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Disaster and disparity: The uneven toll of floods and climate hazards in Canada

Selected insights

Prepared by

PARTNERS FOR ACTION

Prepared for

co-operators

PARTNERS FOR ACTION

About Partners for Action

Partners for Action (P4A) is an initiative of the Faculty of Environment at the University of Waterloo that brings together governments, researchers, businesses, and community organizations to better understand flood risk and empower Canadians to become flood resilient. It was launched in 2015 with founding sponsorship and thought leadership from Co-operators and Farm Mutual Re. P4A promotes community-level flood resiliency as a pathway toward climate action (focusing on awareness and preparedness), climate adaptation and climate justice. It developed FloodSmartCanada.ca, a bilingual site with flood prevention resources and flood maps, and produces applied research and tools – such as its Social Vulnerability Index, policy work on managed retreat, a study on inclusive risk communication, and a database of multi-hazard resilient retrofits, available at www.climateresilientretrofits.ca – which aim to help inform and catalyze equitable resilience.

co-operators

About Cooperators

Co-operators is a leading all-Canadian financial services co-operative deeply invested in helping Canadians build and grow their financial strength and security. Besides offering multi-line insurance and investment products, services, and advice, they are working with municipalities, non-profits, research groups, investors, and all orders of government to mobilize private capital and build more climate-resilient communities. Co-operators' work with P4A is part of their commitment to incorporating equity considerations in investments, planning, and projects so that adaptation and risk reduction efforts can benefit those historically underserved and most impacted by climate change.

Acknowledgements

Data for Flood Resilience

This research was generously supported by Co-operators as part of a multi-year sponsored research project (SRA #091697), ***Data for Flood Resilience: Building Evidence for Equity-Informed Investment, Planning, and Foresight*.** This project builds upon work on *Inclusive Resilience,* a project completed from 2020-2024 with the Canadian Red Cross and funded by Public Safety Canada.

In 2022, Co-operators renewed their multi-year funding commitment to Partners for Action (P4A) to catalyze community-level flood resilience and engaged P4A to explore where and how investments in resilience (which can include disaster risk reduction and adaptation) could make the most impact. Building on P4A's foundational research on assessing and mapping socio-economic vulnerability to climate hazards in Canada, P4A's *Climate Equity and Risk Analysis* team focused on what might help communities apply an evidence-based equity lens to resilience efforts. The goal was to understand where, and how, to prioritize programming and resources to reduce the impacts of flood and other hazard events.

The P4A team is grateful to the collaborators at Co-operators – especially Shawna Peddle, Don Iveson, and the rest of the Resilience Investing Working Group, and the Climate Hazards and Advanced Risk Modelling (CHARM) team – for their invaluable support and contributions in continually shaping and refining this work to be useful to municipalities and others.

Contributions

The insights in this summary were drawn from the *Data for Resilience* and *Inclusive Resilience* projects.

The research on who is made vulnerable to hazard impacts was done by P4A Research Assistants, Kasra Motlaghzadeh and Felicia Watterodt, with contributions by P4A staff and researchers Sharmalene Mendis-Millard (Director), Jason Thistlethwaite (Principal Investigator), Julie Wright (former Director), and Liton Chakraborty (Research Associate).

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Why does equitable resilience matter?

Disaster severity and frequency is increasing, costing billions

It is more important than ever before to invest in proactive disaster risk reduction and adaptation measures as part of building community resilience. Under changing climate conditions, floods are costing Canadian taxpayers, insurers, and communities billions annually in losses and damages. Annual economic risks are now estimated at $2.9 billion per year, and these costs continue to skyrocket as extreme weather events become the norm (Public Safety Canada, 2022). Over the past fifty years, the average cost of a Canadian disaster event has ballooned by 1250% (Canadian Climate Institute, 2020). Between 2010 and 2019, extreme weather events in Canada caused $18 billion in insured losses (Canadian Institute for Climate Choices, 2020). Estimates from the Insurance Bureau of Canada (2020-2024) show that catastrophic events from 2019 to 2023 have already surpassed the prior decade's total, costing $19 billion in just five years.

