The June 2021 British Columbia Heat Dome: A Social Autopsy

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Climate change and its associated extreme heat is one of the greatest risks to public health today. The sharp increase in mortality during the June 2021 British Columbia (BC) heat dome revealed inequities further exacerbated by the social and structural determinants of health. The fundamental causes of health injustices are well-established; however, contemporary solutions, such as increasing access to greenspace, require decision-makers to pay close attention to structural and political determinants that continually perpetuate negative health outcomes. By conducting a social autopsy of the community deaths from the BC heat dome, we illustrate how material deprivation, social isolation, and access to greenspace are key risk factors that are the result of long-standing colonial legacies. Without paying close attention to this relationship, climate-health response risks further exacerbating inequities.

Keywords: climate change · extreme heat · heat dome · heat wave · public health · social determinants of health · emergency

Introduction

Gone are the days of climate change as an abstract notion; its impacts are now very real. Many communities are all too familiar with how climate change is increasing the frequency and duration of extreme weather events, especially in British Columbia (BC). In June 2021, a heat dome washed over the province with record high temperatures and atmospheric pressures, which was made 150 times more likely with anthropogenic - human-induced environmental changes warming.[1] The heat dome resulted in a multitude of negative effects, including heat-related illness and mortality, as well as losses to crops, livestock, work forces, glaciers, and water reserves. The hundreds of deaths reported to the BC Coroners Service during this heat dome revealed social and structural conditions that are central to the health inequities of climate change.[2] This paper builds on the social analysis model first proposed by Klinenberg[2] following the 1995 Chicago heat wave, by conducting a 'social autopsy' of the excess and inequitable deaths exposed by the BC heat dome. Although this event was the result of a rare set of circumstances – considered as a one in 1000 year event – climate change is increasing the likelihood of extreme heat events, with annual odds of reoccurring once every five to ten years.[3] BC is expected to experience increases in average temperature faster than the global average and, since 2009, has encountered extreme heat events associated with increased mortality.4 The emerging climate crisis and the deadly extreme heat it brings, is quickly becoming one of the greatest risks to public health.

As with most climate-related emergencies, the 2021 BC heat dome did not crash with equal forces on all shores of life. By conducting a 'social autopsy',2 this paper critically examines the overall health burden of extreme heat events, the extreme inequity of heat-related mortality, how these inequities are intimately linked to social and structural determinants of health, and future directions necessary to decrease inequities and promote community resilience. We first illustrate that the BC heat dome exposed how the risk of heat-related mortality is intimately linked to both material and social deprivation, demonstrated by the correlation between increased mortality, limited access to greenspace, and social isolation. We argue that such deprivation is intimately linked to broader structural determinants, deeply rooted in colonial histories and legacies. A critical way forward in addressing the expected increase of extreme heat mortality is the disruption of land policies controlling access to greenspace and investment into collectivist and community values. Through this perspective, we

aim to highlight how climate change exacerbates health inequities and underscore the importance of the complex, interconnected nature of social and structural factors to effectively implement mitigation and prevention efforts.

British Columbia: A milestone extreme heat event

Overview and overall burden

From June 25 to July 2 2021, temperatures in greater Vancouver reached up to 40 degrees Celsius in some homes. As a consequence, over 500 deaths were associated with the heat dome, representing a 440% increase in community deaths from what would be typically expected in a normal summer.[5] Mortality during the heat dome doubled in every age group over 50.[5] Beyond mortality and physical illness, this record-breaking event posed a significant risk to the mental health of British Columbians. According to an online pre- and post- survey of those over 16 years of age, British Columbians had higher climate change anxiety following the heat dome.[6] The following sections explore how the overall burden of the heat dome was disproportionately distributed.

An inequitable burden

The process through which BC residents lost their lives was preventable and intimately linked to the social and structural determinants of health. Race-based data has seldom been part of Canadian health information standards, making it difficult to measure the extent of the health inequities worsened by the heat dome. For this reason, the Material and Social Deprivation Index (MSDI), informed by national census data, was cross referenced with data from emergency department visits to determine which communities and populations were impacted most. Material deprivation is associated with risk factors such as lower educational attainment, income status, and material circumstances such as lack of air conditioning.[5] Social deprivation is associated with risk factors such as low social connection and living alone.[5] For example, females over the age of 65, who had the highest proportion of deaths,[5] may have been at higher risk during the heat dome because they are more likely to live alone in older age.

