Climate Change and Homelessness: Generating a Response Framework

Final Report – Year 1

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Executive Summary

"A changing climate threatens to undermine the past 50 years of gains in public health, disrupting the wellbeing of communities and the foundations on which health systems are built… These effects act to exacerbate existing inequities, with vulnerable populations within and between countries affected more frequently and with a more lasting impact."

(Watts et al., 2020, p.134 - The 2020 report of The Lancet Countdown on health and climate change: Responding to converging crises.)

Background

While climate change is having profound and increasing impacts on the health and wellbeing of all, the most marginalized individuals and communities feel its effects the most acutely. This is particularly the case for the many millions of inadequately housed and homeless persons globally. One of the many impacts of climate change and associated weather extremes is to compromise the housing and living circumstances of impoverished peoples. In turn, individuals lacking adequate shelter are the most exposed to weather extremes and the least supported in crisis response and risk mitigation efforts.

Objectives

The objective of this initiative is to synthesize the best available information and recommendations in order to: (1) enhance policy, systems and service level planning for homeless populations as it relates to weather extremes and climate change, and (2) increase research activity in this area, guided by syntheses of existing work and the articulation of knowledge gaps.

Results

- First and foremost, it would seem clear that climate change and associated weather extremes present significant and immediate risks for populations lacking shelter and, moreover, would seem to contribute to the prevalence of homelessness through housing loss, migration, poverty, and other intersecting stressors (e.g., conflict).
- These problems are likely worsening as the climate emergency worsens. These trends and impacts would appear to be complex – both in terms of the number of intersecting challenges that apply and diversity along subpopulation, geographic, and climate risk domains. However, there is a shortage of reliable data and analyses on these risks and how they are

unfolding, which hampers prevention and crisis response planning, policy development, and risk modelling.

- There is a consensus that effective efforts to intervene should concentrate on systemic responses to inadequate housing and a lack of shelter. This would seem to be the far more leveraged and impactful approach. In most contexts, such prevention work will need to occur alongside crisis response activities given the large and growing number of individuals displaced by weather extremes and exposed to the elements while lacking shelter.
- Inclusion and equity in crisis response will require advocacy and education in jurisdictions where homeless individuals are not considered in disaster planning and other risk mitigation efforts (e.g., green urban infrastructure). Planning and implementation should involve close collaboration with direct service providers and individuals with lived experience to develop effective means of engaging and intervening with these marginalized populations.

Key Messages

- Climate change has disproportionately more significant impacts on impoverished people globally, particularly those without shelter or otherwise inadequately housed. These impacts are particularly pronounced for girls and women, Indigenous populations, and low-income contexts.
- The millions of homeless, dislocated and exposed people suffering the effects of weather extremes represent a health and humanitarian crisis that is not being substantively addressed in existing disaster and risk mitigation plans.
- Mitigating risk exposure through the provision of adequate housing is paramount, followed by crisis response efforts that involve co-design approaches with the individuals and communities most affected.

Methodology

This project involved synthesizing two systematic reviews of the academic literature, alongside information gathering in a virtual think tank event with leaders in this field. Further work in the coming year will include convening further think tank events and knowledge exchange activities.

Report Overview

This report is divided into four sections. These sections include (i) a summary of the project background, objectives and methods, (ii) two systematic review reports, (iii) outcomes of the initial global think tank and, (iv) implications, conclusions, and knowledge mobilization activities. This final report concerning year one activities has been published on the project website (https://www.homelesshub.ca/climate-homelessness). Work within this grant will continue after this initial report, with a revised final report posted on this site that captures work done after March, 2021 – including an open access, published version of the second systematic review and updated information and materials related to ongoing knowledge mobilization activities.

Background - Summary

Climate science is an expeditiously advancing field with a large and diverse literature documenting the rapidly increasing global impacts of climate change. In these literatures, the health and social impacts of climate change and weather extremes are becoming clearer. Here, climate refers to weather variables, including temperature, rainfall, humidity, and wind speed occurring over time (Werndl, 2016). Weather extremes significantly impact human mortality (Huang et al., 2011; Peduzzi et al., 2012), illness prevalence and severity, and the progression of vector-borne diseases (Ogden, 2017). The human impacts of climate change and weather are social as well. These impacts exacerbate inequities (e.g., disproportionately higher effects on girls and women in all domains (Carleton & Hsiang, 2016), and influence interpersonal and intergroup violence (Hsiang et al., 2013), the quality of social and health infrastructure (Carleton & Hsiang, 2016), and migration (Cattaneo & Peri, 2016).