Alarmingly, Canada experienced a record $8.5 billion in insured losses in 2024 alone (Insurance Bureau of Canada, 2025). Within the span of only two months, devastating wildfires in Jasper, Alberta, extreme rainfall in Southern Ontario and the Greater Toronto Area, a major hailstorm in Calgary, Alberta, and record-breaking floods in Quebec caused a combined $7.6 billion in losses and damages (DiSabtino, 2024). The evidence is clear: Canada urgently needs to reduce its risks.

However, these losses only tell part of the story when it comes to the hidden costs of climate change and the many intersectional ways that the climate crisis is affecting the lives of Canadians—and in particular, the risks to those already facing social marginalization, economic precarity, and other systemic barriers.

Adaptation and risk reduction efforts must centre the most vulnerable

There is a critical need to identify and reduce underlying vulnerabilities to the adverse impacts of extreme weather events as part of strengthening community resiliency. Care must also be taken to reduce the potential for *maladaptation*—actions that inadvertently exacerbate existing inequalities, create new harms, and/or limit future adaptation options (Schipper et al., 2020).

What might it mean to apply an equity lens to planning for and investing in resilience? For one, it means identifying and understanding the various ways that socio-economic vulnerability intersects with disaster risks—compounding hazard impacts, slowing recovery processes, and creating additional barriers for risk reduction at both the individual and community levels.

Equitable resilience can be defined as "practice [that] takes into account issues of social vulnerability and differential access to power, knowledge, and resources; it requires starting from people's perception of their position within their human-environmental system, and it accounts for their realities and for their need for a change in circumstance to avoid imbalances of power into the future" (Matin et al., 2018). Simply put, equity-driven planning and decision-making processes can create fair and just outcomes, helping to ensure that adaptation and risk reduction measures actively work to reduce inequalities within communities and improve long-term well-being.

A holistic understanding of risk

Hazards do not equal disasters

Disaster risk is defined as a function of hazard occurrence and exposure, physical and socioeconomic vulnerability, and coping capacity (United Nations Office for Disaster Risk Reduction, 2017).

Disasters are neither a “natural” phenomenon nor does exposure alone equate to risk. Rather, hazards, such as flooding and wildfire events, only become disasters when they have adverse social, economic, and physical impacts on people.

Moreover, it is human decisions (e.g., land use planning) and systemic failures (e.g., socioeconomic inequities) that continue to perpetuate risks. While disaster risk reduction measures have historically emphasized disaster recovery and response, there is a growing need to invest in preparedness and mitigation measures, which seek to proactively reduce vulnerability and exposure.

$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Capacity to cope}}$$

Flood exposure in Canada

Canada is a water-rich nation with the longest coastline in the world and an abundance of freshwater resources. The unfortunate reality is that many communities are concentrated within floodplains and coastal flood prone areas, and there is more overland flooding outside of floodplains due to more hard surfaces in urban areas plus more heavy rainfall events with climate change. Climate change is exacerbating existing flood risks, which are further amplified by increasing urban development and other land-use pressures (Public Safety Canada, 2022). As such, flooding is the nation’s most frequent and costly natural hazard (Public Safety Canada, 2022).

In Canada’s first spatial assessment of flood risk, P4A researchers found that 1.7 million people and 250,000 residential properties in eight provinces are flood disadvantaged (Chakraborty et al., 2020). By 2100, coastal flooding, as a result of sea level rise, will impact an estimated 480,000 to 840,000 Canadians (Wade, 2022).