Analyzing variance in mortality and heat-related illnesses across Vancouver, Burnaby, and New Westminster demonstrates how the highest proportion of deaths associated with the extreme heat event occurred in materially and socially deprived groups. For example, the rate of heat-related emergency department visits was about triple the rate in Vancouver-Centre North compared to Vancouver Westside, mostly attributed to the Downtown Eastside (DTES), an area with high rates of homelessness and low-income residents.[7] More broadly, an overlay of emergency-department visits illustrates that the areas hit hardest have higher proportions of Canadian newcomers and people of colour.

Social, political, and structural determinants of health
The mechanisms that produce an over-representation of deaths from materially and socially deprived neighborhoods are closely connected to the fundamental structures of social hierarchy and conditions. The social, political, and structural determinants of health offer a framework to understand the drivers of health inequities, including structural discrimination, income inequality and poverty, disparities in opportunity, disparities in political power, and governance that limits meaningful participation.[8] This framework recognizes that colonial histories and legacies, structural racism, and discrimination are mutually reinforcing systems that operate in a socioecological cycle and interact on individual, interpersonal, institutional, community, and policy levels.

Material circumstances, largely influenced by the structural determinants of health, include factors such as the built environment and access to greenspace. The human-made built environment refers to where we live and go about our day-to-day lives; our homes, buildings, walkways, roads, bike paths, greenspace, and so on. There is robust evidence that supports the symbiotic relationship between the built environment and overall human health and wellbeing.[9] Within the context of the BC extreme heat event, the highest mortality was in deprived neighborhoods, which also had significantly less greenspace.5 It is clear that greenspace is a protective factor from the stress and trauma caused by extreme heat events.[5,10] Greenspace, however, is afforded to those who are materially privileged.[11]

Access to greenspace is deeply embedded in settler colonial laws and policies and therefore connected to the displacement of Indigenous communities: the conversation around access to greenspace and contemporary forms of community resilience “cannot

be separated from dispossession of Indigenous lands and resources''.[10, p299] Any climate health intervention that seeks to employ greenspace as a protective factor requires an upstream approach that also disrupts colonial policies controlling access to land. Greenspace interventions that fail to recognize colonial roots of land distribution during urban planning only compound health inequities and are unsuccessful in long-term systematic community-based progress. Greenspaces must be prioritized for those who are materially deprived.

A second major risk factor associated with increased mortality and climate anxiety from the extreme heat event concerned social isolation, or the lack of social connectedness.[5] Social connection refers to a multilayered construct composed of structural, functional, and qualitative aspects of social relationships.[13] All of these factors contribute to overall risk and protection of adverse health outcomes. During BC's extreme heat event, those who were socially isolated had a higher risk of mortality.[5] Social connections that facilitate regular communication with those who are socially isolated in their communities may be an early intervention for those most vulnerable.[14] The backdrop of the COVID-19 pandemic, however, riddled with campaigns to socially distance, complicated social cohesion at a time where it was needed the most. In addition to mitigating the acute realities of extreme heat events, social connection also plays an important role in improving emotional resilience to stress and trauma, benefiting long-term mental health overall.[14] As a modifiable protective factor, focus should be on identifying those who are most isolated, building strong community connections,[14] and moving away from the western individualist narrative. Interventions need to center the community and critically reflect on the societal norms and cultures that choose to promote individualist behavior as opposed to prioritizing collective lifestyles.

Learning from historical events

Though rare, extreme heat events are not new in the province of British Columbia. In the summer of 2009, temperatures reached 34.4 degrees Celsius and health authorities registered 455 deaths (from all causes and all ages) from July 27 to August 3, as compared to an average of 321 during the same calendar period the year prior.[4] Over a decade ago, the Environmental Health Sciences Division at the BC Centre for Disease Control was aware that "medical, personal, social, and environmental factors [are] associated with high vulnerability to the effects of heat".[4] Though outcomes from the 2021 extreme heat event were unparalleled for BC, learnings from the 1995 Chicago heat wave tell a familiar story. This heat wave was one of the most severe recorded in history.[2] Temperatures reached 120 degrees Fahrenheit (48 degrees Celsius) and led to 739 deaths over a period of five days.[15] Much like the BC heat event, during the Chicago heat wave, "geography was linked to destiny:" those living in deprived neighborhoods or those who were Black, low-income, and/or elderly, were most at-risk of death.[2, p250]

If evidence has long-supported that heat-related deaths are readily preventable, those with power in the context of climate and health action have a responsibility to implement past knowledge into future preventative action. This unjust distribution of impacts illustrates the larger architecture of the social and structural determinants of health. Future responses and preventative measures require contextualizing these risk factors, attributing them to the fundamental roots of disparities that endure during disasters.

