities, families or individuals are forced to leave the community to address medical emergencies and appointments with specialists. Other health challenges include seeking care for mental health and substance use.<sup>111</sup> Rural communities see higher rates of mental health challenges and substance use compared to urban populations. Access to mental health services is scarce or precarious, and this has been associated with an increased reliance on substances such as alcohol or drugs as coping

mechanisms.<sup>112</sup> First Nations and Inuit communities, in particular, see a disproportionate impact of substance use within their communities, which are manifestations of many factors including colonisation and cultural loss.<sup>113</sup>

Future research can better illuminate the way rurality acts as a determinant of health, and how changing rural climate impacts the health of elderly and young women, women with disabilities, and Indigenous women, who are particularly vulnerable to adverse health impacts and gender-based violence.<sup>114,115</sup>



### 1.3 HEALTH IN COASTAL COMMUNITIES

With warming temperatures, Canada's northern coastline is expected to experience increased precipitation, more frequent and intense storms, and increased flooding. Vulnerability to the negative effects of these changing weather patterns will depend on the geographic location and adaptive capacity of a given community; that is, their ability to adapt to changes.<sup>116</sup> Unfortunately, as evidence combined in this section suggests, Black and Indigenous communities are at higher risk of experiencing the worst of these effects.<sup>117</sup>

#### **Worsening water quality in coastal regions can exacerbate water insecurity among Indigenous communities**

With coastal aquifers being increasingly in contact with saltwater from the ocean, there are growing concerns about the contamination of groundwater which could make water sources unusable for drinking.<sup>118</sup> Additionally, extreme precipitation can contribute to sewage waste release and overflow.<sup>119</sup> Increased rainfall and snowmelt as a result of climate change increases the chances of bacterial contamination if communities do not have access to properly treated water.<sup>120</sup> Pathogens found in sewage can contaminate ocean water and subsequently bioaccumulate in shellfish. Some Indigenous communities are heavily reliant on marine mammals and fishing. Consumption of raw or undercooked fish, animals, and shellfish can contribute to illness and disease outbreaks.

Furthermore, warmer temperatures create conditions for algae and bacterial growth in ocean and freshwaters; some species of cyanobacteria produce toxins that are harmful to human health by impacting skin, liver, or nervous system toxicity.<sup>121</sup>

Water contamination has long-lasting and severe implications for health, as well as water and food security. The impacts of climate change on water quality within Canadian coastal regions is still emerging and further research is required to understand the gendered and intersectional health impacts of climate change.

#### **Climate change compounds the effects of environmental racism**

In Nova Scotia, low-income and racialized communities are more likely to live and work near factories and polluting facilities. As such, they are more likely to be adversely impacted by industrial disasters and toxic waste.<sup>122</sup> Environmental advocates and scholars argue that these risks are the outcome of environmental violence and **environmental racism**, historical class and racial dynamics that marginalise, oppress, and place communities in vulnerable situations.<sup>123</sup> The **feminization of poverty** provides an additional layer of challenges regarding exposure to contaminants and toxic substances.<sup>124</sup>

Nitrate levels in water are an increasing concern for communities near polluting factories. More frequent and intense precipitation can lead to floods, which coupled with proximity to polluting sources increases the risk of exposure to nitrate in drinking water. This contributes to congenital anomalies such as limb deficiencies.<sup>125</sup>

***Emerging evidence suggests that women, Indigenous, Black, low-income, elders, and pregnant individuals are more vulnerable to the adverse health impacts of climate change.***

Floods in low-income neighbourhoods in Truro, Nova Scotia, are associated with higher rates of infectious diseases, such as cholera. Floods also cause emotional trauma and psychological distress. Emerging evidence suggests that women, Indigenous, Black, low-income, elders, and pregnant individuals are more vulnerable to the adverse health impacts of climate change. For example, members of Black Nova Scotian communities tend to receive little support or response from government to flooding compared to White counterparts, which impacts climate resilience.<sup>126</sup>

Seniors are particularly vulnerable to stress and sensitivities that may result from higher temperatures. This is partly due to pre-existing health conditions or age-related chronic diseases. In general, senior citizens living in long term care homes experience higher vulnerability to adverse health impacts associated with exposure to wildlife, drought, extreme heat, and flooding.<sup>127</sup>

Further research is necessary to unpack the gendered and intersectional dimensions of health impacts in coastal Canada.

## Climate change elevates the risk of adverse physical and mental health impacts

Extreme heat elevates the risk of adverse physical health outcomes and mortality. There is significant evidence suggesting that heat waves have a negative effect on individuals with cardio-respiratory conditions while also increasing emergency room visits and hospitalizations.<sup>128</sup>

In addition to physical impacts, a natural experiment study on the impacts of the 2021 heat wave in British Columbia indicates that climate-induced extreme heat also increases the risk of mental health disorders, such as anxiety, depression, and post-traumatic stress disorder. In fact, the impacts of climate change on mental health have been so significant that the term **climate anxiety** is increasingly gaining attention.<sup>129</sup>

Future research can investigate how climate change anxiety can be experienced by groups with diverse intersecting identities.



## 1.4 HEALTH IN URBAN SETTINGS

### Urban floods will become more frequent, and young women are particularly vulnerable

Urban flooding is expected to increase in frequency and intensity.<sup>130</sup> Heavy rainfall can increase waterborne disease outbreaks. It is projected that 2°C to 4°C in global warming levels by 2080 will increase up to 25-fold the risk of diarrhoeal diseases.<sup>131</sup>

Floods disproportionately affect women with less financial resources and less access to public services. Research indicates that, in several countries, natural disasters are more likely to kill women compared to men, which is partly explained by the fact that women have, on average, lower income.<sup>132</sup> In the city of Toronto, low-income women face disproportionate impacts from floods as they are more likely to occupy basement apartments and rent which makes them ineligible for government infrastructure subsidies.<sup>133</sup>

Urban flooding and social vulnerability share a complex relationship. There are inconsistent patterns in the disproportionate impact of flood risks on racialized and ethnic minorities, which suggests that, rather than unequal exposure, there is a need to better understand unequal vulnerability.<sup>134</sup> Further research is required to improve understanding of the gendered and intersectional health implications of climate change in urban settings in Canada.

## Heat in urban settings has differential impacts on seniors, children, pregnant individuals, and those experiencing homelessness

Projections suggest that, by mid-century, Toronto will experience 46 additional days per year of extreme heat.<sup>135</sup> Broadly, health impacts from heat include all-cause mortality, cardiovascular disease hospitalizations, perinatal effects, and impacts to psychosocial health.<sup>136</sup> Poor air quality can exacerbate heat related illnesses.<sup>137,138</sup>

***Research on the effects of heat stroke indicates that prolonged heat exposure carries health risks for pregnant individuals. Other vulnerable populations include seniors and children who are unable to adapt physically and respond to heat stress signs.***

Research on the effects of heat stroke indicates that prolonged heat exposure carries health risks for pregnant individuals. Other vulnerable populations include seniors and children who are unable to adapt physically and respond to heat stress signs. Furthermore, those experiencing homelessness and low-income individuals are likely to be more exposed to extreme heat, due to unstable access to housing or a tendency to live in poorly insulated and ventilated homes.<sup>139</sup>

Climate change can exacerbate the vicious cycle of extreme heat and social inequities. Low-income individuals tend to live in neighbourhoods with high-intensity **urban heat islands**, where the prevalence and access to greenspace is limited, which, in turn, increases the risk of heat exposure.<sup>140</sup> Further research is necessary to shed light on the nexus between gender, health, and extreme weather in urban settings in Canada.

# FOOD SECURITY IN A CHANGING CLIMATE

## Key findings and takeaways:

Food insecurity is not a new challenge in Canada. Currently, women-led lone-parent families, low-income groups, Indigenous people, newcomers and individuals with disabilities report higher levels of food insecurity than the overall population.

Climate change further impacts food security and food safety by disrupting food systems, impacting food prices, and affecting access to quality and nutritional food. These impacts vary across regions.

It is expected that Indigenous people in the Canadian Arctic will experience the most severe impacts of climate change on food security and food safety.



### Arctic communities

- Climate change will impact availability of country foods, on which Indigenous communities heavily rely for food and cultural practices. Traditional food storage and preservation are also disrupted by warming temperatures.
- Warmer temperatures impact hunting and fishing expeditions, posing significant safety threats to Indigenous men.
- Climate change threatens the availability and accessibility of berry patches, which can disproportionately affect the physical and mental health of Indigenous women and girls.
- Gender roles and disruption of sharing networks due to higher difficulties to access traditional foods may further constrain Indigenous women's access to food.



### Urban communities

- Climate-induced heavy precipitation, flooding, heat waves, and winter ice storms affect access to local food and the transportation of fresh foods to local grocery stores.
- It is estimated that approximately 9% of Toronto's food banks are located in flood risk areas. Those more likely to rely on food banks – racialized communities, newcomers, Indigenous people, and people with dependents – experience particular vulnerabilities.

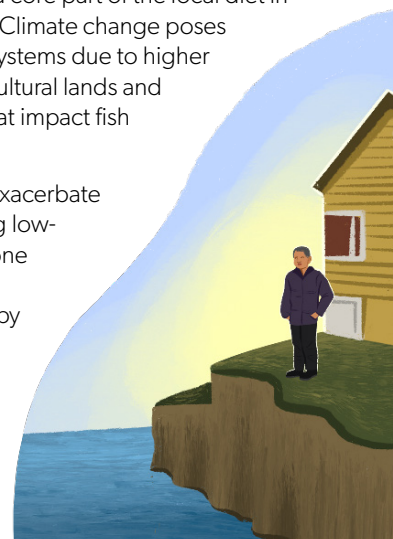
### Rural communities

- Climate change is expected to impact local food production, storage, and distribution.
- Climate change disrupts the role of Indigenous women in rural food systems. Indigenous women also play a central role in berry picking outside of the Arctic ecosystems, but these activities are threatened by climate hazards and warming temperatures.
- In rural regions of Ontario and Quebec, food insecurity is associated with self-harming behaviour among women, partly due to the inability to feed their children and families.



### Coastal communities

- Outside of the Arctic, food insecurity is particularly prominent in communities along the Atlantic coast.
- Fish and seafood are a core part of the local diet in coastal communities. Climate change poses threats to local food systems due to higher risks of floods in agricultural lands and ocean acidification that impact fish stocks.
- Climate change can exacerbate food insecurity among low-income groups and lone parent households, particularly those led by women.





## 2 Food security in a changing climate

**Food security** broadly refers to a situation in which people have ongoing access to safe and nourishing food at a level that is sufficient to meet their dietary needs for physical growth and development, and a healthy life.<sup>141</sup> Relatedly, a situation of **food insecurity** emerges when food access is disrupted because of financial constraints or other factors. Statistics Canada classifies and measures food insecurity along three categories<sup>142</sup>:

1. *Marginal food insecurity*, which refers to worries about running out of food and/or limiting the selection of food due to budgetary constraints;
2. *Moderate food insecurity*, which refers to a compromise in quantity and/or quality of food due to budgetary constraints;
3. *Severe food insecurity*, which involves missing meals, reducing food intake, or even going a day without food.

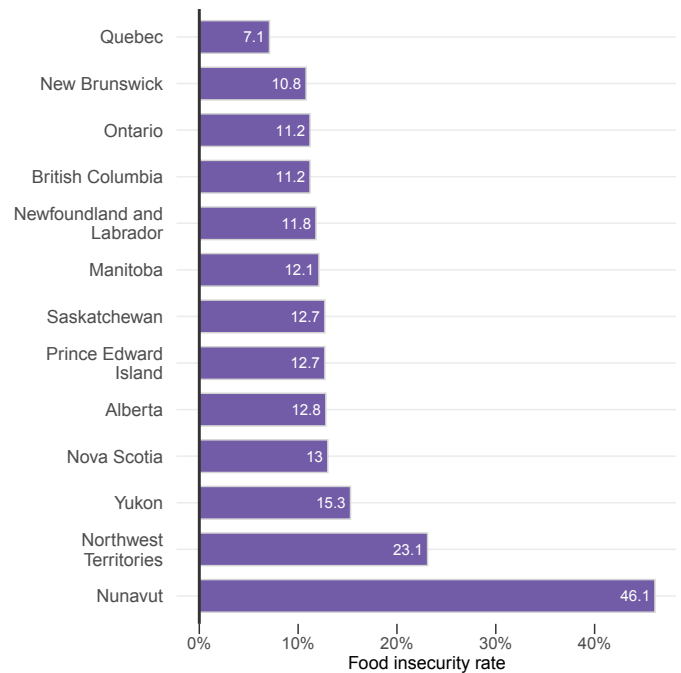
As such, not all situations of food insecurity lead to hunger, defined as the uncomfortable and painful physical sensation due to insufficient food intake. However, hunger can be the outcome of severe food insecurity.

The rate of food insecurity varies immensely across Canada (Figure 1). This challenge is particularly pronounced in the territories. It is estimated that, in 2019, 27.6% of individuals in the territories experienced moderate or severe food insecurity. Nunavut has approximately 46.1% of people facing food insecurity, the Northwest Territories has 23.1%, and Yukon has 15.3%. Excluding the Canadian Territories, Nova Scotia and Alberta had rates of food insecurity above the national average of 10.6%, and Quebec had the lowest food insecurity rates, estimated at 7.1%.