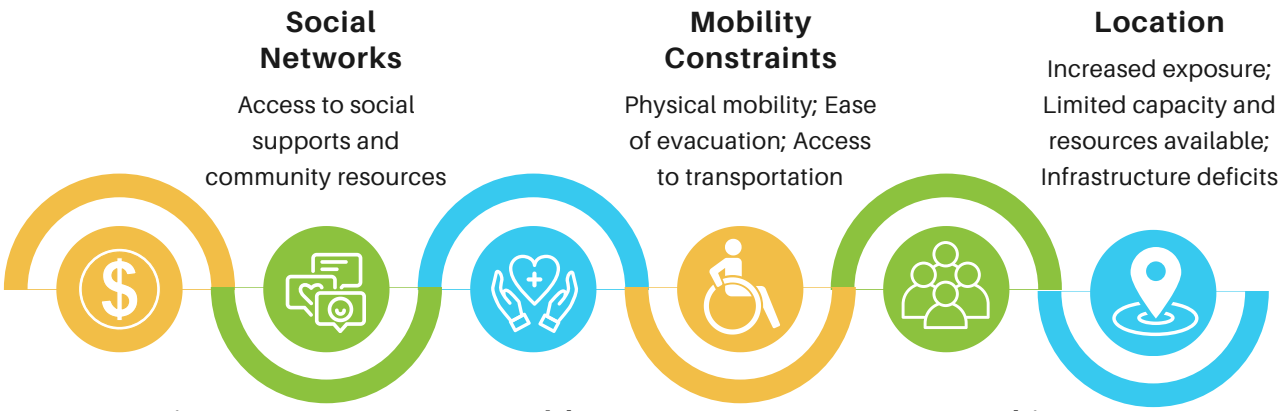
Flood risks are not evenly distributed among those who are exposed

Assessing **social vulnerability** is one key starting point for building an equity-informed approach to resilience investing. Social vulnerability is the increased susceptibility to the adverse impacts of hazards due to systemic barriers and structural inequalities associated with personal characteristics, such as race, ethnicity, socio-economic status, and/or other demographic characteristics (Wisner et al., 2004; Cutter et al., 2003; Cutter, 1996). It is a state of socio-economic well-being that informs a person's ability to adapt to shocks and stressors (Cutter, 1996).

Taking an **equity-oriented approach** to flood risk reduction means that we don't simply ask where floods happen, but also ***who gets flooded and who pays in different ways—physically, emotionally, socially, and culturally?***

Rooted in pre-existing disparities and systemic barriers, socio-economic marginalization limits an individual's or community's ability to cope with unanticipated shocks and stressors, leading to disproportionate vulnerabilities, as compared to well-resourced community members who have better access to social and economic infrastructure (Plough et al., 2013). People experiencing higher rates of social depravation (e.g., low income, housing insecurity) are disproportionately affected by the psycho-social impacts of flood events, including emotional trauma, displacement, and loss of livelihoods and community connections (Scherrieb et al., 2020). Furthermore, factors that undermine an individual's resilience to flooding are often applicable to how they cope with other types of hazards as well, although there may be some hazard-specific nuances.

Factors of social vulnerability, shown below, cover a range of demographic, geographic, social, health, and economic aspects that can limit an individual's agency and capacity to prepare for, respond to, and recover from hazard events, such as flooding.



Vulnerability is not an inherent condition

People are not inherently vulnerable in the face of adversity adversity, and in fact, conditions of both vulnerability and resilience can co-exist. Power constructs and systems, whether intentional or inadvertent, perpetuate vulnerabilities by privileging certain groups over others (Fuenteabla, 2021; Rivera, 2020). Thus, the onus to reduce vulnerability is on systems and institutions—not the individual (Haalboom & Natcher, 2012; Bankoff, 2001; Chmutina et al., 2023). Resilience-building initiatives provide many synergistic opportunities to not only advance disaster risk reduction and climate preparedness objectives, but also to produce multi-benefit outcomes for improving community health and well-being, social cohesion, justice and equity, poverty reduction, and accessibility (Carmen et al., 2022).