Homelessness, in turn, is a major global challenge. While exact numbers are unclear, it is estimated that over 100 million people experience homeless internationally, with another 1 billion experiencing precarious housing (United Nations, 2005). By definition, homeless people are the most exposed to weather extremes - alongside the social and economic problems caused by climate change. Despite the role of climate change and weather extremes in both driving homelessness rates and exacerbating the risks faced by people who are precariously housed and homeless, the intersection between homelessness and the climate has received very little attention in policy, public, and research forums. With most systems internationally struggling and typically failing to prevent homelessness and provide adequate supports to homeless populations (Polakow & Brooks, 2014), preparedness for the impacts of a changing climate on homelessness prevalence and morbidity and mortality within homeless populations would seem minimally developed. Broadly, the interaction between climate change and homelessness could be considered a wicked problem (Walls, 2018) that will require an analysis that takes a systems approach (Sterman, 2012). By a ‘wicked problem’, we mean one in which it is caused by multiple problems from individual to systems levels, is itself a cause of other social problems, and is complex to the degree that many singular, face valid solutions are unlikely to have an impact. In such scenarios, systems analyses are essential to articulate both the problem and the

combinations of solutions with the greatest leverage – producing the greatest impact for the finite resources that are available to be invested.

Objectives

This project, a part of the Living Within the Earth's Carrying Capacity initiative, had several objectives subsumed within the premise that it is important to consider the implications of climate change for homelessness and the observation that scholarship in this area is, to date, under-developed. These objectives are:

1) Systematically identify and synthesize the academic literature on the topic of climate, weather and homelessness specifically and climate, weather and housing precarity more broadly.
2) Identify and engage global experts on this topic and develop a network to inform the synthesis of information on this topic and the best strategies for associated knowledge mobilization activities.
3) Engage in a series of knowledge mobilization activities, grounded in the best available evidence and expert input, to: (i) raise general awareness about the importance of this topic, (ii) provide information to policy makers to inform policy development in areas of prevention, risk mitigation, and crisis response, (iii) provide tools for service systems and providers, and (iv) inform the research community and research funders about the major knowledge gaps in this area where more and better data are needed.

The intended outcomes of these activities include enhanced policy, systems, and service level planning for homeless populations related to weather extremes and climate change – both in terms of direct impacts upon homeless populations and the increased prevalence of homelessness resulting from weather change and extremes. Additionally, these activities intend to increase research activity in this area, guided by syntheses of existing work and the articulation of knowledge gaps alongside a fostering of new collaborations in an area where researchers are not very well networked.

Methods

Systematic Reviews

Two systematic reviews were completed in line with the objectives of this project. First, a focussed systematic review of peer-reviewed publications on the topic of homelessness as it relates to weather and climate change was conducted. This review was published in the Journal of Urban Health and is appended within this report – wherein the specific methods and findings are described. The second systematic review was at a higher level – concentrating on existing literature reviews, systematic and otherwise, that addressed weather and climate change more broadly as they were associated with housing and homelessness. The preliminary results of this systematic review are provided in this report, with the final published version to be appended in subsequent months once it has been peer-reviewed and accepted in an appropriate academic journal.

Expert Network Development and Global Think Tank

As a wicked problem, homelessness and climate change cut across several diverse areas in terms of pertinent bases of knowledge. There are:

-social and geographic implications as a function of infrastructure (e.g., low-income country versus high), environment (low-lying geographies vulnerable to sea-level change and storms, icecap melting threats to livelihood and transportation),

-complexities that attend domains of response including prevention and risk mitigation for populations vulnerable to climate impacts, disaster response, service system and related infrastructure pertinent to homeless and migrating populations, ethical and equity imperatives, policy demands and implications,

-considerations not only of how climate brings risk upon marginalized and homeless populations but also of how populations made desperate by adverse climates and homelessness impact environments,

-a concordant need for diverse perspectives that include experts in the area of the social and economic impacts of climate change, public health, prevention and intervention related to homelessness, cultural experts representing those communities most affected including

Indigenous representation, and lived experience experts who can speak from direct knowledge of exposure to weather change and extremes.