Food insecurity also varies across family types. In 2020, approximately 27.3% of persons in lone-parent families experienced moderate or severe food insecurity in Canada, a much higher rate than the 11.2% of total moderate or severe food insecure persons in the country.<sup>143</sup> Women-led lone-parent families face even higher risks of food insecurity; 33% of these households experience food insecurity.<sup>144</sup> Those with less than high school education, living in households reliant on social assistance or employment insurance as their primary source of income, those who rented rather than owned their dwelling and those who identify as Indigenous or Black are more likely to report higher levels of food insecurity.<sup>145</sup> Newcomers and individuals with disabilities are also more likely to experience food insecurity than the overall population.<sup>146</sup> In the Arctic, Inuit households are more likely to be moderately or severely food insecure than non-Inuit households.<sup>147</sup> Outside the territories, the proportion of Indigenous people experiencing moderate and severe food insecurity is more than double the overall population.<sup>148</sup>

**Figure 1: Food insecurity in Canada varies significantly by region**

Percentage of persons facing moderate or severe food insecurity, 2019



Data source: Canadian Income Survey and Canadian Income Survey, Statistics Canada. Table 13-10-0835-01 Food insecurity by age group and sex.

Unsurprisingly, higher income groups tend to report lowest food insecurity rates, and low-income groups report higher rates of food insecurity. Individuals who experience worsening financial situations, layoffs, job loss, and business slowdown are significantly more likely to be food insecure than those with stable economic conditions. Furthermore, individuals who experience multiple **stressful life events** are also more likely to be food insecure than those who experience one event.<sup>149</sup>

Food insecurity is not a new challenge in Canada. However, as temperatures warm, it is projected that there will be substantial reductions in staple crop yields in some locations, decreased fisheries catch, decreases in the nutrient value of staple foods, all of which will heighten food prices. As such, climate change affects food security and food safety by disrupting **food systems**, impacting food prices, and affecting the access to quality and nutritional food.<sup>150</sup>



## 2.1 FOOD INSECURITY IN THE ARCTIC

The average temperature in the Arctic has been warming more than the global average and this trend is virtually certain to continue. Projections indicate that permafrost thawing and loss of snow cover is likely to make the Arctic ice-free at least once by 2050.<sup>151</sup>

These climatic changes dramatically affect ecosystems and species migratory patterns,<sup>152</sup> which adversely impacts access to food and cultural activities in Arctic communities. Even in places like Iqaluit, located in the Qikiqtaaluk region of the Nunavut territory, which has a large portion of non-Inuit population and inhabitants from diverse backgrounds and geographical locations, harvesting activities like hunting, fishing, and trapping remain a key part of the community.<sup>153</sup> Climate change is likely to further exacerbate food insecurity, an ongoing challenge in the Canadian Arctic.<sup>154</sup> It is expected that the Canadian Arctic and Indigenous people will experience the most severe impacts of climate change on food security and food safety.<sup>155</sup>

### Climate change affects hunting, fishing, and trapping practices, impacting Indigenous food systems and cultural practices

Indigenous communities in the Arctic rely on both traditional foods (also called country foods) as well as processed store-bought foods.<sup>156,157</sup> Hunting and fishing for subsistence has been practiced since time immemorial.<sup>158</sup> More than providing food, Inuit communities and First Nations people in the Arctic rely on hunting, trapping, and fishing for recreation, connection with fellow community members and the natural world, fostering cultural identity and morale, and transmission of **Traditional Ecological Knowledge**.<sup>159,160</sup> However, hunting, trapping, and fishing for subsistence has faced numerous challenges over the years, particularly due to harmful colonial policies and institutions, forced relocations, cultural assimilation, and introduction of the wage economy.<sup>161,162,163</sup> Climate change is yet another factor that will deeply impact Indigenous communities' food systems.

In the Canadian Arctic, rising temperatures over the years have slowed the formation of sea ice in the fall and have led sea ice to recede faster during the spring.<sup>164</sup> As the conditions of sea ice change, the habitat of available species is impacted, affecting the entire Arctic **food web** and causing further changes in animal migration patterns.<sup>165,166</sup> These changes significantly impact the availability of marine mammals (e.g., walrus, seals) and fish – staple foods of Inuit traditional diet.<sup>167</sup> Similarly, increasing temperatures and precipitation changes have altered the distribution of wildlife species, such as wood bison and caribou, whose population has reportedly dwindled, increasing food insecurity amongst Indigenous communities.<sup>168,169</sup> For example, Inuit in Labrador are grieving the rapid decline of caribou due to early snow melt, which negatively affects not only their access to food but also their sense of cultural identity.<sup>170</sup>

These changes also impact off-reserve First Nations communities in the Arctic, where hunting, fishing and trapping are widely performed activities (Figure 2).

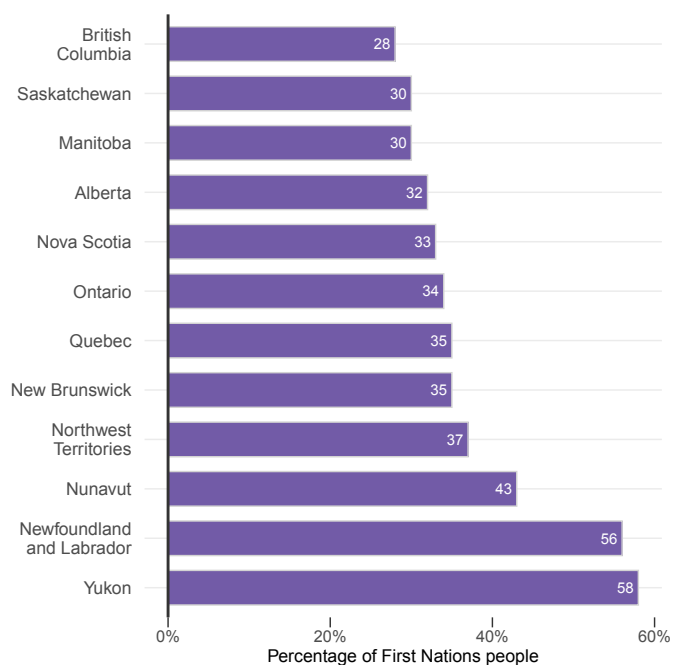
Climate change also impacts the conditions necessary for safer hunting expeditions.<sup>171</sup> Changes in the winter climate have disrupted access routes to traditional hunting grounds and deteriorated foraging conditions, placing hunters, usually men, at high risks of injury.<sup>172,173</sup> Without thick sea ice, hunting seals becomes more difficult as their feeding habits change when ice becomes thinner.<sup>174</sup> More than impacting traditional food procurement, climate change also destabilizes traditional food storage and preservation as permafrost thaw affects in-ground freezers used by Arctic Indigenous communities.<sup>175</sup>

Furthermore, Indigenous people report an increasing population of orcas in the Arctic, as disturbances in the sea ice expand the range of orca predation. This has impacted access to abundant sealskins. Inuit women also report that sealskins are thinner and with shorter fur. These impacts on caribou and seals populations pose a risk to food security in the region as well as threaten men's hunting expeditions and women's engagement and enjoyment with traditional sewing activities.<sup>176</sup>

Further research is necessary to unpack the gendered implications of climate impacts on Indigenous hunting, fishing, and trapping activities.

**Figure 2: First Nations people who hunted, fished, trapped in previous year**

Off-reserve First Nations people (%), 15 years or older



Data source: Statistics Canada. Aboriginal Peoples Survey, 2017  
Retrieved from: <https://www150.statcan.gc.ca/n1/pub/89-653-x/89-653-x2019001-eng.htm>  
Note: Data for Prince Edward Island is too unreliable to be published

## **Climate change impacts Inuit relationships to berry picking**

Berry picking is an important activity in Nunavut, Nunavik, and Nunatsiavut. Berries are the most widely harvested plants and one of the most widely consumed wild foods in the Arctic.<sup>177</sup> As Arctic climate changes, the availability and accessibility to berry patches become threatened. Inuit women report that berries have become smaller, seedier, and less abundant since their childhood.<sup>178</sup>

Inuit women and children often come together to gather berries for medicinal and food use. The practice of berry picking is also critical for community wellbeing.<sup>179</sup> Women plan day trips to combine berry picking, walking, interacting with friends and extended family.<sup>180</sup> It is also common for Inuit women to combine berry picking with caring for children.<sup>181</sup> Others view the practice of berry picking to be a form of therapy as it contributes to positive mental health.<sup>182</sup> Women-led counselling sessions focus on land-based counselling or healing trips involving berry picking.<sup>183</sup>

Around Iqaluit, Inuit women actively harvest crowberries, blueberries, and blackberries, which are eaten on their own after being freshly picked or mixed with animal fat.<sup>184</sup> The impacts of climate change on berry harvesting can thus impact food security and create a wide range of adverse health effects for Indigenous women and children in the Arctic.

## **The role of industrialized foods in a changing Arctic**

A changing climate further stresses traditional Indigenous hunting, fishing, and trapping activities, already in decline due to social, political, economic factors. These compounding factors decrease the access to country foods. To cope, Indigenous communities increasingly turn to industrial foods.<sup>185</sup> However, this does not solve food insecurity.

Store bought food in the Arctic is notoriously expensive. Given the remoteness of Arctic communities, costs associated with food transportation (flying in goods and increased shipping costs) inflate the price of store bought food in the Arctic.<sup>186,187</sup>

Industrial foods are unlikely to carry the same health benefits as country or locally procured foods. Additionally, store bought foods do not fulfil the same cultural benefits to Indigenous Peoples as traditional foods do. Traditional hunting, harvesting and fishing, coupled with traditional food preparation and sharing networks provide a sense of cultural identity and belonging, as well as increased levels of physical activities.<sup>188</sup> Locally procured traditional foods are deeply associated with Indigenous physical, mental, and spiritual well-being.<sup>189</sup>

Arctic communities are particularly dependent on transport through air, water and terrestrial routes to acquire and exchange goods and services. With the melting of glaciers, snow, and sea ice, the risk of exposure to persistent organic pollutants (e.g., industrial chemicals, pesticides) increases, posing further risks to the food security and food safety of Arctic communities and wildlife. Fish and marine mammals become the primary source of toxic contaminants and heavy metals (such as mercury). However, exposure to these toxic contaminants vary across gender and geographic lines. Inuit women in Nunavik and Nunavut are more vulnerable to exposure to contaminants and heavy metals than women from Nunatsiavut (in Northern Labrador) and the Inuvialuit Settlement Region (in the Northwest Territories) because the former tend to consume more marine mammals than the latter. Similarly, Inuit men consume traditional foods more often and in larger quantities than Inuit women, making the former more vulnerable to exposure to heavy metals and toxic contaminants due to climate change than the latter.<sup>190</sup>

## **Family composition as a factor of Indigenous vulnerability to climate impacts**

An important factor that influences Indigenous women's ability to access traditional foods is relationship status. Family couples rely on each other for survival in an inhospitable environment. As climate change adversely impacts hunting, trapping, and fishing practices, and the price of processed food rises, the risk of food insecurity also increases if the household does not have an active hunter. Hunting, fishing, and trapping are primarily male activities. Without a hunter in the family, Indigenous women become more vulnerable to food shortages.<sup>191</sup>

Households with dependents are another predictor of vulnerability to climate impacts. Currently, First Nations households with children across the Arctic are more likely to experience greater rates of food insecurity than those without children.<sup>192</sup> Research evidence indicates that families with children have higher expenses with store bought foods. Low income, women-led single parent families face particular challenges to secure nutritional foods.<sup>193</sup>

Further research can illuminate how climate change exacerbates food insecurity and improve understanding of how different family members adapt or cope with climate-exacerbated food insecurity in the Arctic.

## Gender roles and food sharing networks mediate vulnerability to climate change

The disruptions to Indigenous food systems brought by climate change are felt differently across gender and age lines. Evidence indicates that Indigenous women in Igloodik Island, Nunavut, are typically the last to eat in the household as to ensure other family members, particularly children, have enough to eat.<sup>194</sup>

***Evidence indicates that Indigenous women in Igloodik Island, Nunavut, are typically the last to eat in the household as to ensure other family members, particularly children, have enough to eat.***

Household and food sharing networks help limit instances of chronic food insecurity by providing vulnerable community members with food. However, food sharing networks have been compromised. Rising food prices and increasing adverse climate change impacts on hunting practices decrease the amount of food that can be shared.<sup>195</sup> Research indicates that, as food sharing networks become strained, women refrain from actively asking for food access in fear of community judgement. Social challenges such as gambling and substance addiction can also stress food-sharing networks and disrupt household dynamics, further constraining access to food for Indigenous women.<sup>196</sup>

As Indigenous communities shift from food sharing network systems to cash transactions, women increasingly pay hunters for country food. However, Indigenous women also have less financial security and less net income per year to spend on country food or processed foods in stores than their male counterparts.<sup>197,198</sup>



## 2.2 FOOD INSECURITY IN RURAL COMMUNITIES

Rural communities less connected to commercial and urban centres experience higher costs of store-bought foods.<sup>199</sup> These communities are also experiencing loss of knowledge relevant to local ecology and local food systems, impacting capacity to produce food for local consumption.<sup>200</sup> Climate change can exacerbate risks to rural communities' food systems.