> **"Social vulnerability, at its core, is determined by systems of power**... People who face systemic oppression, exclusion, and marginalization receive labels of vulnerability based on demographic characteristics. Yet demographic characteristics are not an inherent vulnerability."
>
> *—Bouikidis & Tynan, 2022*

An introduction to disaster-related social vulnerability in Canada

This report is intended to serve as a primer for thinking about how various demographic and socio-economic factors can influence a person's ability to respond to climate-related challenges, and how multiple characteristics can intersect to create disproportionate vulnerabilities within a community. It includes selected insights from a comprehensive review of disproportionate disaster vulnerabilities within the Canadian context for two Partners for Action projects (*Inclusive Resilience* with Canadian Red Cross and *Data for Resilience* with Co-operators).

What follows is an overview of how flooding and other climate-related disasters can disproportionately impact individuals and groups on the basis of socio-economic status, housing security, racial, ethnic, or cultural characteristics, gender, age, immigration status, and health. The purpose of this primer is to spark discussion among decision-makers, practitioners, planners, and communities around what an equity-driven approach to adaptation and risk reduction could entail, and the many intersecting community needs to consider and prioritize.

Socio-economic status

Risk overview

Income is arguably the most significant determinant of vulnerability and intersects with many other persistent, systemic inequalities within Canadian society. Disasters and climate change may be considered “threat multipliers,” exacerbating existing vulnerabilities and further marginalizing at-risk populations (Hallegate et al., 2017). Low-income households spend a greater proportion of their household income on basic necessities, allocating on average 8% more to food, shelter, and clothing than their higher-income counterparts – meaning that economic shocks and inflation disproportionately impact them (Uppal, 2023)

Select examples of disproportionate impacts

Low-income households who possess fewer resources (e.g., savings, assets, disposable income, access to finance and credit) disproportionately experience post-disaster financial hardship (Burton et al., 2016; Walker et al., 2022; Davies, 2020).

Communities with lower socioeconomic status are more likely to live in poorly constructed housing, older housing units, and mobile homes, which are susceptible to disaster-related structural damage (Fothergill & Peek, 2004).

Financial constraints limit people’s agency in how, where, and in what manner they are able to evacuate. Wealthier households often evacuate earlier, to safer locations, and for longer durations (Whitehead et al., 2011; Yabe & Ukkusuri, 2020; Deng et al., 2021).

Housing insecurity greatly affects a household’s ability to prepare for emergencies (Rao et al., 2022). Unexpected expenses (e.g., disaster displacement, costly housing repairs) can exacerbate existing economic insecurities (SAMHSA*, 2017; Burton et al., 2016).

Underserved neighbourhoods are disproportionately located in hazard-prone areas. Buildings constructed on hazard-prone lands (e.g., floodplains) typically possess lower land value and are hence more affordable (Van Zandt, 2022).

Limited access to personal vehicles, and a subsequent reliance on public transportation, constrains individuals’ abilities to evacuate or access disaster supports (e.g., muster points) (Renne & Mayorga, 2022; Bian & Wilmott, 2018).

**SAMHSA = Substance Abuse Mental Health Services Administration*

Renters

Risk overview

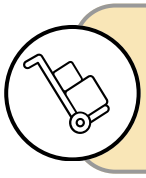
Pre-existing systemic challenges within the rental market exacerbate the impact floods and other hazard events can have. These include the ongoing housing affordability crisis, the limited supports available to low-income renters, the affordability of renter's insurance, the prevalence of ill-maintained or poor-quality rental stock, inadequate building code enforcement, and barriers in securing pet-friendly and multi-bedroom housing (Martín et al., 2023; Graham & Rock, 2018).

Select examples of disproportionate impacts

Landlords and tenants often have lower incentives to invest in property maintenance and mitigation, compared to owner-occupied households; however, renters are the most constrained in their agency to initiate repairs and adaptations (NLIHC*, 2019).

