

# Western Canada's 2021 heatwave will happen again: Why we need to better protect older adults

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The sweltering heat experienced by Canadians during the 2021 heatwave in western Canada is a stark reminder that climate change is not just some far-off problem. It is already here, and we are already reeling from its impacts. Previously thought to be a once-in-a-millennium event, extreme events like this one could occur with a frequency of once every five to ten years. Compared to the rest of the population, older adults – an increasingly large share of the Canadian population – are more susceptible to heat-related trauma because of impaired thermoregulatory responses from aging and other chronic conditions. The compounded effect of climate change and an increasingly older population will necessitate that we expand the availability of health resources and the capacity of health systems in response to these stressors. Our current health care funding mechanisms, as they stand, do not address either of these problems. This commentary explores how the increasing frequency and intensity of temperature extremes impact older adults at both an individual and health systems level. Climate-related stressors in an aging demographic will require that we redefine health resilience – including a serious conversation about health systems resources – and how we currently operationalize it in the Canadian context.

## Introduction

The sweltering heat experienced by Canadians during the 2021 heatwave in western Canada is a stark reminder that climate change is not some far-off problem. It is already here, and we are already reeling from its impacts. The deaths of nearly 600 people have been attributed to this heatwave, making it the deadliest weather-related event in Canadian history.<sup>1</sup> Older adults are disproportionately affected during heatwaves. For example, in British Columbia, 85% of the deaths in the 2021 heatwave were among individuals 60 years or older; worsening of health conditions and increased hospitalizations were also observed.<sup>2</sup> As a result, heatwaves tend to increase demand for health services and can stress a health system's capacity to provide quality care. This commentary explores how the increasing frequency and intensity of temperature extremes impact older adults at both an individual and health systems level. To conclude, suggestions for targeted recommendations to mitigate these risks are provided.

## Climate change and heatwaves

It is not surprising that extreme weather events of this kind are occurring with greater frequency and severity.

In fact, the 2021 heatwave is precisely the kind of extreme weather event that climate scientists have been warning about for years that would likely become more prevalent and more intense.<sup>3</sup>

However, one may ask: are these extreme weather events due to climate change or are they just the result of natural variability in the climate system? It turns out that these are the sort of questions that studies in attribution science aspire to answer. For example, how far outside of the historical range were daily maximum temperatures throughout the course of a given heatwave? How did other climatic and meteorological factors contribute to the intensity of that heatwave? Following last summer's heatwave in western Canada, a rapid attribution analysis concluded that "an event such as the Pacific Northwest 2021 heatwave is still rare or extremely rare in today's climate, yet would be virtually impossible without human-caused climate change."<sup>4</sup>

Previously thought to be a once-in-a-millennium event, extreme events like this one could occur with a frequency of once every five to ten years in a world with 2°C of warming.<sup>4</sup> Additional research suggests that extreme heat events are likely to occur with greater intensity but also

“break previous records by much greater margins.”<sup>5</sup> Yet another study found that 38.5% of heat-related mortality in Canada between 1991 and 2018 was attributable to human-induced climate change.<sup>6</sup> Together, the scientific literature underscores the need to understand the impacts of a warming world at both an individual and at a health systems level to build resilience. More specifically, for the purposes of this paper, we narrowly define resilience as the ability of hospital systems to withstand climate stressors, and respond accordingly in an efficient and timely manner.<sup>7</sup> A larger conversation on the need for sustained and broad health systems resilience – beyond hospitals – and the investment that this entails is unfortunately outside the scope of this paper.<sup>7</sup>

## What makes older adults disproportionately vulnerable to the heat?

The normal thermoregulatory response in the human body to excess heat must be considered. There are four mechanisms at play to counteract excess heat production. The first is conduction, whereby heat can transfer through solids or liquids as can be felt when lying on a cold floor. The next is convection, a process in which heat is transferred to the air, as is experienced when a ceiling fan is turned on. Evaporation is the third mechanism at play, through which heat is expelled from the human body through sweating and breathing. Finally, heat dissipates down the temperature gradient from the skin to ambient air, but the extent to which this last mechanism operates is reduced during a heatwave because the ambient air is warmer than the body.

Older adults are more susceptible to heat-related trauma because at baseline, individuals 50 years or older store 1.3-1.8 times more body heat than their younger counterparts when exposed to external heat sources.<sup>8</sup> In addition, changes in physiology from aging are associated with dysfunctional thermoregulation and reduced sweat production per sweat gland, impairing normal heat loss through evaporation.<sup>8</sup> Older adults also have a reduced ability to dilate blood vessels near the skin, which is necessary to help body heat escape through conduction and convection. This is all exacerbated by chronic conditions such as obesity, high blood pressure, diabetes and cardiovascular disease, which compromise the ability of the heart and other organs to compensate

for heat stress.<sup>9</sup> Finally, many common medications prescribed to older adults (e.g., beta-blockers for heart disease, thyroid agonists, antidepressant drugs) may worsen heat stroke.<sup>9</sup>

Common signs of heat-related illness are overheating, dehydration, headaches, dizziness, weakness, increased breathing rate, nausea and vomiting, in addition to sweating, thirst, and muscle cramps.<sup>9</sup> Older adults have less awareness of thirst signals and signs of dehydration, resulting in non-specific symptoms including confusion, slurred speech, neurological deficits, and decreased level of consciousness.