The original, pre-pandemic plan for engaging international experts proposed to use a web-based Delphi method to identify 10-12 global experts on the climate-homelessness intersection. These individuals were then going to attend a 3-day think tank event in Toronto, Canada where the Nominal Group Technique (NGT) would be used to review the existing knowledge base and generate a consensus strategy to move forward within policy, practice, and research domains. The onset of the pandemic had two substantive impacts on this aspect of the project strategy, aside from delays in project process and initiation, with it based out of a healthcare organization where capacity was strained due to pandemic response. First, the project needed to shift to purely digital engagement due to travel restrictions. Second, the project needed to pivot to address the pressures faced in all sectors by the pool of topic experts (and associated ability to engage in intensive survey processes) and the limitations posed by purely virtual engagement. While certainly disruptive with respect to the initial project plan, moving to fully virtual engagement allowed for the opportunity to connect with a larger group of global experts in ways not feasible if the event was in person. As well, impacts were offset by the responsiveness of the community of experts in this area despite pandemic-related pressures.

Accordingly, the search strategy proceeded with the following steps:

1) Email addresses were obtained for (i) the authors of papers in this area as identified through the systematic reviews, (ii) leaders and other point people in organizations, globally, that are involved in domains where the climate-homelessness intersection is pertinent – as identified through web search and consultation with project leaders, and (iii) leaders of homelessness-related organizations in countries most affected by climate change.
2) Emails sent to the individuals identified in #1 above, used a survey monkey survey to inquire if they are interested in participating, some basic information about their

work, and to make recommendations for other experts that they know of whom they believed we should engage.

3) We then contacted these additional individuals with the same invitation to participate as indicated in #2 above.
4) After the preliminary engagement was completed, a more in-depth description of the project was sent along with another brief survey monkey survey asking for preferences with respect to remaining in contact, being 'read only' – wanting to stay abreast of developments but not participate in meetings, and full participation.
5) The full participation group, identified in step #4, was invited to take part in one of two virtual orientation meetings with times set to accommodate different time zones. At these meetings, participants discussed major theme areas of interest and ideas/preferences as they related to how, as a group, they would engage one another and the types of outputs that would be helpful to generate collectively.
6) In parallel with the above steps, efforts were made to connect with Indigenous experts and organizations, internationally, to engage in co-leading the project and providing Indigenous-relevant information in the knowledge generation process – recognizing that this area is under-developed in the academic literature.
7) Also, in parallel with the above steps, an effort was made to connect with a prominent international climate think tank that might advise both on content related to the project but, more importantly, provide some mentorship on process.
8) A 4-hour think tank event was held on January 11th to which all participating experts from the steps above were invited. TAP Resources, an Indigenous-run event coordination business operating out of Six Nations, Ontario, was engaged to assist with the development of materials and activities for the event and the technical components. TAP Resources also advised on how to hold the event in a manner that recognizes the role of Indigenous communities as custodians and caretakers of the land and as communities facing the greatest impacts of climate change. The objectives of this event were to (i) foster relationships, collaboration, and alignment on collective goals, (ii) discuss and develop an articulation of key considerations (built upon themes identified in step #5) related to the climate-homelessness nexus, and (iii) draft next step actions for the group. The flow of the event included some

initial orientation elements, a series of brief presentations by participants across an array of topics, and moderated, discussions on the themes of climate/weather as a driver of homelessness, the unique and heighted exposure of homeless people to climate-related risks, and considerations related to the diverse geographical, political, and cultural domains where these risks are unfolding in different ways (see the meeting agenda in Appendix 1). The meeting was recorded, the recording link shared with the full group of experts some of whom could not participate, and the content was analysed using qualitative thematic analysis (Hsieh & Shannon, 2005).

9) Subsequent to this initial think tank, and to be reported in the second iteration of this project report, as a group, we will explore more targeted and smaller virtual think tanks – as a function of topic (e.g., disaster response) and domain (e.g., geographic, culture, gender).