Rental units are often ineligible for disaster assistance, are more prone to damages due to low quality and hazard-prone locations, and typically require a longer recovery than owner-occupied homes (Peacock et al., 2014; Hamideh et al.,2021; NLIHC, 2019).

Tenants are less likely to develop emergency preparedness plans and are less risk aware than homeowners (Grothmann & Ruesswig, 2006; Rivera, 2020). Landlords often do not disclose the property's hazard history to new tenants (Dundon & Camp, 2021).



Tenants are more likely to experience "forced moves" as a result of permanent eviction (Sheldon & Zhan, 2019). This adversely impacts households' health, wellbeing, wealth, social cohesion, and housing stability (Raymond et al., 2021; World Bank, 2022).

Disasters decrease available rental stocks, leading to higher rental prices (NLIHC, 2019). Those who cannot find or afford suitable rental units may be at risk of experiencing transitional homelessness or housing instability (Paidakaki, 2012).

Renters are frequently overlooked in emergency planning, burdened with post-disaster evictions with minimal relocation support from landlords and government (Dundon & Camp, 2021; Morris-Underhill, 2023; Aubrey, 2022).

NLIHC= National Low Income Housing Coalition

Racialized Canadians & newcomers

Risk overview

Floods and extreme climate events exacerbate existing daily challenges and socioeconomic vulnerabilities that immigrants and racialized communities currently face, particularly with respect to economic marginalization, language and cultural barriers, limited residential mobility, and social exclusion (Yong et al., 2017; Renaud et al., 2006). Newcomers, who have recently immigrated to Canada, are among the racial communities most disproportionately affected by climate risks, yet simultaneously receive minimal supports to cope (Mohtat & Khirfan, 2023).

Select examples of disproportionate impacts

Immigrants face numerous housing barriers, including racial discrimination, affordability, unfamiliarity with local housing markets, and language barriers; thus, they are at risk of settling in poor quality housing (Gupta, 2022; Teixeira & Drolet, 2016; Rao et al., 2023).

Newcomers often possess limited financial resources due to economic marginalization (Oulahen et al., 2015). Compared to Canadian-born citizens, immigrants struggle significantly more to find jobs that match their skillsets (Raihan et al., 2023).

New immigrants (>10 years) disproportionately live in overcrowded rental housing, and multi-generational or larger families are often unable to secure affordable housing with a suitable number of bedrooms (Preston & Ray, 2021; Basavarajappa, 1998).

Risk communications and preparedness programs are often not designed with diverse cultural and linguistic considerations in mind; for instance, emergency communications are often inaccessible to non-native speakers (Wright et al., 2022; Oulahen et al., 2015)

Discriminatory housing and zoning policies based on racial segregation have led to significant underinvestment in racialized neighbourhoods, leading to poorer quality housing and infrastructure deficits (CERA* & NRHC**, 2021; Mohtat & Khirfan, 2022).

Immigrants experience a number of pre- and post-migration stressors that adversely impact their mental health (Williams et al., 2022). As well, disasters exacerbate existing healthcare inequities, such as systemic racial discrimination (Abdillahi & Shaw, 2020).

CERA= Centre for Equality Rights in Accommodation
** NRHC= National Right to Housing Network*

Indigenous Peoples

Risk overview

Colonialism, systemic racism, marginalization, and disenfranchisement from governance structures have created significant socioeconomic disparities for First Nations, Inuit, and Métis populations within Canada, in contrast to Euro-Canadian populations (McKenzie et al., 2016; Wilson & MacDonald, 2010). First Nations, Inuit, and Métis communities disproportionately experience poor housing quality and health disparities, particularly in remote and northern areas. These disparities are rooted in their limited access to healthcare services, inadequate housing and community infrastructure, food insecurity, and unsafe drinking water—disparities which are then exacerbated during and in the aftermath of a hazardous event (Furgal & Seguin, 2006; Yumaglova, 2020).