## How can health systems be more resilient to heat stressors?

Health systems must be able to respond to medical emergencies as heat cramps (most mild) progress to heat exhaustion or even heatstroke (most severe). For example, during the 2021 heatwave, emergency health services were overwhelmed, resulting in many people not receiving crucial services in a timely manner.<sup>10</sup> Timeliness is key here: heatstroke symptoms of severe dehydration, stroke and seizure-like activity require immediate care, and as a result, can further burden already-strained health and emergency services. Heat stressors therefore contribute directly and indirectly to an increase in demand for healthcare services. Health systems must therefore be resilient enough to respond appropriately to the expected increased demand from climate stressors.

The ability of our overburdened healthcare system to respond to present and future stressors is in question. Our health systems have been severely underfunded for decades and have been crippled by the pandemic. Despite qualifying as an “acute” stressor, COVID-19 has been devastating in so many ways: directly, with the high number of COVID-19 patients needing urgent care, and indirectly, undermining our capacity to provide non-urgent but still necessary care. For example, the rate of cancer screenings in Canada remains below the pre-pandemic level,<sup>11-13</sup> likely resulting in many missed diagnoses. The surgery backlog – estimated to be over half a million surgeries over the first 16 months of the pandemic<sup>14</sup> – will also most certainly continue to challenge the recovery of our health system’s functionality. This begs the question: if all this and more

are the unintended impacts of an overburdened health system by an acute stressor, how will our health systems fare in the expected onslaught of persistent climate-related stressors? Balancing the needs of additional climate-related stressors will inevitably have a ripple down effect, with systems needing to prioritize and triage at a grander scale than is currently being done. This phenomenon will result in the delay of care for everyone but will almost certainly further harm already vulnerable populations like older adults.

Just as climate change is not some far-off problem, neither are the challenges associated with an aging Canadian population. One in five Canadians will be over the age of 65 years by 2028 in part due to increasing life expectancy and reduced population growth.<sup>15</sup> Health problems and increased healthcare utilization has also been shown to be exacerbated by unequal social determinants of health in older adults,<sup>16</sup> such as living in houses with poor ventilation, neighbourhoods with high deprivation or poverty, or urban heat islands.<sup>17</sup> More broadly, only 61% of Canadian households have AC, an important risk mitigation tool during a heatwave.<sup>18</sup> Furthermore, the chronic conditions and mobility challenges that arise with aging limit their ability to hydrate sufficiently or seek out a cooler location during heatwaves.

An aging population will increase demands on the healthcare system with an upward trajectory of non-communicable and communicable diseases, even in the absence of climate-related stressors. Health care costs of our public health care system will also increase in order to meet this rising demand. Add heatwaves and additional climate-related stressors to this and we have a serious problem ahead of us. The compounded effect of climate change and an increasingly older population will necessitate that we expand the availability of health resources and the capacity of health systems in which these resources operate. Our current health care funding mechanisms, as they stand, do not address either of these problems, let alone the compound impact of climate change plus aging.

## The path forward

Over the longer term, implementing meaningful climate change policies to reduce greenhouse gas emissions is paramount to limiting warming to no more than 2°C and avoiding the most dangerous impacts of climate change.

But even in a future scenario where we successfully limit global warming to 2 °C, we will still be at a far greater risk to extreme heat events than we are today.<sup>3</sup> Therefore, in addition to the vital efforts focused on mitigating future climate change through emissions-reduction policies, we must also allocate resources to build health systems resilience to climate extremes. This could take the form of investing in integrated risk monitoring and early monitoring, emergency preparedness and management, climate-resilient and sustainable technologies, a robust healthcare workforce, and the implementation of climate-informed health programmes, among other mechanisms of strengthening health infrastructure.<sup>19</sup> All of this will require that we restructure climate and health financing. In doing so, we must be mindful of how to mitigate the enhanced risk faced by vulnerable populations, like older adults, during extreme heat events.

There are also short-term solutions that can help alleviate some of the more direct impacts of heatwaves on older adults. Italy's Long Live the Elderly Program provides an excellent example of a social intervention shown to reduce heatwave-associated mortality in older adults.<sup>20</sup> The program is linked to the national heat health warning system and connects an able-bodied volunteer with a vulnerable older adult to check in, provide basic necessities, or procure healthcare during a heatwave.<sup>20</sup> At an individual level, preventative measures include the availability of air conditioning and fans, and access to clean drinking water. During a heatwave, individuals should be aware that immersing themselves in a cold-water bath, and using cool compresses and ice packs, can be a temporary cooling measure before seeking medical attention. Early recognition of heat-related illnesses will save lives. Therefore, it is very important for older adults, their caregivers, and healthcare providers to recognize signs of heat-related illness.

We acknowledge that the solutions proposed are far from exhaustive, and we urge further inquiries towards the implementation of equitable solutions that will particularly center our most vulnerable groups.

## Conclusion

Last summer's heatwave in western Canada gave us a preview of the consequences of climate change; the death toll demonstrates how older adults are disproportionately affected, and the first line of defense for these events is our healthcare system. Climate-related stressors will

require that we redefine health resilience – including a serious conversation on health systems resources – and how we currently operationalize it in the Canadian context. All of us are getting older in an environment that will increasingly become more volatile, and we need to prepare our population and health systems to respond accordingly. Pooling efforts to mitigate the impacts of climate change and building resilience of health systems to respond to stressors – while resource-intensive – will be necessary and beneficial now and in the future.

## Acknowledgements

All authors' graduate studies are all supported, in part, by the Pierre Elliot Trudeau Foundation. PB is also supported by the Canadian Institutes for Health Research.

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