### Climate change impacts food production, processing and distribution

Climate projections indicate that there will be further increases in precipitation as temperatures rise, with the most serious impacts expected to be in the form of extreme weather, such as extreme precipitation and flash floods.<sup>201</sup> Climate change is also expected to increase the intensity and duration of droughts in agricultural areas in Canada.<sup>202</sup> This has significant impacts on food production, storage, and distribution in rural areas.

Extreme weather increases the risk of chemical and bacterial contamination of food production sites. It also increases the growth and survival of toxic fungi, reducing the yield of agricultural crops. Additionally, rising temperatures increase the risk of food spoilage and contamination of food facilities.<sup>203</sup>

For Indigenous communities based in and outside of the Arctic, country food is important in maintaining health, well-being and cultural identity.<sup>204</sup> Climate change impacts their capacity to procure and use local food sources, exacerbating food insecurity due to variation and decline in animal availability.<sup>205</sup>

Further research is necessary to better understand the nuances of the gendered and intersectional impacts of climate change on food production, storage, and distribution in rural communities in Canada.

### Climate change impacts gathering and harvesting practices

Farmers in non-Indigenous rural communities in British Columbia, such as Kamloops, Prince George, and Quesnel, have reported longer growing seasons and higher harvest yield. However, longer growing seasons also come with higher chances of droughts, which affects local food production.<sup>206</sup>

***In rural regions of Ontario and Quebec, food insecurity is associated with self-harming behaviour among women, partly due to the inability to feed their children and families.***



Climate change disrupts the role of Indigenous women in rural food systems. Indigenous women also play a central role in berry picking outside of the Arctic ecosystems, but these activities are threatened by climate hazards and warming temperatures.<sup>207,208</sup>

Emerging evidence suggests that, as food systems become stressed, women’s health is impacted. In rural regions of Ontario and Quebec, food insecurity is associated with self-harming behaviour among women, partly due to the inability to feed their children and families.<sup>209</sup>



## 2.3 FOOD INSECURITY IN COASTAL COMMUNITIES

Communities along the Atlantic and the Pacific coast share similar food insecurity worries as other communities across Canada. Over 10% of households along the coast of British Columbia are food insecure.<sup>210</sup> However, food insecurity is particularly prominent in communities along the Atlantic coast.<sup>211</sup> Education, income, the number of family dependents, geographical location, and age are factors that contribute to food insecurity.<sup>212</sup>

### Food systems in coastline communities depend on fisheries

Fish and seafood are a core part of the local diet in coastal communities. However, overfishing to meet local and global economic needs have deeply destabilised marine ecosystems and heightened the risk of food insecurity in these areas.<sup>213</sup>

Unlike the Arctic, Canada’s coastal communities have experienced a decline in food insecurity over the years predominantly due to policy interventions such as provincial poverty reduction plans.<sup>214</sup> Nonetheless, climate change brings additional challenges to food systems in coastal communities. For example, extreme weather and rise in the sea level can flood agricultural lands and damage crops or alter conditions for agriculture production.<sup>215</sup> Ocean acidification and hypoxia cause shellfish to die off, adversely impacting fish stocks, food webs, and consequently food security.<sup>216</sup>

Indigenous food systems are particularly vulnerable to climate change. Not only does the health and wellbeing of Indigenous communities depend on dwindling fish stocks, but also store-bought foods are unable to replace the health and cultural value of traditional foods. For example, between the years 1981 and 2009, consumption of spring salmon decreased from 38kg per family to 13kg. These sources of food provide energy, protein, minerals, and essential vitamins for health. Shifts to store bought foods are linked to a diet consumption of energy-dense foods that are high in fat, sodium, and refined sugar. It is projected that consumption of essential nutrients will further decline by the year 2050 as fish stocks decline due to climate change.<sup>217</sup>

Food insecurity is pronounced in Atlantic provinces, especially among low-income<sup>218</sup> and lone parent households.<sup>219</sup> There is emerging evidence that food insecurity impacts the ability of lactant individuals to breastfeed, negatively affecting children’s development.<sup>220</sup> Challenges to afford healthy foods also result in nutritional deprivation and a reduction of wellbeing.<sup>221</sup>

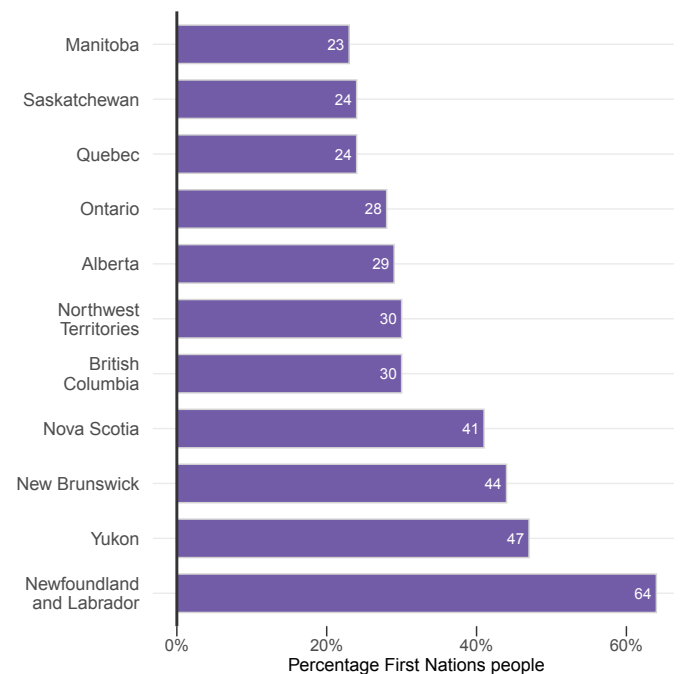
Despite the emerging evidence on how climate change may further stress food systems in coastal communities, little is known about the gendered and intersectional implications of climate change on food security in these contexts.

### Beyond fisheries, climate change impacts access to other nutritional foods

Gathering wild plants and berry picking among off-reserve Indigenous groups is quite prevalent in coastal Atlantic coastal communities, particularly in Newfoundland and Labrador (Figure 3). Indigenous women in coastal communities are particularly active in berry picking, an activity that connects them to their spiritual, emotional, mental, and physical selves, in addition to providing significant nutritional value.<sup>222</sup>

**Figure 3: Coastal First Nations are active in berry picking**

Off-reserve First Nations people who gathered berries/wild plants in the previous year (%)



Data source: Statistics Canada. Aboriginal Peoples Survey, 2017  
Retrieved from: <https://www150.statcan.gc.ca/n1/pub/89-653-x/89-653-x2019001-eng.htm>  
Data for Nunavut and Prince Edward Island are too unreliable to be published

Women report that climate change, especially extreme weather events, poses great risks to traditional berry patches, such as cranberries, blueberries, and cloudberries. Berry abundance is declining and becoming more variable. Permafrost thaw, changes in vegetation and weather have an impact on cloudberry productivity and patch fragmentation. As this important food source is threatened, climate change increases the risk of anxiety, mental illness, and even suicidal ideation related to cultural and spiritual loss.<sup>223</sup>

Available data indicates that women consume more vegetables and fruit than men in coastal communities. This is particularly pronounced in British Columbia and New Brunswick, the two coastal provinces with the wider gender gap in fruit and vegetable consumption for people over 12 years of age (Figure 4). However, this data is not disaggregated by race or Indigeneity. As climate change further threatens berry patches, it remains to be known how these changes impact the food intake of fruits among girls and women, particularly of Indigenous identities.



## 2.4 FOOD INSECURITY IN URBAN SETTINGS

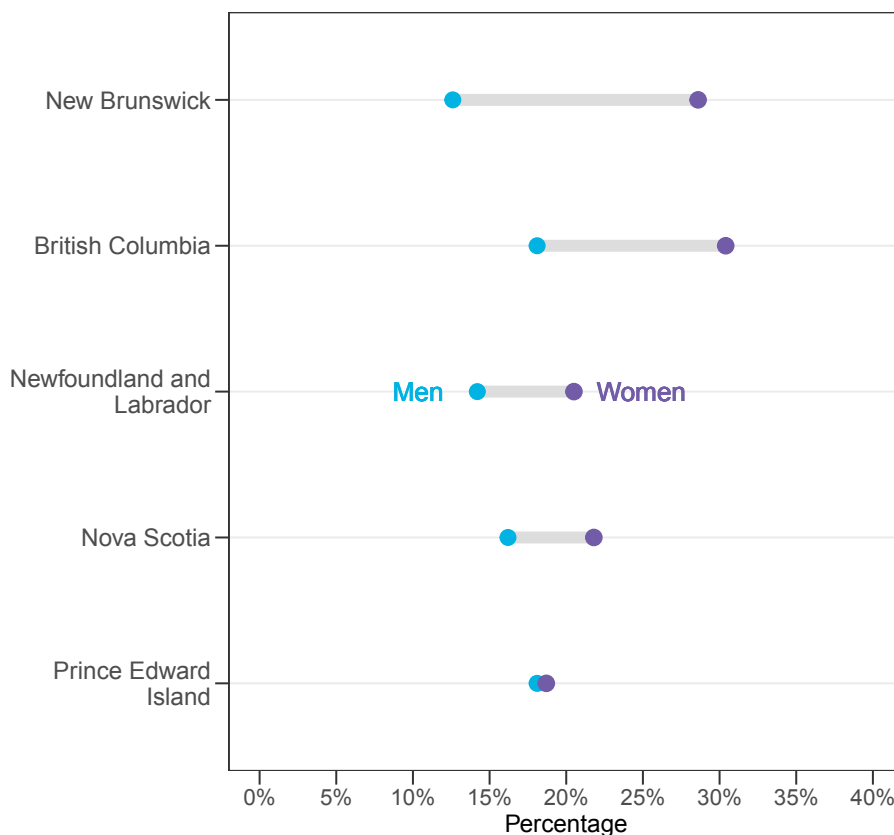
Living in urban settings is associated with higher odds of experiencing food insecurity than living in rural communities in Canada.<sup>224</sup> However, the prevalence of household food insecurity varies markedly across metropolitan areas within and across Canadian provinces.

### Climate hazards destabilize food storage and distribution in urban areas

Climate change impacts urban food systems through extreme weather events, such as rain, flooding, heat waves, and winter ice storms. These events affect access to local food and the transportation of fresh foods to local grocery stores. For example, one of the primary distributors for supermarkets in Toronto, known as the Ontario Food Terminal, is vulnerable

**Figure 4: Fruit and vegetable consumption in coastal Canada**

Population aged 12 or older consuming fruits and vegetables at least 5 times daily, 2020



Data source: Statistics Canada. Table 13-10-0096-01. Health characteristics, annual estimates.

to riverine flooding which can affect distribution capacities. Furthermore, it is estimated that approximately 9% of Toronto's food banks are located in flood risk areas. Ice storms and heat waves can also lead to power outages, which affect food storage and distribution facilities, food banks, and retail food stores.<sup>225</sup> Food disruptions will be particularly felt by those residing in **food deserts** as urban transportation or public transportation systems, relied upon by Canadians to access food sites such as grocery stores, are also vulnerable to climate change.<sup>226</sup>

In the cities of Edmonton and Calgary, power-outages from heat waves have affected the transportation of food supplies and decreased the ability to access grocery stores. Climatic changes and more severe droughts put pressure on the production of fruits and vegetables, increasing food prices.<sup>227</sup>

These disturbances to local food systems have intersectional implications. It is estimated that those who visit food banks are more likely to have experienced job loss or reduced hours of work. Members from racialized communities, newcomers, Indigenous people, and people with dependents are also more likely to rely on food banks.<sup>228</sup>

### **The potential and combined loss of water, fuel, and power during and after disaster emergencies can be devastating for low-income and racialized groups**

Evidence from the United States indicates that approximately 47% of African American and 40% of Oaxacan-American households may have exhausted their food supply after three days of a disaster that resulted in the loss of resources such as power, water, and fuel. This is particularly felt by single parent low-income households. Reduced mobility, transportation, and power can exacerbate these impacts by challenging access to food banks, school meal programs, and other food relief benefits and services.<sup>229</sup>

Future research can examine disaster emergency food supply risks experienced by diverse groups in Canada.

### **Indigenous women are particularly vulnerable to climate-related food insecurity in urban settings**

Time is a core determinant of food security for Indigenous people. The lack of time to harvest traditional country food impacts the access of nutrition and culturally relevant food. This later influences consumption of store-bought foods, the rates of diet-related chronic diseases and obesity, as well as the centrality of homemade family meals. In urban settings, the dominant driver of food security is income and financial security. Urban-based Indigenous people are six times more likely to experience food insecurity than on-reserve communities.<sup>230</sup>

Indigenous urban-based households, predominantly led by single mothers, are disproportionately represented in low-income groups, and are overly reliant on store-bought processed foods. Urban Indigenous people are more likely to rely on soup kitchens and food banks and report a desire to consume traditional foods more often, compared to on-reserve residents who are more likely to have informal social support and institutional networks to buffer food insecurity. In urban settings, food sharing networks are more limited due to cultural and spatial distance from the reserve.<sup>231</sup>

Further research can shed light on how climatic changes and hazards can affect these dynamics.