Select examples of disproportionate impacts

The forced relocation of First Nations to designated reserves, often located on low-lying lands, has led to disproportionate flood exposure (Waldram, 1988). 81% of Indigenous land reserves are currently exposed to 1-in-100-year flooding (Chakraborty et al., 2021).

First Nations communities are 18 times more likely to face evacuation, compared to non-Indigenous communities, and are most likely to experience long-term disaster displacement (Thompson et al., 2014; Martin et al., 2017; NCCPH*, 2021).

As of 2021, Indigenous peoples are two times more likely to live in overcrowded housing and three times more likely to reside in inadequate housing that is in need of major repairs, compared to non-Indigenous Canadians (Melvin & Anderson, 2022).

Emergency support services often neglect to account for the specific dietary and cultural needs of First Nations Elders, those living on-reserve, and those relying significantly on traditional food sources, contributing to adverse health outcomes (Walker et al., 2022).

For First Nations, the mental distress associated with disaster displacement from one's home territory can be further compounded by the intergenerational trauma of historic forced relocation policies (Walker et al., 2022; Asfaw et al., 2019; McGee et al., 2019).

Emergency response capacities are limited for many First Nations communities due to infrastructure deficits, remote community access (e.g., accessible by boat or plane), reduced access to critical services (e.g., hospitals), and service gaps (OAG**, 2022).

**NCCPH= National Collaborating Centres for Public Health*
***OAG= Office of the Auditor General of Canada*

Health & disability

Risk overview

Flooding poses significant mental and physical health risks, which are compounded for those with pre-existing health conditions and disabilities. Disabled and medically-vulnerable populations are often excluded from emergency management planning and face significant barriers to disaster resilience, leading to accessibility challenges, exacerbated health inequalities, lower evacuation rates, heightened housing insecurity, and increased financial hardship (Sisson et al., 2023). Those with pre-existing health challenges often report the onset of new symptoms and additional conditions, as well as worsened health outcomes, following disaster events (Agyapong et al., 2022).

Select examples of disproportionate impacts

Pre-existing mental health conditions (e.g., post-traumatic stress disorder; anxiety, depression) constrain ability to cope with trauma, while psychosocial impacts of loss and disruption can worsen mental health (Agyapong et al., 2022; Burton et al., 2016).

Flood-related morbidity and mortality is often underreported during long-term recovery, while those most in need of medical care (e.g., chronically ill) may experience disruptions in critical healthcare services (Burton et al., 2016; Rath et al., 2007)

Disabled Canadians (ages 25-64) are twice as likely to be unemployed (41%) compared to working-age Canadians without disabilities (20%), facing both social and economic marginalization that effectively limit the resources at their disposal (Morris et al., 2018).

Disabled people disproportionately face high disaster-related mortality that can be attributed to mobility challenges, evacuation barriers, limits to physical autonomy, and health complications (Walbaum et al., 2014; Oulahen et al., 2015; HRW*, 2022).

Households with a disabled family member are slower to evacuate and more likely to remain in place due to a lack of timely, accessible, and inclusive shelters, emergency communications, and transportation (Peek & Stough, 2010; Van Willigen et al., 2002).

Disasters exacerbate the existing housing insecurity disproportionately experienced by disabled people, as linked to poverty, a lack of affordable and inclusive housing, and higher overall costs of living (Downer & Rotenberg, 2023; Peak & Stough, 2010).

*HRW= Human Rights Watch

Children & youth

Risk overview

As children are highly dependent on parents and caregivers, post-disaster outcomes often depend on factors beyond the child's control, such as household dynamics, socio-economic status, caregiver stress levels, and the level of at-home support received (Felix et al., 2020; McDonald-Harker et al., 2021). Living through a disaster event can be a traumatic experience, particularly for children and adolescents who are still in the process developing critical coping and emotional intelligence skills. Prolonged periods of instability related to evacuation, relocation, and disrupted daily routines can adversely impact a child's physical, mental, and emotional health (Walker et al., 2012; Mort et al., 2018a).