Ways forward

Equitable greenspace

Two promising avenues for reducing inequitable heat-related mortality is improving access to greenspace and social connection. Greenspace alone is a well-established protective factor from ill-health effects caused by extreme heat events.[5, 10, 14] Notably, greenspace is also associated with improved social connection and community building.[16] Investing in greenspace targets multiple ecological levels and has potential to alleviate inequities. Not surprisingly, however, access to greenspace is afforded to high-income groups and deeply entrenched in settler-colonial laws and policies.[11, 17] Prevention efforts that seek to increase greenspaces and green infrastructure (i.e., green roofs, permeable pavements and community gardens) must pay close attention to this injustice, rooted in discriminatory land policies, and mitigate health consequences by equitable urban planning policy. When undertaking green infrastructure initiatives, it is imperative to consult and collaborate with First Nations communities, who have a deep understanding and knowledge of responsible environmental stewardship and rehabilitation.[18] Co-production of knowledge with Indigenous scholars and communities is key. Equally important is the recognition of Canada's colonial legacies and their lasting influence on the marginalization of Indigenous communities.

Social connection

Another useful approach to address improving social connection is the concept of collective lifestyles.[19] Public health interventions have largely focused on individual risk factors and disease prevention and therefore, current responses to extreme heat include public messaging to "cool off" and "wear loose clothing", implying that individuals are fully in control of health outcomes.[20] The concept of collective lifestyles recognizes the interplay between social conditions and individual behaviours that influence health outcomes,[19] illustrating how individual- and group-level attributes, together, shape unjust burdens such as inequitable heat-related mortality. Contemporary public health interventions, rooted firmly in colonial and neoliberal frameworks, must be cautious of individualized messaging and ensure there is a sense of shared and collective responsibility. Strong community connection is imperative for a sense of belonging and serves as a protective factor against health injustices of extreme heat events. Government and community agencies have an opportunity during pre-season planning to identify potentially isolated residents, clients, and patients receiving health and social services such as home care and food delivery.[14] Increased public messaging encouraging community members to check on their friends, loved ones, and neighbors are key actions individuals at every level of society can take.

Advocacy

Practically, advocacy work supporting public health objectives, such as increasing greenspace access and social connection in materially deprived communities, is key to removing inequities.[21] Through advocacy it is possible to foster mutually beneficial partnerships with public, private, and community actors in order to advance healthy public policy and legislation. This may involve advocating for increased funding for green initiatives and implementing by-laws for green infrastructure. Such an approach benefits multiple stakeholders by aligning policy directives and funding priorities to invest in action against climate change and to protect at-risk communities from future extreme-heat events.[21] Moreover, while there is consensus for Canada to collect race-based data to measure the extent of health inequities, this needs to be in tandem with efforts to dismantle systemic racism altogether. Proper assessment of populations at-risk for adverse health outcomes cannot be completed without addressing factors of race and ethnicity, especially in the context of climate emergencies and public health advocacy.

Conclusion

The social autopsy of the catastrophic June 2021 BC heat dome illustrates how climate change can, and will, continue to exacerbate health inequities. Through examining the high mortality rate in social and materially deprived communities, we have highlighted how risk of death is closely linked to upstream factors (i.e., greenspace, social connection), and is fundamentally related to colonial histories and policies. It must be realized that equitably mitigating harm from extreme heat requires a committed approach to understanding the social and structural determinants of health that put individuals at risk in the first place. Government and political leaders need to incorporate this lens when planning and responding to extreme heat events. Interventions should begin to focus on addressing these upstream determinants, rather than solely relying on individual-level actions. Now, more than ever, there is a great need to prioritize responsive research, practice, and governance mechanisms in order to support equity-informed solutions.[22,23]

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