***Urban Indigenous people are more likely to rely on soup kitchens and food banks and report a desire to consume traditional foods more often, compared to on-reserve residents who are more likely to have informal social support and institutional networks to buffer food insecurity.***

# WORK IN A CHANGING CLIMATE

## Key findings and takeaways:

The characteristics of the Canadian labour market (e.g., occupational segregation, wage gaps, precarization of work) shape vulnerability to climate change.

Climate change can render entire regions unproductive due to flooding, extreme weather, and wildfires, making workplaces unsafe, reducing labour productivity, and slowing down economic activity. The implications will be felt unevenly across geographic regions and social groups.



### Arctic communities

- Work in Arctic communities consists of a mixture of subsistence work and wage work.
- Climate change impacts traditional work such as sewing, disrupting an important avenue of women's socioeconomic participation.
- Little is known about how climate change impacts wage work in the Arctic, but it is known that Inuit women are already regularly involved with wage work and have taken the responsibility to pay for basic necessities such as rent, groceries, and household bills. This increased participation in wage work did not, however, change gendered expectations around childcare and domestic responsibilities.



### Urban communities

- There is limited research on how climate change impacts workers in Canadian urban centres.
- Evidence from California suggests that the 2017 wildfires deeply endangered the livelihood and health of undocumented immigrants and Indigenous people from Latin America.

### Rural communities

- Natural resource sectors are of particular importance for employment and income in rural communities. The impacts of climate change on these sectors make these communities economically vulnerable.
- Women living in rural areas tend to have lower educational attainment, lower labour force participation rates, and lower employment rates than women living in urban settings; important factors that decrease their adaptive capacity to climate change.



### Coastal communities

- In Atlantic Canada, a large portion of the workforce is employed in agriculture, fisheries, forestry, and mining. Many occupations in these industries entail outdoor work and exposure to outdoor temperatures. Men are at higher risk of heat related illness.



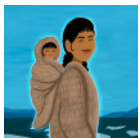


### 3 Work in a changing climate

The Canadian labour market underwent significant transformation in the past 50 years: Women increasingly entered the workforce<sup>232</sup> and have been gaining space in occupations traditionally dominated by men<sup>233</sup>; the workforce has aged<sup>234</sup>; and youth have experienced **precarization of work**.<sup>235</sup> What is still very evident is gendered and racial disparities in terms of **occupational segregation, wage gaps**, differences in career advancement, and experiences of precarious employment.<sup>236,237,238</sup>

The disparities in experiences and access to opportunities in the labour market are of an intersectional nature. For example, in the general population, men have higher employment rates than women. However, women with disabilities tend to have higher employment rates than men with disabilities. Among people with disabilities who have a high school diploma or less, women have a lower employment rate than their male counterparts. Furthermore, working women with disabilities are more likely to hold part-time jobs and earn less than others, partly due to childcare responsibilities.<sup>239</sup> These intersectional and, in particular, gendered experiences and disparities in work shape vulnerability to climate change, as income and financial resources are factors that influence adaptive capacity.

What is more, climate change can render entire regions unproductive due to flooding, extreme weather, and wildfires. This in turn can make workplaces unsafe, reduce labour productivity, and slow economic activity.<sup>240</sup> These implications will be felt unevenly across social groups and geographical regions.



#### 3.1 WORK IN ARCTIC COMMUNITIES

Work in Arctic communities consists of a mixture of subsistence work, or what some call **land-based economy**, and wage work.<sup>241</sup> Research indicates that Indigenous people experience significant disparities in the labour market, with Indigenous employment and participation rates lower compared to non-Indigenous populations. Furthermore, the rate of employment among Inuit women (53%) is slightly higher than their male counterparts (51%).<sup>242</sup> As such, Inuit women are the primary income earners in many households, and part of their wage is used to support subsistence activities.<sup>243</sup> The fact that Inuit women are often the primary income earners has led to suggestions that they might be less affected by climate change than Inuit men, though recent research has increasingly shed light on their particular vulnerability and adaptive capacity.<sup>244</sup>

#### Climate change affects women's participation in traditional sewing

Sewing is predominantly performed by women in the Arctic, and it is traditionally important to the survival of local communities. This type of work is key for Inuit women identity and plays a central role for wellbeing and economic gain. Women sew outdoor parkas (called *amautis*), mitts, and waterproof boots made from sealskins (also called *kamiks*) for their family.<sup>245</sup>

The disruption of this traditional work can have deep implications on wellbeing. Sewing is a method of relaxation and mental health and plays an important role in healing trauma from colonisation. Climate change impacts access to animal skin, and skins are reported being thinner and more prone to ripping than in the past. Many women resort to ordering skins from southern furriers or other northern suppliers.<sup>246</sup> In addition, the reduced access to seal skins impacts sewing practices, leading to adverse economic consequences for communities or families that rely on sewing. Sewing circles are also vital to sharing intergenerational knowledge. Disruption of sewing practices can affect Elder-youth relationships.<sup>247</sup>

Further research can shed more light on the nexus between gender, sewing practices, and climate change in northern communities.

#### Little is known about climate change impacts on wage work in the Arctic

Climate change is disrupting Arctic ecosystems and traditional subsistence practices, such as hunting and gathering. These disruptions to the land-based economy may further exacerbate reliance on the wage economy in the Arctic. However, employment opportunities are limited in many remote communities.<sup>248</sup>

Inuit women, who are now regularly involved with wage work, have taken the responsibility to pay for basic necessities such as rent, groceries, and household bills. The increased participation in wage work has meant a certain level of empowerment, but it also brought considerable stress, given the persistent gendered expectations around childcare and other traditional domestic responsibilities.<sup>249</sup>

Inuit women occupy a central role in families and communities. They are primarily responsible for caregiving, family health and well-being, and food preparation.<sup>250</sup> The compounding wage work with domestic and care responsibilities is what scholars call the **second shift**. This is not unique to Inuit women in the Arctic, but the lack of care services in the region<sup>251</sup> creates specific challenges to participation in the local formal economy. Another source of stress is the cultural expectation to share resources obtained through wages.<sup>252</sup>

How climate change impacts these work dynamics in the Canadian Arctic is yet to be understood, especially through an intersectional lens that incorporates gender, age, educational attainment, and other identity factors.



### 3.2 WORK IN RURAL COMMUNITIES

Approximately 2.6 million people, or 13.7% of employed people in Canada, work in rural communities.<sup>253</sup> In more than 1,800 rural and remote communities in Canada, around 30% of the local workforce is dependent on natural resource sectors for employment.<sup>254</sup>

Canadian rural areas are also the location for approximately 15.4% of all small businesses in Canada (or 312,500 small businesses), and 14.5% (or 7,500 enterprises) of medium businesses in the country. This indicates a relative vitality of the rural economic scene. However, outmigration and a declining population had an impact on the rate of growth of small businesses in rural areas.<sup>255</sup>

Given the importance of natural resource sectors for employment and income in rural communities, the impacts of climate change on these sectors make these rural communities economically vulnerable.<sup>256</sup>

#### Climate change may exacerbate scarcity of employment opportunities

Employment opportunities are limited in rural, remote, or northern communities in Canada.<sup>257</sup> Interprovincial migration is an adaptive measure to cope with lack of local economic opportunities.

Climate change may exacerbate these trends. Many of the work opportunities within rural regions are sensitive to climate change. For instance, extreme weather events can deeply disturb resource-based and seasonal industries such as fishing, farming, and tourism. These seasonally dependent industries offer limited year-round opportunities, causing many to migrate elsewhere in search of jobs and other opportunities.<sup>258</sup>

#### Rural women’s representation in low-income jobs impact their adaptive capacity

Women living in rural areas tend to have lower educational attainment, lower labour force participation rates, and lower employment rates than women living in urban settings. Furthermore, working rural women are significantly overrepresented in low-income jobs.<sup>259</sup> These are all factors that decrease rural women’s adaptive capacity to climate change.



### 3.3 WORK IN COASTAL COMMUNITIES

The workforce in Atlantic Canada is experiencing a decline partly due to an ageing and retiring workforce. This is exacerbated as youth increasingly migrate in search for jobs and opportunities in other provinces. The Atlantic provinces also experience rates of unemployment above the national average.<sup>260</sup> On the Pacific coast, British Columbia is also experiencing increasing rates of retirement.<sup>261</sup> However, the province continues to attract new immigrants and workers from other regions of Canada.<sup>262</sup>

The labour market dynamics and the economic sectors that characterize each coastal province vary widely between the Pacific and the Atlantic coasts, producing different access to employment and economic opportunities – factors that contribute to climate vulnerability and adaptive capacity.

#### As temperatures rise, outdoor workers are exposed to heat stress

The contribution of marine sectors is particularly high in Newfoundland and Labrador (16.8% of total employment), Nova Scotia (13.3% of total employment), and Prince Edward Island (9.3% of total employment).<sup>263</sup> Mining, quarrying, and oil and gas extraction also comprise 13% of Atlantic Canada’s total economic output, with men accounting for 84% of total employment. The industry is particularly important in Newfoundland and Labrador, comprising approximately 43% of the province’s GDP.<sup>264</sup> Many occupations in these industries entail outdoor work and exposure to outdoor temperatures. Men are at higher risk of heat stress illness than women, particularly because they are more likely to work outdoors, a trend that was also identified by the US Centers for Disease and Control’s Environmental Public Health Tracking Program.<sup>265</sup>

Working in hot environments, outdoors and indoors, adversely impacts the body’s cooling system. If the body’s capacity to regulate heat is undermined, heat stress can occur. If not treated early, heat stress can lead to serious and life-threatening conditions.<sup>266</sup>

In late June through mid-July 2021, Western North America experienced an unprecedented extreme heat wave. The village of Lytton, with a population of 250 residents, reached 49.6 °C (121 °F), the highest temperature ever recorded in Canada. In British Columbia, it is estimated that 595 deaths between June and August 2021 were related to heat stress.<sup>267</sup> In the aftermath of the so-called **heat dome**, British Columbians experienced high levels of climate-related anxiety. An identified concern was the potential of climate change undermining the ability to work.<sup>268</sup> Future research can clarify how workers with diverse intersecting identities are exposed to heat stress and experience climate anxiety.



## 3.4 WORK IN URBAN SETTINGS

There is limited research on how climate change impacts workers in Canadian urban centres.

Previous studies indicate that the 2013 flooding in Calgary and the 2016 wildfire in Fort McMurray, two of the costliest natural disasters in Canadian history, had devastating social implications. In Calgary, homes and businesses located in the downtown core and other historic neighbourhoods experienced significant damage from storm weather flooding in 2013. Businesses were closed, traffic was disrupted, and power was lost. It is estimated that the damage totalled \$6 billion, but little is known about the extent to which jobs and wages were impacted, much less who bore the brunt of these impacts.

Evidence from California suggests that the 2017 wildfires, specifically in Ventura and Santa Barbara, deeply endangered the livelihood and health of undocumented immigrants and Indigenous immigrants from Latin America. Unsafe labour conditions exacerbate vulnerability of precarious workers, many of whom were not provided with the appropriate equipment for protection against wildfire smoke and were therefore exposed to higher health risk. Following the Thomas Fire, the highway was severed due to debris; daily-wage workers were unable to pay for alternative transportation and were forced to lose weeks of income, with many being ineligible for unemployment benefits. Most recovery efforts and resources were directed towards wealthier individuals, with little support and emergency information provided in the appropriate languages, creating another layer of vulnerability. In general, low-income and immigrant communities in California do not have the resources to pay for insurance, invest in fire-safety or rebuild, increasing their vulnerability during climate hazards.<sup>269</sup>

Given that women and racialized minorities are overrepresented in low-paying retail and services industries, further research can improve understanding of the nexus between work, gender, and climate change in Canadian urban settings.<sup>270</sup>

# HOUSING IN A CHANGING CLIMATE

## Key findings and takeaways:

A core factor of vulnerability to climate change is homelessness and inadequate housing.



### Arctic communities

- There is an ongoing shortage of housing options available in Arctic communities. Permafrost thaw is accelerating degradation of infrastructure in Northern communities. It is also worsening housing conditions and damaging housing structures.
- Nunavut, Yukon, and the Northwest territories have the highest rates of unsheltered homelessness in Canada. Climate change can exacerbate chronic illnesses, physical exposure, and stigmatization among those experiencing homelessness.
- Indigenous women and nonbinary individuals are particularly vulnerable to homelessness, and the majority of Indigenous women who live off the reserve do not receive any financial assistance in the form of subsidies or aid to manage housing costs. Climate change can exacerbate housing challenges experienced by these groups.



### Urban communities

- In Canadian urban centres, there is a notable overrepresentation of Indigenous people among those who experience homelessness.
- In Ontario, not only has homelessness been increasing, but the number of unique individuals experiencing homelessness visiting emergency departments has been also surging, for both men and women. Individuals experiencing homelessness are disproportionately vulnerable and have lower adaptive capacity to cope with climate hazards.