Select examples of disproportionate impacts

Children are highly susceptible to the adverse mental health outcomes associated with displacement and housing instability, loss of possessions, disrupted schedules, familial stress, educational discontinuity, and separation from social circles (Mort et al., 2018b)

As child development is closely related to maternal health and well-being, disaster-related prenatal stress can lead to developmental, cognitive, behavioural, and physical health complications (Tuovinen et al., 2021; Dancouse et al., 2015; Kildea et al., 2017).

Disasters exacerbate existing emotional, behavioural, and academic challenges; thus, youth who already experience challenges with mental health, conduct, and academic achievement are at risk of deteriorated post-disaster outcomes (La Greca et al., 1998).

Childhood trauma has been associated with a heightened vulnerability of developing health-risk behaviours (e.g., substance use and sleep disorders, obesity) and diseases (e.g., diabetes, respiratory, cardiovascular) (Felix et al., 2020; Lai et al., 2014).

Caregivers play a significant role in helping children process and cope with disasters; however, a child's post-disaster psychological health is highly dependent on how effectively caregivers cope with stress (Gil-Rivas et al., 2010; Felix et al., 2016).

Special needs and chronically-ill children, who require specific caregiving interventions, are particularly vulnerable to the adverse effects of displacement, disruption to daily routines and medical services, and declining health outcomes (Rath et al., 2007).

Young adults & students

Risk overview

Young adults and post-secondary students, in particular, are often overlooked in disaster risk reduction planning, yet face unique barriers to disaster-preparedness related to possessing limited finances, living in short-term rentals, having a lack of previous disaster experience, and being separated from family support networks (Tanner & Doberstein, 2015). University and college students find themselves in a transitional period between adolescence and adulthood, and thus, may struggle with isolation, financial hardship, and emotional distress during and after a disaster (Breen & Meyer, 2021).

Select examples of disproportionate impacts

Students tend to possess low levels of personal emergency readiness and are unlikely to possess a contingency plan, an emergency kit (beyond common household items), or awareness of local resources (Tanner & Doberstein, 2015; Simms et al., 2013).

Young adults (>30) are increasingly struggling to obtain financial security, related to labour-market precarity, rising inflation, depressed wages, and affordability challenges, which limit their coping capacity (Tomaszczyk & Worth, 2018; Bhawra et al., 2021).

Compared to previous generations, young adults today face significant barriers to home ownership and are likely to settle in poor quality housing (Cournéde & Plouin, 2022). 1-in-5 young adults spend 30%+ of their pre-tax income on shelter (Choi & Ramaj, 2023).

Post-secondary students are highly susceptible to experiencing heightened post-disaster emotional distress, financial hardship, and decreased academic performance (Ladd et al., 2007; Doyle et al., 2017; Breen & Meyer, 2021; Davis III et al., 2010).

The exacerbation of existing stressors, such as financial burdens (e.g., managing recovery, tuition, and living expenses) and familial responsibilities, can prevent students from completing degree requirements (Lowe & Rhodes, 2012; Breen & Meyer, 2021).

Young adults are highly susceptible to post-disaster psychological distress (e.g., PTSD, anxiety, depression) and maladaptive coping strategies, such as increased alcohol intake (Peek-Asa et al., 2012; Schroeder & Polusny, 2014; Obuobi-Dunkor et al., 2022).

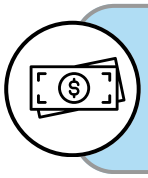
Older adults (65+)

Risk overview

Older adults are among the most physically, financially, and emotionally vulnerable to the adverse impacts of disasters, attributed to their age-related elevated health risks (e.g., chronic illness, sensory and cognitive impairment, multi-morbidity), higher dependency on medications and assistive devices, disproportionately high rates of social isolation, mobility challenges, financial constraints, and gaps in caregiver (e.g., home care providers, nursing homes) preparedness (ARC* & AAN**, 2020). Furthermore, older adults face unique barriers in engaging with emergency preparedness and risk communications, necessitating targeted and accessible interventions (Wright et al., 2022).

Select examples of disproportionate impacts

Older adults may experience difficulties in evacuating from their home due to decreased physical mobility, existing medical conditions, and the need for varying levels of care and assistance (Burton & Cutter, 2008; Manuel et al., 2015; Walker et al., 2022).



Older adults often have limited financial resources to prepare for (e.g., flood-proof their home, afford insurance) and cope with disasters due to possessing a fixed income, such as a pension or retirement savings (Oulahen et al., 2015; Manuel et al., 2015).

Older adults rely significantly on social supports to cope with disaster-related stressors, yet are also at risk of social isolation, which adversely impacts their emotional and physical well-being (Oulahen et al., 2015; Brockie & Miller, 2017)

Older adults are disproportionately susceptible to adverse post-flood health outcomes due to their comorbidity, health complications, physical limitations (e.g., driving, mobility), and specialized healthcare needs (Lowe et al., 2013; Cherry et al., 2009).

Older adults, particularly those who are hospitalized, homebound, or living in care facilities, are more likely to remain in place during a disaster due to mobility barriers and limitations in accessing transportation (Cherry et al., 2009).

Older adults often have difficulties in accessing and understanding risk communications due to lower levels of technological literacy (e.g., inability to access online resources) and age-related cognitive and sensory impairments (Wright et al., 2022).

*ARC= American Red Cross
**AAC= American Academy of Nursing

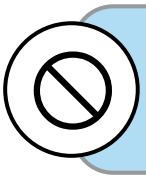
Gendered outcomes

Risk overview

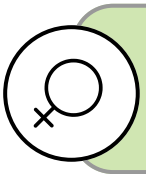
Emergency planning and disaster risk reduction efforts often fail to consider how gender dynamics—such as systemic inequalities, gaps in social safety nets, societal norms, expectations, and roles, and physiological risk factors—influence how women and men prepare for, cope with, and respond to disasters differently (Erman et al., 2021). Although women disproportionately experience post-disaster economic and housing insecurity, as well as elevated domestic violence, men are not immune to the harmful consequences of the patriarchy and face societally-ingrained barriers to accessing psychosocial supports, such as mental health counselling, following traumatic events (Parkinson, 2022).

Select examples of disproportionate impacts

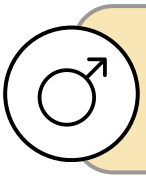
Persistent wage gaps constrain women's access to financial resources in an emergency event. In 2019, women earned an average salary of $17,670 less than men, and as of 2021, women were paid $3.6 less in their median hourly rate (CWF*, 2022a).



Disasters lead to increases in gender-based violence due to household instability, familial stress, housing insecurity, reduced access to social networks and resources, and restricted agency and mobility (Enarson, 1999a; Parkinson, 2019; CWF, 2022b).



Due to gendered norms (e.g., primary caregivers, household division of labour), women disproportionately bear the additional stress and labour of caring for dependents and providing emotional support (Fletcher & Knuttila, 2016; Enarson & Scanlon, 1999).



Gendered norms (e.g., toxic masculinity, risk-tolerance) mean that, compared to women, men are less likely to access mental health supports following a disaster and tend to favour remaining in-situ to protect property over evacuation (Walker et al., 2022)

Following a disaster, women experience increased housing insecurity. In particular, women who are single mothers, low-income, or victims of domestic violence may be constrained in their ability to find safe and affordable housing (Enarson, 1999b).

Flood-related health risks for pregnant women include of maternal anxiety, PTSD, obesity, postpartum depression, eclampsia, miscarriage, disrupted medical care, anemia, and susceptibility to water-borne illness (EPA, 2022; Tuovinen et al., 2021)

**CWF= Canadian Women's Foundation*

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