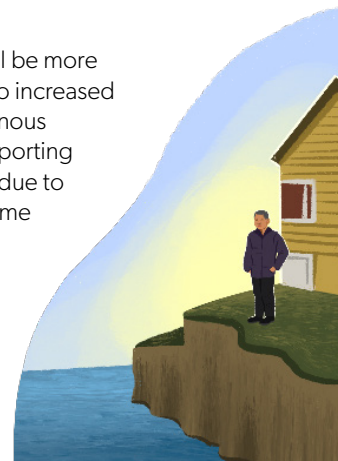
### Rural communities

- High cost of housing is an increasing problem in rural communities in Canada.
- A long trend in reduction of services and investment infrastructure in rural communities increases vulnerability of rural residents to climate hazards.
- There are unique factors specific to Indigenous rural communities that shape the experience of climate-related evacuation, such as difficulties in accessing transportation, fear of losing homes in a context of existing housing shortages, lack of information and media attention, language barriers, high rates of poverty, difficulties in evacuation of large multi-generational family, health concerns, and reduced access to reimbursement and disaster relief programs.



### Coastal communities

- Coastal and inland flooding can lead to failure and even destruction of critical infrastructure systems and houses.
- As sea level rises and erosion increases, the land base of Indigenous communities along the coast decreases, while the reserve system continues to impact their ability to retreat from eroding shorelines.
- Coastal and inland erosion is expected to increase, threatening many existing Indigenous cultural and archaeological sites.
- Buildings near the coast will be more susceptible to mould due to increased precipitation. Some Indigenous communities are already reporting higher incidence of mould due to climatic changes. Low-income and racialized women are also particularly exposed to these risks given their overrepresentation in low paying jobs and precarious housing, which limit their adaptive capacity.





## 4 Housing in a changing climate

A core factor of vulnerability to climate change is **homelessness**, broadly defined as the situation in which an individual or a family lives without safe, stable, or appropriate housing. It can take many forms: living in the streets, in shelters, in places not suitable for human habitation. It can even take the form of living temporarily with family or friends, without prospects of finding permanent housing elsewhere, which is known as **hidden homelessness**.<sup>271</sup>

What was previously known as a social problem affecting mostly single men, homelessness has evolved to affect a wider segment of the population. The rate of homelessness is higher among First Nations people living off reserve and the Inuit. Indigenous women and Indigenous non-binary people are particularly affected by hidden homelessness.<sup>272</sup>



### 4.1 HOUSING IN ARCTIC COMMUNITIES

There is an ongoing shortage of housing options available in Arctic communities.<sup>273</sup> The housing crisis in the Canadian Arctic is a direct outcome of colonial policies, rapid sociocultural changes, uneven regional economic development, and high dependency on the government for housing and income support.<sup>274,275</sup> In the regions of Nunavut and Nunavik, the majority of the housing market is subsidised.<sup>276</sup> However, funding and resources tend to flow to less costly housing models, and there is a chronic lack of funding towards climate resilient housing options.<sup>277</sup>

Indigenous people are substantially more likely to live in homes with mould or mildew, without reliable and safe power supplies, or in houses in need of major repairs. Indigenous people are also more likely to live in overcrowded households.<sup>278</sup> Household overcrowding occurs as a result of lack of affordable housing and limited financial resources available to pay for the cost of living.<sup>279</sup>

Overcrowded housing has particular implications for women. Overcrowding increases domestic chores for which women are more likely to be responsible, given gender norms and expectations. As such, overcrowding is associated with higher levels of psychological distress and increased levels of depression among women than men.<sup>280</sup> Furthermore, household crowding increases the risks of adverse health effects, such as upper respiratory illnesses from bacteria, skin infections, and ear diseases, which in turn increases the risk of preterm birth and infant mortality.<sup>281</sup>

Evidence suggests that overcrowding can be linked to fewer options for leaving domestic violence, substance abuse, and unhealthy relationships.<sup>282</sup> Women are more likely to access public housing dedicated to those who are victims of gender-based violence. However, shelters usually run with limited resources and lack capacity to meet the demand.<sup>283</sup>

### Arctic housing infrastructure is not equipped to face increasing climate hazards

The construction of housing units is not enough to face new challenges with climate change. Many houses within Arctic Indigenous communities also require household repairs.<sup>284</sup> In Indigenous communities, repairs and upgrades in infrastructure are overdue and underfunded.<sup>285</sup> Permafrost thaw is accelerating degradation of infrastructure in Northern communities.<sup>286</sup> And yet, it is estimated that only 10 to 15% of households in Canada are covered by insurance for repairs and re-building post flood damage,<sup>287</sup> and little is known about insurance access and coverage in Arctic communities.

### Climate change has the potential to worsen homelessness in the Arctic

Nunavut, Yukon, and the Northwest territories have the highest rates of unsheltered homelessness in Canada.<sup>288</sup> However, the topics of housing and homelessness in Indigenous communities in Canada are still largely unexplored. Despite the paucity in research investigating the impacts of climate change on populations experiencing homelessness, emerging evidence suggests that climate change can exacerbate chronic illnesses, physical exposure, and stigmatization among those experiencing homelessness.<sup>289</sup>

As climate-induced natural events can worsen or even destroy housing conditions, there is an urgent need to better understand how those experiencing homeless or living in precarious housing are exposed or respond to climatic changes.<sup>290</sup> Given that Indigenous women and nonbinary individuals are particularly vulnerable to homelessness, and that the majority of Indigenous women who live off the reserve do not receive any financial assistance in the form of subsidies or aid to manage housing costs,<sup>291</sup> it is paramount that future research improves understanding on the links between housing, homelessness, and climate change through an intersectional approach.

***Emerging evidence suggests that climate change can exacerbate chronic illnesses, physical exposure, and stigmatization among those experiencing homelessness.***



## 4.2 HOUSING IN RURAL COMMUNITIES

The share of population living in rural areas in Canada decreased from 18.7% in 2016 to 17.8% in 2021, in line with the trend of rural population decline since 1867. Currently, there are approximately 6.6 million people residing in rural communities in Canada. The Atlantic provinces have the highest number of rural residents in Canada, followed by Manitoba and Saskatchewan.<sup>292</sup>

High cost of housing is an increasing problem in rural communities in Canada.<sup>293</sup> In rural areas, the inventory of municipally owned social and affordable housing assets is quite low. It is estimated that only 5,205 total units were available in 2018.<sup>294</sup> Furthermore, only 17.6% of social and affordable housing structures near public transit stations are located in rural municipalities.<sup>295</sup>

### **The most remote rural areas are overrepresented by Indigenous people**

It is estimated that over half of people living in Indigenous communities live in the most remote or more remote areas in Canada. Remote rural communities often face high food prices, restricted access to health care, and other public services.<sup>296</sup>

***Rural residents must travel longer distances for healthcare services, and rely on seasonal and precarious transportation networks. Those responding to emergencies are also vulnerable given the precarity of rural infrastructure.***

### **A long trend in reduction of services and investment infrastructure in rural communities increases the vulnerability of rural residents to climate hazards**

Over the past 50 years, investments on critical infrastructure, such as roads, bridges, water systems, and electricity grids, have not kept up with the pace of population growth.<sup>297</sup> Added to the trend of regionalization and reduction of services in rural communities, rural communities are left particularly vulnerable to the impacts of climate change.<sup>298</sup>

For instance, rural residents must travel longer distances for healthcare services, and rely on seasonal and precarious transportation networks. Those responding to emergencies are also vulnerable given the precarity of rural infrastructure.<sup>299</sup>

### **Previous experiences with mandatory wildfire evacuation have caused negative effects for First Nations rural communities**

Wildfire evacuations negatively affect evacuees. Among the factors that shape evacuation experiences are poverty, health issues, transportation, and ethnicity. Recently, research has also brought increasing attention to the unique experiences of Indigenous Peoples.

A case study on the evacuation experiences of the Whitefish Lake First Nation provides valuable insights. In 2011, a wildfire led to mandatory evacuations. There were unique factors specific to Indigenous rural communities that shaped the experience of evacuation, such as difficulties in accessing transportation, fear of losing homes in a context of existing housing shortages, lack of information and media attention, language barriers, high rates of poverty, difficulties in evacuation of large multi-generational family, health concerns, and reduced access to reimbursement and disaster relief programs. Those who did not speak English or experienced language barriers had difficulties getting assistance. It took longer to return evacuees with health issues, pregnant individuals, and infants back to the communities – a week longer than the general population. Parents and caregivers reported difficulties in childcare during evacuation. Many children developed anxiety about evacuation potentially occurring again.<sup>300</sup>

Generally, the elderly experience difficulties during and after disaster evacuations. For example, the elderly may experience limited mobility, diminished sensory-awareness, and reduced physical strength, which hinder their capacity to prepare and respond to climate disasters. Furthermore, disaster events amplify existing risk factors, such as the risk of illness-related complications. The fact that many evacuation centres are not equipped with appropriate geriatric health services increases the risks of adverse outcomes.<sup>301</sup>

***The elderly may experience limited mobility, diminished sensory-awareness, and reduced physical strength, which hinder their capacity to prepare and respond to climate disasters.***

A case study on the experiences of the Sandy Lake First Nation following the 2011 wildfire evacuations indicates that several factors affect Indigenous Elders' vulnerabilities to climate hazards: The lack of evacuation preparedness (which is common among Indigenous communities), not being accompanied by a family member, lack of culturally-sensitive services in evacuation centres, language barriers and lack of access to traditional foods in host communities, and difficulties to cope with pre-existing

and newly developed health issues during evacuations. These factors reduce the coping capacity of Indigenous elders during the initial states of evacuation and subsequent stay in host communities.<sup>302</sup>

Initial research suggests that volunteers can increase Indigenous community resilience by taking the important role of building disaster preparedness and response capacity that is aligned with Indigenous values and institutions. The case of the Siksika Nation is illustrative. Siksika Nation volunteers communicate with affected communities and speak the same language (Blackfoot) for 'ispommitaa' (help out). This enables a trusted relationship between the service providers, volunteers, and community members. However, volunteering can lead to burnout and elevated stress among volunteers during evacuations.<sup>303</sup>

There is little understanding of how gender intersects with Indigeneity and rurality to produce or alleviate vulnerabilities during and after climate hazards.



### 4.3 HOUSING IN COASTAL COMMUNITIES

The Atlantic coastline is vulnerable to flooding due to sea-level rise, though the risks vary across the region. Sea-level rise is projected to be above the global median in many areas of Nova Scotia, New Brunswick, and Prince Edward Island, whereas in Labrador, sea level is projected to rise only slightly by the end of the mid-century. Snowmelt and intense precipitation can also cause rivers in the overland to flood. Furthermore, areas like the coastline of the Northumberland Strait in New Brunswick, and Prince Edward Island, are particularly prone to coastal erosion due to the highly erodible sandstone bedrock. Increase in storm activities will only increase erosion in these areas.<sup>304</sup>

Coastal and inland flooding can lead to failure and even destruction of critical infrastructure systems and houses.<sup>305,306</sup> Many communities in low-lying coastal areas will be disproportionately impacted by climate-induced floods and erosion.<sup>307</sup>

#### **Climate-induced infrastructure failure can be fatal, but we know little about intersectional vulnerabilities**

Severe winter storms can lead to loss of electricity, impacting access to water and heat. Evidence from the ice storm in New Brunswick in January 2017 reveals that long term electricity disruptions pose health and safety risks, particularly to the most vulnerable communities. It is estimated that more than a third of customers lost access to electricity for more than 10 days. Some tried to heat their homes with alternative methods, but without generators with proper ventilation, two people died and 49 others became ill from carbon monoxide poisoning.<sup>308</sup> Little is known about the demographic characteristics of those impacted.

#### **The legacy of colonial policies increases climate vulnerability in coastal Indigenous communities**

The reserve system imposed by the Crown on First Nations in the early 1800s reduced the freedom of Indigenous Peoples to move with the changing environment. Entire communities were confined to a land base. As sea level rises and erosion increases, the land base of Indigenous communities decreases, while the reserve system continues to impact their ability to retreat from eroding shorelines.<sup>309</sup>

***As sea level rises and erosion increases, the land base of Indigenous communities decreases, while the reserve system continues to impact their ability to retreat from eroding shorelines.***

#### **Climate-induced erosion threatens Indigenous cultural infrastructure**

Coastal erosion is an ongoing threat to Indigenous infrastructure. More than losing important cultural artefacts, the loss of archaeological sites has political implications for title, land, water, and resource claims. Coastal and inland erosion is expected to increase, threatening many existing cultural and archaeological sites.<sup>310</sup>

#### **Changes in precipitation patterns increase the risk of mould**

Buildings near the coast will be more susceptible to mould due to increased precipitation. In the Gitga'at First Nation communities, climate-induced precipitation and temperature changes are already increasing mould in households. Precipitation changes are also leading wooden boardwalks to rot at a faster rate and causing floods at seaweed gathering camps.<sup>311</sup>

Similar trends are found in the West coast. In communities across British Columbia, changing precipitation patterns and storminess increase the risk of mould or dampness. Low-income and racialized women are particularly exposed to these risks given their overrepresentation in low paying jobs and precarious housing, which limit their adaptive capacity.<sup>312</sup>



## 4.4 HOUSING IN URBAN SETTINGS

In 2021, it is estimated that nearly 74% of residents in Canada live in large centres of 100,000 people or more, in what is usually called census metropolitan areas.<sup>313</sup> In major urban areas around Toronto, Peel, and York, there is a lack of housing supply to meet demand causing many to move to the outskirts of these cities. There is an urgent need for family-friendly and climate-friendly housing in cities to respond to the increase in population in Ontario.<sup>314</sup>

***As climate-induced storms, floods, and wildfires increasingly threaten infrastructure, insurance premiums are also increasing. These trends can make insurance for households located in flood prone areas prohibitively expensive or unavailable.***

### **Rising insurance costs may become prohibitive, particularly for single parent led households**

Private insurance and governmental disaster assistance programs have been covering much of the damage caused by natural disasters. However, as climate-induced storms, floods, and wildfires increasingly threaten infrastructure, insurance premiums are also increasing. These trends can make insurance for households located in flood prone areas prohibitively expensive or unavailable.<sup>315</sup> The implications for lone-parent families, elders, and people living alone, groups who are overrepresented into low-income levels,<sup>316</sup> are yet to be fully understood in urban settings.

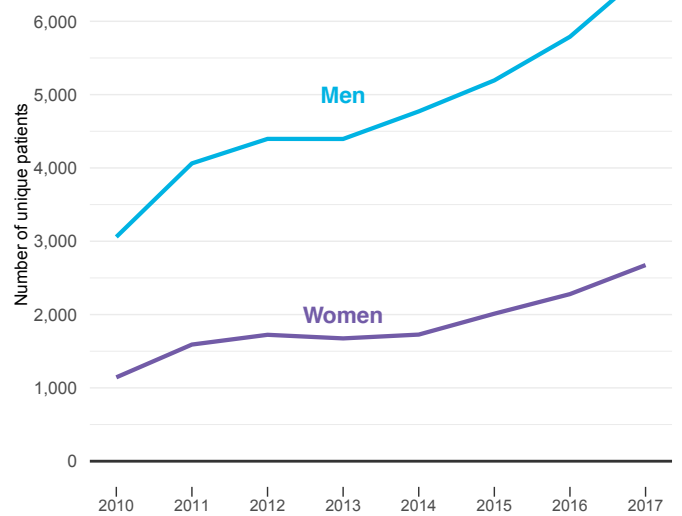
### **Climate change may devalue properties in flood and wildfire prone areas**

Growing evidence from the United States indicates an emerging trend of permanent devaluation of property values in high-risk areas. Wildfire zones are likely to experience property devaluation, having differential impacts on communities and individuals. It is likely that with housing devaluation, outmigration may be dampened.<sup>317</sup> The loss of housing stock can have a ripple effect on the housing market, which may impact low-income tenants disproportionately.<sup>318</sup>

In Canada, little is known about the risks and implications of climate-induced property devaluation, especially through a gender and intersectional lens.

**Figure 5: Increasing number of patients in emergency departments experiencing homelessness**

Ontario, 2010-2017



Data source: National Ambulatory Care Reporting System for Ontario from 2010 to 2017. Statistics Canada.

### **Homelessness contributes to climate vulnerability among Indigenous people**

In Canadian urban centres, there is a notable overrepresentation of Indigenous people among those who experience homelessness. Some estimates indicate that the prevalence of Indigenous people among the population experiencing homelessness is at least five times higher than the general population.<sup>319</sup>

A number of factors drive vulnerability to homelessness among Indigenous people. A long history of colonisation led to land dispossession, disempowerment, and **cultural genocide** of Indigenous Peoples in Canada.<sup>320</sup> The legacies of colonialism have lasting effects, such as barriers to access formal quality education, reduced access to employment opportunities and decent work, poorer health outcomes, and heightened sense of cultural isolation in urban areas. These are all contributing factors to homelessness among Indigenous populations.<sup>321</sup>

In Ontario, not only has homelessness been increasing, but the number of unique individuals experiencing homelessness visiting emergency departments has been also surging, for both men and women (Figure 5).<sup>322</sup> Future studies are necessary to unpack the nexus between homelessness, use of emergency services, and climate change through an intersectional lens.



# MIGRATION AND DISPLACEMENT IN A CHANGING CLIMATE

## Key findings and takeaways:

Across the world and in Canada, extreme weather events are contributing to involuntary displacement and increasing migration.



### Arctic communities

- Migratory movements are a crucial element of Inuit culture, playing a role in hunting and nomadic living to attain livelihood resources. However, climate change threatens Indigenous mobility.
- Evidence from Alaska indicates an increase in relocation as an adaptive response to increasing flooding and erosion.
- Climate change can exacerbate trends of women out-migration from Arctic communities.



### Urban communities

- There is little evidence on how urban residents in Canada cope with climate-induced displacement, much less through an intersectional perspective.

### Rural communities



- As droughts, floods, and extreme weather become more frequent and intense, the rates of rural migration increase. This is partly due to the fact that rural livelihoods are highly dependent on agriculture and other natural resource-based sectors, which tend to be more directly impacted by extreme weather events than service sectors or manufacturing.
- Research suggests that outmigration can erode social networks within communities. This has negative effects on women's lives who are dependent on these networks.

### Coastal communities

- As climate change impacts both marine and terrestrial systems on which rural-coastal communities heavily rely, out-migration has become an adaptive measure. However, little is known about the gendered and intersectional implications and dimensions associated with climate-induced relocation and displacement in Canadian coastal communities.

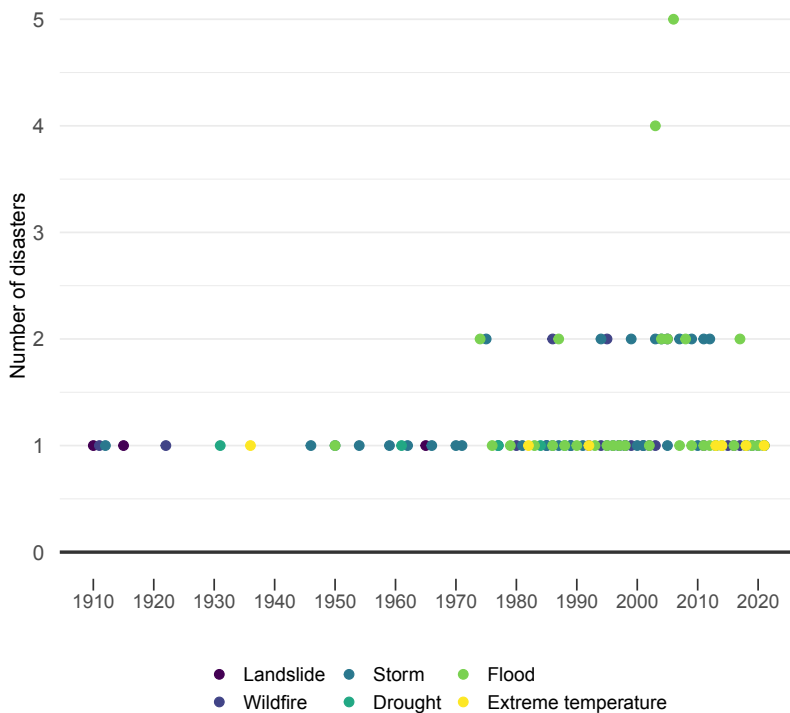


## 5 Migration and displacement in a changing climate

The number of natural disasters has increased over the years in Canada (Figure 6). Across the world, extreme weather events are contributing to involuntary displacement.<sup>323</sup>

In Canada, natural disasters led to the displacement of thousands of individuals over the past decade (Table 2). The extent to which climate-induced disasters contribute to humanitarian crises depends on how climate hazards interact with high vulnerability.

Figure 6: Natural disasters have become more frequent in Canada



Data source: EM-DAT, CRED/ UCLouvain, Brussels, Belgium [www.emdat.be](http://www.emdat.be)

Table 2: Disaster-induced displacement in Canada

Number of people displaced by natural disasters, 2008-2020

| Year         | Flood          | Wildfire       | Storm        | Extreme temperatures |
|--------------|----------------|----------------|--------------|----------------------|
| 2008         | 2,200          | –              | –            | –                    |
| 2013         | 120,000        | 200            | –            | –                    |
| 2014         | 3,000          | 3,000          | 300          | –                    |
| 2015         | –              | 13,300         | –            | –                    |
| 2016         | 688            | 91,428         | 200          | –                    |
| 2017         | 7,267          | 77,563         | –            | –                    |
| 2018         | 11,852         | 4,291          | 2,509        | 100                  |
| 2019         | 15,498         | 18,485         | 1,303        | 6,000                |
| 2020         | 18,635         | 5,993          | 118          | 500                  |
| <b>Total</b> | <b>179,140</b> | <b>214,260</b> | <b>4,430</b> | <b>6,600</b>         |

Data source: Internal Displacement Monitoring Centre (IDMC)



## 5.1 CLIMATE-INDUCED DISPLACEMENT AND MIGRATION IN ARCTIC COMMUNITIES

As sea ice declines due to rising temperatures, it is projected that the Canadian Arctic will experience a drastic loss in physical territory by 2030, increasing the risk of involuntary migration amongst Arctic communities.<sup>324</sup>

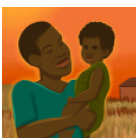
Migratory movements are a crucial element of Inuit culture, playing a role in hunting and nomadic living to attain livelihood resources.<sup>325</sup> However, climate change threatens Indigenous mobility.<sup>326</sup>

Melting of Arctic sea ice, glaciers, and ice caps, rising sea levels, and thawing permafrost exposes communities to flooding and erosion. Evidence from Alaska indicates an increase in relocation as an adaptive response.<sup>327</sup> However, little is known about the gendered implications of climate-induced involuntary displacement and voluntary relocation as adaptive capacity.

### Climate change can exacerbate already gendered out-migration trends

Inuit communities have been experiencing a phenomenon coined the **female flight**, in which more women are relocating away from their Arctic communities. Most of these women leave in hope of better access to economic opportunities. Out-migration has become a viable option in the pursuit of wage labour opportunities.<sup>328</sup>

In Nunavut, research indicates that women with higher levels of formal education are particularly prone to relocate.<sup>329</sup> Further research can illuminate the nexus between climate change, female flight, and **brain drain** – both in terms of formal skills and Traditional Knowledge – in Arctic communities.



## 5.2 CLIMATE-INDUCED DISPLACEMENT AND MIGRATION IN RURAL COMMUNITIES

Rural communities are not monolithic. Rural population growth and decline vary substantially across provinces, much of it driven by diverse patterns of intra- and interprovincial migration. In the past five years, Nunavut (10.3%), Prince Edward Island (6.2%) and Yukon (3.4%) experienced the largest increase in rural population in Canada, whereas Newfoundland and Labrador (-6.4%) and the Northwest Territories (-4.9%) experienced the largest declines (Figure 7).

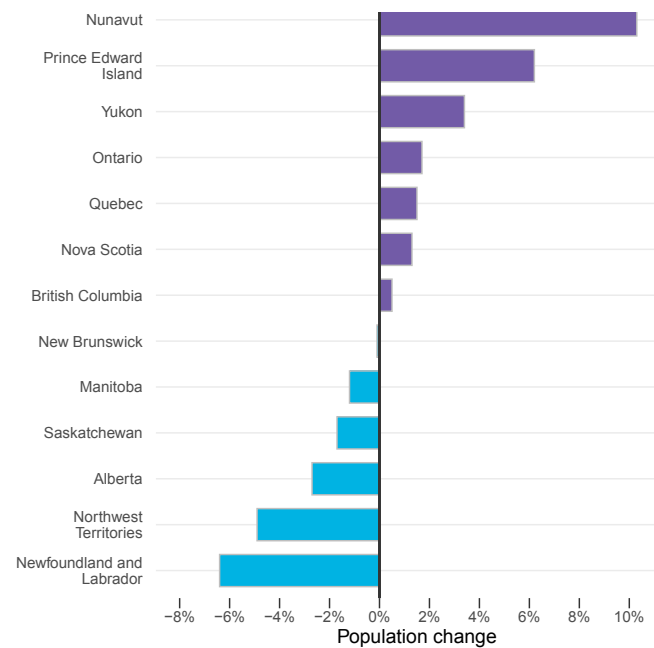
Rural migration to urban cities is not a recent phenomenon. In some regions like rural eastern Ontario, this trend is particularly evident among rural youth looking for employment opportunities

in urban areas.<sup>330</sup> It has been well documented that Indigenous youth leave Indigenous reserves at increasing rates to seek employment and continue education in urban centres, leading to a brain drain among reserve communities.<sup>331</sup>

As droughts, floods, and extreme weather become more frequent and intense, the rates of rural migration increase. This is partly due to the fact that rural livelihoods are highly dependent on agriculture and other natural resource-based sectors, which tend to be more directly impacted by extreme weather events than service sectors or manufacturing.<sup>332</sup>

Figure 7: Rural population change varies significantly by region

2016-2021



Data source: Statistics Canada, Census of Population, 2021

### Out-migration erodes local social networks, impacting mental health

Research suggests that out-migration can erode social networks within communities. This has negative effects on women’s lives who are dependent on these networks.<sup>333</sup> Social networks are a crucial aspect for rural families; they provide support and reduce feelings of loneliness or isolation.<sup>334</sup> Following the Fort McMurray fires, evacuee adults who had witnessed their homes destroyed reported higher levels of generalised anxiety disorder.<sup>335</sup>

However, little is known about how climate-induced migration and disaster-induced displacement impact social networks and the gendered implications of such impacts.

## Extreme weather-induced displacement take a toll on mental health

Individuals and families who experienced displacement to a shelter, property loss, and returning to a damaged home (and all associated tasks such as cleaning, restoration, and even rebuilding) report a toll on mental health, both during and after climate hazards. Anxiety also increases at the prospect of re-flooding in the future.<sup>336</sup>

***Individuals and families who experienced displacement to a shelter, property loss, and returning to a damaged home (and all associated tasks such as cleaning, restoration, and even rebuilding) report a toll on mental health, both during and after climate hazards.***

## Little is known about the intersectional patterns of climate-induced displacement

Evidence from the United States indicates that counties experiencing wildfires have also recorded an increase in out-migration and a decrease in in-migration. Factors like employment status and home ownership have varying effects on migration patterns. However, the majority of people tend to relocate to nearby places.<sup>337</sup> In the case of the Colorado Fourmile Canyon fire, many of those who evacuated chose nearby locations to retain existing social bonds.<sup>338</sup>

Ability to prepare, evacuate, and rebound is unevenly distributed across and within communities. The 2017 wildfire season in British Columbia saw evacuation of 65,000 individuals, many of whom continued to face displacement many years after, with little government protection. In some affected communities, such as the Ashcroft Indian Band, band leaders were central actors that facilitated evacuation of community members, given that the provincial government failed to help or provide instruction.<sup>339</sup>

There is little research on climate-change induced displacement, and future research can unpack the intersectional and gendered implications of these sorts of movements of people in rural areas.



## 5.3 CLIMATE-INDUCED DISPLACEMENT AND MIGRATION IN COASTAL COMMUNITIES

Newfoundland and Labrador experienced the largest rural population decline in Canada from 2016 to 2021, approximately 6.4% decline (see Figure 7). As climate change impacts both marine and terrestrial systems on which rural-coastal communities heavily rely on, out-migration patterns can intensify.

### Gender norms and expectations play a role on migratory patterns and decisions

A study on the out-migration patterns in a rural-coastal community in Nova Scotia indicates that women tend to leave at higher rates than men. There are few economic opportunities for women in communities heavily reliant on fisheries for employment and income. However, women have a greater propensity to relocate to areas in the proximity, even when they have achieved higher levels of education and earn on average less than half what men earn. Men who relocate to proximate areas are more likely to have lower levels of education than women. Gender norms and expectations, particularly in the form of considerations about family and social networks, partly explain these gendered differences in out-migration.<sup>340</sup>

Given the evidence that patterns of migration and relocation from coastal communities are gendered, and that climate change will have profound impact on coastal communities reliant on fisheries and other natural resources which further destabilises local economic opportunities, it is fundamental to improve understanding of how climate change affects migratory patterns through an intersectional lens.

### Communities with self-organized local institutions have greater adaptive capacity

Communities with strong self-organized institutions that can set and reinforce local rules usually have been associated with more sustainable management of natural resources. The presence of strong formal and informal local institutions structure risk mitigation at the community and household levels. Indeed, communities with strong local institutions appear to better adapt to climatic changes without substantial loss of well-being or an increase in out-migration, particularly because they nurture trust, reciprocity, norms, and connectedness, which help address adaptation challenges.<sup>341</sup>

Further research can examine the gendered roles and expectations involved in the operations of self-organized formal and informal local institutions, and highlight how men, women, and gender non-conforming individuals contribute to local climate resilience, as well as the gendered implications of these systems and structures.





## 5.4 CLIMATE-INDUCED DISPLACEMENT AND MIGRATION IN URBAN COMMUNITIES

### **Little is known about social patterns of climate-induced natural disaster displacement**

Climate induced displacement typically occurs for a short period of time, and usually within national borders.<sup>342</sup> Research on displacement patterns resulting from floods or wildfires in Canada is scarce. However, evidence from British Columbia suggests that government assistance is a crucial resource to facilitate accommodation during displacement.<sup>343</sup>

Research on migration patterns of those affected by the floods associated with Hurricane Katrina provides valuable insights into climate induced migration. For instance, some stayed in the city of Baton Rouge in Louisiana to temporarily reside in a disaster shelter. Other families flew to California or New York for temporary means. Those who stayed in New Orleans sought shelter either in the New Orleans Superdome or the Convention Centre. However, in both these locations there was a limited supply of food and clean water, there was poor sanitation, and the arena lacked air conditioning to fight off humidity and high temperatures. Nearly 273,000 were housed in temporary evacuation shelters and either returned to their homes in New Orleans or migrated to Louisiana. About 14,000 never returned to New Orleans after the hurricane.<sup>344</sup>

### **Elders are more likely to relocate permanently after climatic hazards**

Emerging evidence suggests that elders are more likely to relocate after disasters due to a lack of resources to rebuild.<sup>345</sup> Factors that may contribute to movement include gender, age, and income status; however, there is no substantial evidence to support clear arguments applicable to the Canadian context.

Wildfires in California have resulted in widespread damages and displacement. Southern California wildfires from 2003 onwards destroyed hundreds of thousands of acres of land and thousands of houses, and contributed to the displacement of thousands of individuals, including some deaths. Displacement patterns tend to fall in three categories: 1) temporary displacement until residents can return to homes that are suitable for habitation or undamaged; 2) longer-term displacement due to a need to wait for repair or rebuilding efforts; and 3) forced displacement due to an inability or unwillingness to rebuild in wildfire areas as well as a desire to move to less vulnerable areas.

Intersectional impacts of wildfires in urban areas requires further investigation to better understand whether there are uneven impacts or underlying factors shaping migratory and displacement patterns.



# KEY TAKEAWAYS AND AVENUES FOR FUTURE WORK

*The understanding of the nexus between gender, intersectionality and climate change in Canada has come a long way in the past decade. Research increasingly considers intersectional experiences of vulnerability to climate change. Though the literature is still growing, there are important takeaways from the evidence synthesised in this report:*

## **Climate change is a threat multiplier, an exacerbating factor for many issues already happening in Canada**

Extreme weather events threaten physical and mental health, and access to food and water. Climatic events can also disrupt or destroy critical infrastructure and housing, which has **cascading effects** on transportation, communications, health care, community services, and accommodation.<sup>346</sup> Indirectly, climate change can reduce access to economic opportunities, disturb family relations, increase risk factors for gender-based violence, and so on. Direct and indirect impacts can compound, exacerbating risks such as homelessness, joblessness, gender-based violence, involuntary displacement, exposure to harmful environmental substances, and food insecurity, among others. These risks are felt differently, and those who are already facing many of these issues in Canada are disproportionately exposed and sensitive to the threats of climate change.

## **Current evidence on how some highly vulnerable groups experience and cope with climate change is superficial**

There has been increasing attention to how gender intersects with Indigeneity, rurality, socioeconomic status and other identity factors, shaping how people experience and respond to climatic changes in Canada. However, there are a few identity factors that have not received due attention, such as disability and LGBTQIA2S+ identities.

This absence is worrisome given that those with disabilities and those who identify as non-binary may experience inequities that situate them as particularly vulnerable to climate impacts. Available evidence suggests that individuals with disabilities are sensitive to extreme weather, and have less adaptive capacity given higher rates of poverty. Vulnerability for Two-Spirit people to climate impacts may also be elevated, given research suggesting they face higher risks of homelessness. Nonetheless, current knowledge about climate impacts on these at-risk groups is, at best, superficial.

The following are recommendations for future work to fill this gap:

- Raise qualitative evidence on how at-risk communities and groups highly sensitive or exposed to climate change experience and cope during and after climate events;
- Design frameworks to track vulnerabilities that account for intersectional experiences of groups facing high risks;
- Track changes on physical and mental health, food insecurity, work disruptions, housing supply and quality impacts, and climate-induced displacement by improving collection and access to disaggregated data on gender, race, Indigeneity, income, and other identity factors.

## **Research on the social implications of climate change is concentrated in the North, given that Arctic communities face disproportionate risks due to climate change**

Existing literature appears to have reached a consensus that Indigenous communities and livelihoods in the Arctic face disproportionate risks due to climate change given their cultural traditions and relationship with local ecosystems. However, the evidence on gendered and intersectional impacts of climate change on livelihoods tends to be concentrated around health and food security dimensions, though many questions remain unanswered around the nexus between gender, Indigeneity, climate change, health, and food systems. What is much less understood are the implications for work, housing, and climate-induced migration and displacement.

The following are recommendations for future work:

- Investigate how gendered differences in employment, marital status, and cultural practices and activities shape exposure to climate change impacts that can adversely affect different dimensions of livelihoods;
- Explore the links between how gender and other identity factors heighten sensitivity to climate change related health risks and outcomes;
- Explore how groups with diverse intersecting identities cope and adapt to climate change in the Arctic.

## **Gendered impacts of climate change in non-Arctic rural, coastal, and urban communities are severely understudied**

Communities outside of the Arctic are also experiencing the impacts of climate change. Nonetheless, research on the impacts of climate change on livelihoods in rural, coastal, and urban communities outside of the Arctic is so sparse that we have little understanding of how diverse groups experience and cope with a changing climate in these settings. There is emerging evidence that climate change might exacerbate environmental injustices, given that low-income, racialized groups may be disproportionately exposed to climate hazards, but further studies are necessary to unpack gendered patterns.

The following are recommendations for future work:

- Systematically explore how women, the elderly, lone-parent households, people with disabilities, visible minorities, Indigenous people, and low-income individuals are exposed to diverse climate hazards in different contexts;
- Explore how different social groups experience and cope with climate risks;
- Explore the gendered impacts of climate-induced migration or displacement within coastal and rural communities across Canada.

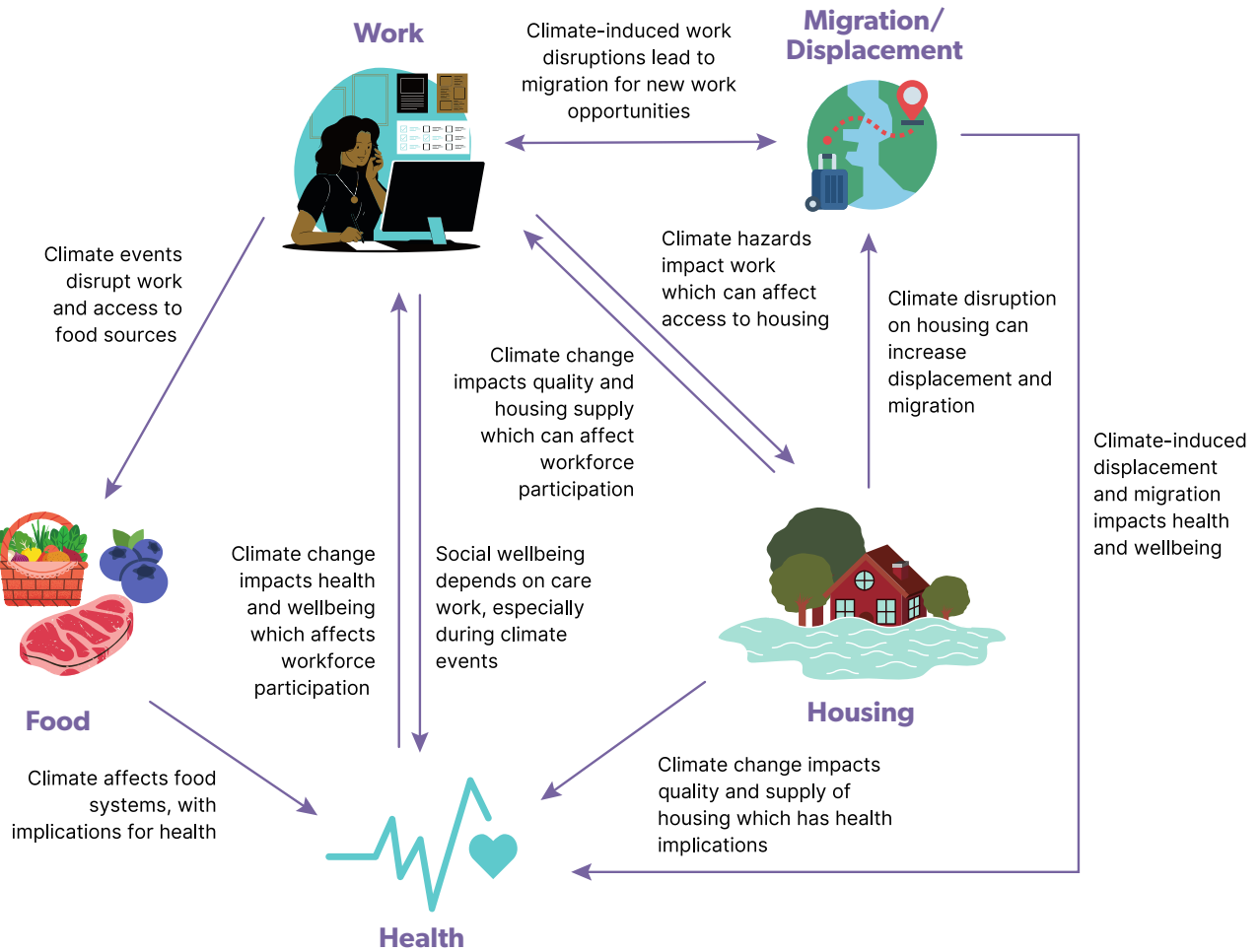
## **Climate-induced disaster research in Canada rarely addresses intersectional vulnerabilities**

Climate-induced natural disasters are becoming more frequent and severe in Canada. Data gathered on the impacts of extreme weather and disasters – such as evacuations, property damage, job loss and other economic impacts, as well as injuries and fatalities – are rarely gender-disaggregated or easily available.

The following are recommendations for future work:

- Explore how men, women, and gender diverse groups perceive and experience disasters in northern, rural, coastal, and urban settings;
- Identify patterns of disaster responses, evacuation, and adaptation across gender lines and other intersecting identities such as a Indigeneity, race, class and sexual orientation;
- Examine the short and long-term consequences of disasters to different groups living in different settings in Canada;
- Explore patterns of gender-based violence in areas experiencing climate-induced ecological stress and involuntary displacement.

**Figure 8: Climate impacts on different dimensions of livelihoods can have cascading effects**



**It is time to combine intersectional thinking with a systems thinking approach to better understand climate impacts**

Climate impacts on livelihoods and communities are complex and multidimensional. Factors that drive vulnerability to climate change can interact and compound, producing situations in which vulnerability is exacerbated. The impacts of climate change on a particular dimension of livelihoods may cause chain reactions into other dimensions. For example, climate change may exacerbate the housing crisis, which can affect health and the ability to participate in the workforce. Another example is how natural disasters, such as floods, can induce displacement, impacting the health and wellbeing of individuals.

The cascading effects of climate change on livelihoods have led researchers to increasingly make the case for **systems thinking** about climate change.<sup>347</sup> It means that the impacts of a changing climate on any of the dimensions explored in this report – health, food security, work, housing, and displacement and migration – can have feedback loops and spill over effects that impact other dimensions (Figure 8).

Without a more integrated approach to understanding how different identity factors and dimensions of livelihood interact, there is a risk of capturing an incomplete picture of the impacts of climate change. These sort of chain reactions require further examination, precisely to identify patterns and trends that take place in different regional contexts. Combining intersectional perspectives with systems thinking approaches would allow us to trace the deep gendered and intersectional implications of climate change. Policy decisions that don't account for these complexities may have unintended direct or indirect effects on already-vulnerable groups. The following are recommendations for future work to strengthen this knowledge base:

- Raise and conduct new qualitative research studies to better inform and target quantitative assessments of climate risk, to further uncover and deepen understanding of the linkages between different livelihood dimensions and climate change;
- Create frameworks and data collection methods that better capture the dynamic nature of relationships between livelihood dimensions;
- Uncover the relationship between climate-induced system-wide disturbances on livelihoods and gender-based violence.



# APPENDIX A: GLOSSARY OF TERMS

**Adaptive capacity:** The ability of a community, institution, system, social group, or individual to adapt to changes. This ability is influenced by a number of factors, such as income, education level, social connection and cooperative networks, strong community leadership, natural capital, community social norms, person-place bonds or place identities.

**Brain drain:** The migration of educated or professional people from one country or economic sector to another. Some migration factors include better pay or living conditions.

**Cascading effects/impacts:** This term describes the spill over or chain reactions associated with particular events or occurrences.

**Census agglomeration:** Statistics Canada defines a census agglomeration as an area that has a core population of at least 10,000.<sup>348</sup>

**Census metropolitan areas:** Statistics Canada defines a census metropolitan area (CMA) as an area that has a total population of at least 100,000 of which 50,000 or more live in the core.<sup>349</sup>

**Climate change:** According to the IPCC, “climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.”<sup>350</sup>

**Climate anxiety:** This term refers to feelings of anxiety, or anxiety inducing mental health illnesses as a result of the effects associated with climate change.<sup>351</sup>

**Climate hazards:** A physical process or event that puts individuals’ health, livelihoods or natural resources in harm’s way.<sup>352</sup>

**Climate-induced displacement:** This term refers to migratory or displacement movements of peoples as a result of climate change or climate events.<sup>353</sup>

**Cultural genocide:** This term broadly refers to targeted efforts destabilize the spiritual heritage, cultural practices, traditions and identity, and the overall way of life of a particular group of people.

**Ecological grief:** A deep sense of loss from witnessing, experiencing or learning about environmental destruction and biodiversity loss.

**Environmental racism:** This term broadly refers to the disproportionate exposure to environmental hazards that Black communities and other racialized groups experience.

**Exposure:** Risks and impacts of climate change that are currently felt or expected to be felt in future climate variations.

**Female flight:** Term to describe the phenomenon in which women leave their place of residence at disproportionately high rates in comparison to their male counterparts.<sup>354</sup>

**Feminization of poverty:** This refers to a set of structural, economic and social processes and dynamics that cause or exacerbate the overrepresentation of women and girls among the poor.

**Food deserts:** Areas with little to no access to sustainable and consistent food sources such as groceries or farms.<sup>355</sup>

**Food insecurity:** Situation when food access is disrupted because of financial constraints or other factors.

**Food safety:** A situation in which people have access to food that is non contaminated with pathogens or chemical contaminants that are harmful to human health.

**Food security:** A situation in which people have ongoing access to safe and nourishing food at a level that is sufficient to meet their dietary needs for physical growth and development, and a healthy life.

**Food systems:** The set of commercial and non-commercial interconnected activities related to food production, processing, distribution, preparation and consumption.

**Food web:** The natural feeding relationship between species, from preys to predators, in an ecological community.

**Gender:** Gender refers to the cultural and social norms and expectations, roles and behaviours that societies assign to particular biological sex. These norms, expectations, roles, and behaviours change over time and across societies.

**Gender-based violence:** Gender-based violence refers to any form of violence that is inflicted upon others because of their gender, gender expression, gender identity or perceived gender.<sup>356</sup>

**Heat dome:** A “heat dome is created when an area of high pressure stays over the same area for days or even weeks, trapping very warm air underneath.”<sup>357</sup>

**Hidden homelessness:** A situation in which an individual or a family lives without safe, stable or appropriate housing.

**Homelessness:** A situation in which an individual or a family lives temporarily with family or friends, without prospects of finding permanent housing elsewhere.



**Identity factors:** An attribute or characteristic of identity ascribed to or held by an individual, such as gender, age, ethnicity, race, Indigeneity, sexual orientation, physical attributes, marital status, citizenship status, political affiliation, religious belief, occupation, income levels, and so on.

**Intersectionality:** Intersectionality is both a theory and an analytical concept that refers to the multiple and combined identities a person holds, which ultimately shape their experiences and life chances. Intersectionality offers a powerful frame to investigate the challenges and barriers people face, and how climate change impacts people differently, depending on their combined identities.

**Intersex:** This term refers to a person who presents a combination of male and female chromosomes or genitals.

**Intimate partner violence:** Intimate partner violence (IPV) is a prevalent form of gender-based violence also known as spousal or domestic violence. It impacts people of all genders, ages, economic, racial, educational, ethnic, religious and cultural backgrounds.<sup>358</sup>

**Land-based economy:** This term broadly refers to a locally specific economy heavily reliant on natural resources. In the case of Inuit land-based economy, it includes activities such as hunting, fishing, trapping, and gathering plants. It can also include clothing and footwear making, and handicraft and artwork.

**LGBTQIA2S+:** This acronym is used to refer to sexual orientations and gender identities that are outside the scope of heterosexual or cisgender orientations/identities. The acronym stands for Lesbian, Gay, Bisexual, Transgender, Queer or Questioning, Intersex and Asexuality, and Two-Spirit people. The plus sign indicates other non-heterosexual or cisgender identities.

**Non-binary people:** This term refers to individuals who don't identify as male nor female. The term is broadly used as an umbrella concept to refer to gender identities that fall outside the male/female binary.

**Occupational segregation:** This term refers to the distribution of workers, either by gender, race, or other attribute, within occupations. Canada has a marked and stable gender-specific labour market segregation in which new hires continue to work in typical male or female jobs.

**Precarity:** State of uncertainty and insecurity.

**Precarization of work:** This refers to the increase of non-standard or temporary employment usually characterised by low-wages, insecure, and unprotected from employment insurance and other benefits.

**Resilience:** Capacity of a community or a group to prepare for disruptions, recover from foreseen or unforeseen shocks, and adapt to or manage a disruptive experience.

**Risk:** The potential for adverse consequences of events or processes for humans or the environment.

**Rural communities:** A community is rural if it is located in areas outside of the census metropolitan areas and census agglomeration areas.

**Second shift:** Refers to the household duties, and care responsibilities that gender norms assign for women to complete following the paid workday.

**Sensitivity:** In the climate context, it refers to the degree a community or a social group experiences the impacts of climate change. A number of factors drive susceptibility to exposure, including, but not limited to, livelihood conditions, household composition, gender roles and expectations.

**Sex:** While gender refers to societal roles and behaviours associated with being male or female, sex refers to biological and anatomical characteristics of male, female or intersex persons.

**Social determinants of health:** This concept refers to the social or cultural conditions and circumstances that shape health outcomes. According to the World Health Organization, "they are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies and political systems."<sup>359</sup>

**Stressful life event:** According to Statistics Canada, a stressful life event refers to an event that can have adverse effects on a person and their family. This can include unemployment, the end of a marriage, an incapacitating injury, and so on.

**Systems thinking:** Holistic way to think about the various intertwining factors that contribute to and influence climate change outcomes. This approach highlights how these factors may have spill over effects and lead to chain reactions that impact other dimensions of livelihoods.<sup>360</sup>

**Traditional Ecological Knowledge:** Broadly defined as the set of knowledge, practices, and beliefs about the natural world and its relationship with a community that has been accumulated since time immemorial and that is passed down through generations by cultural practices and Oral Teachings.

**Two-Spirit people:** Refers to an individual who identifies as occupying both the masculine and feminine spirit. It may also be used by Indigenous people when describing their sexual, gender or spiritual identity.

**Urban heat islands:** It is an effect associated with heat waves in large cities that work to trap heat faster than natural ecosystems or rural areas with trees and vegetation to produce shade and moisture.<sup>361</sup>

**Vulnerability:** In the context of climate change, vulnerability broadly refers to the propensity or susceptibility to experience adverse effects of climatic changes or climate hazards. Vulnerability is a function of exposure, sensitivity and adaptive capacity.

**Wage gap:** The earnings differential between two groups of people. It is usually calculated by finding the ratio of the two groups' annual median earnings followed by taking the difference.

**Water security:** The term refers to sustainable and constant access to safe sources of potable water with acceptable quality and quantity to provide human and ecosystem health.

**Zoonotic diseases:** Zoonotic diseases refers to infection diseases that are transmitted between species, such as from animals to humans.

# APPENDIX B: METHODS

## Literature review

The literature review sought to identify research evidence on the gendered impacts of climate change in Canada, particularly through an intersectional lens. To be included in the review, studies should have addressed any of the following domains:

- Health
- Work
- Housing
- Food security
- Migration

The following are some additional inclusion criteria:

- The study had to relate to Canada (studies pertaining to other Global North high-income economies were considered merely to “fill the gaps”);
- Selection prioritized primary research studies, systematic reviews, and/or other peer-reviewed literature.

## Databases

There were two primary databases used for this report:

1. Web of Science
2. Scopus

## Search terms

Table 3 presents the search string used to gather literature:

**Table 3: Search string used to identify potential literature/studies**

| Boolean operator | Search string   |
|------------------|---|
|                  | “Climate change” OR “global warming” OR “extreme weather” OR disaster* OR heat OR flood* OR drought   |
| AND              | Gender OR Sex OR women OR girls OR female OR men OR boys OR Male  |
| AND              | Canada OR “British Columbia” OR Alberta OR Saskatchewan OR Manitoba OR Ontario OR Quebec OR “Prince Edward Island” OR Newfoundland OR Labrador OR New Brunswick OR “Nova Scotia” OR Yukon OR “Northwest Territories” OR Nunavut |
| AND              | Health OR pathogens OR disease OR Work OR employment OR jobs OR housing OR homelessness OR “food insecurity” OR “food systems” OR migration OR “climate migrants” OR “displacement” OR “climate-displacement”                   |

## Time frame

The focus was placed on bibliographic sources published between 2010-2022. The rationale behind this decision was to collect the most up-to-date research evidence.

## Source selection

The selection of sources was based on the inclusion criteria. It is standard practice to decide on the selection of a source by examining the title and the abstract of the work. If the material proved unfit during the coding process, it was excluded from the database.

While the initial research protocol was focused on gathering research evidence from peer-reviewed articles through the databases identified above, some of the themes investigated required broader scoping efforts. We expanded our search to Google Scholar database and grey literature from specialized authoritative sources, such as the Intergovernmental Panel on Climate Change. Furthermore, we conducted snowballing techniques on the reference lists of reviewed literature to identify other valuable material to include in this report.

Only material in English was collected and analysed.

All bibliography was managed using the citations management software [Zotero](#).

## Analysis

Researchers used [NVivo 12](#), a qualitative analysis software, to code the material and test for inter-rater reliability, which refers to “the extent to which two or more raters (or observers, coders, examiners) agree.”<sup>362</sup> In the case of this study, inter-rater reliability was evaluated through percentage agreement.

## Statistical data

Statistical data used in this report was gathered from secondary sources, such as official statistics from Statistics Canada and data provided by other authoritative sources.

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