Systematic Review #1 Open Access Link:

https://link.springer.com/content/pdf/10.1007/s11524-020-00483-1.pdf

Systematic Review #2

Summary Level Pending Completion and Publication of the Full Review

Climate change presents diverse challenges and has a range of negative consequences for human populations. Temperature and weather extremes have a significant direct effect on human health. Although climate change is a global concern, it influences some populations disproportionately. Socioeconomic disadvantage is one of the key determinants of vulnerability, with the homeless and precariously housed populations being particularly vulnerable to climatic events due to increased exposure and decreased ability to respond to natural hazards. This systematic review of reviews was conducted to examine broader issues of housing precarity and homelessness as they relate to climate change and weather extremes internationally. The question for the review was: What are the impacts and implications of climate change and weather for vulnerably housed and homeless populations globally as evidenced in reviews of the academic literature? A systematic review of reviews method was used to identify relevant peer-reviewed literature and to synthesize the current knowledge on the topic. The databases searched were Scopus, PubMed, PsycINFO, Web of Science, and Google Scholar. Of the 15 articles identified in this review, five were systematic reviews and ten were non-systematic. Most of the reviews had global or North American focus.

The key results of this review can be grouped into the following categories: risk factors for homelessness, climatic events, health, and structural factors and housing. First, there is an increased risk of homelessness for those vulnerably housed, and lower SES populations due to energy insecurity and due to climate change-induced natural hazards. Second, there is evidence that homeless and vulnerably housed populations are disproportionately exposed to climatic events, including extreme heat, cold and natural disasters. Extreme heat events are of particular concern as the capacity of public health messages to reach vulnerable populations is unclear. Further, homeless populations tend not to be included in disaster planning, exacerbating the issue of exposure. Lower SES groups also tend to lack the financial and social resources needed to recover from natural disasters, especially those leading to relocation. As to health, weather extremes and climate change are projected to increase incidences of infectious and vector-borne diseases amongst the homeless, who are both more exposed to infection and more vulnerable due

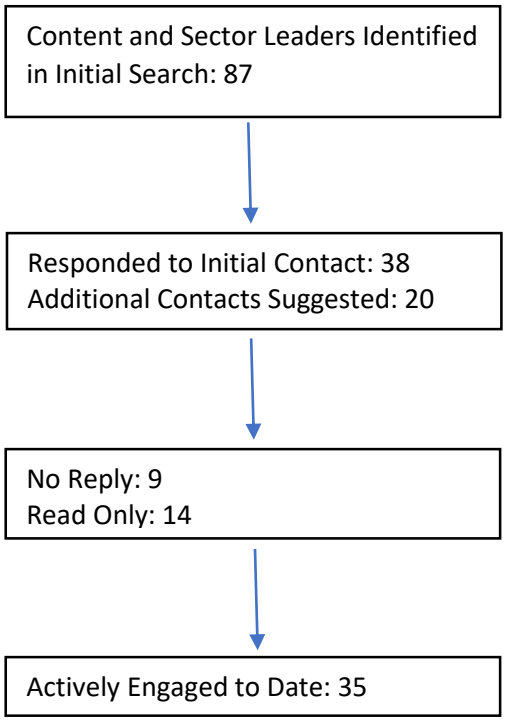
to pre-existing conditions. Mental health issues are also expected to worsen, largely due to the stress associated with extreme climatic events. Finally, when it comes to structural factors, there is evidence that green infrastructure has positive bio-physical and social effects for marginally housed and homeless populations. Housing quality also remains a large concern, especially as it relates to living conditions in urban slums.

Based on the synthesis of review results, a list of interventions was generated, organized according to the following four themes: homeless and vulnerably housed populations and weather extremes; housing and urban planning; research; and other. Further, we suggest that the Human Rights-Based Approach (HRBA) can be useful when developing programs and designing research. Within the HRBA framework, extreme poverty is considered to be a violation of human rights. The guiding principles of the HRBA (Accountability and Rule of Law; Participation and Inclusion; and Equality and Non-discrimination) focus on addressing the underlying structural issues and highlight the need to develop programs and research that are context-specific. These principles can be used to identify pertinent guiding questions that can aid in program development. Further, the interventions identified in this review can also be applied through the HRBA lenses.

Thought Leader Engagement and Virtual Think Tank Outcomes

Thought Leader Engagement

The global network generation effort, as described in steps 1-4 in the Methods, is summarized in the figure below with respect to numbers. This process, which took approximately two months to complete, resulted in the identification of 35 experts interested in being actively engaged and 14 experts interested in staying abreast of developments but preferring to not actively engage in events and the development of outputs at this time (read only). The final group is very diverse with respect to discipline and sector with representation from and expertise in nearly all major geographic areas wherein the climate and weather impacts upon homeless populations are most acute.



Alongside the above efforts a targeted search was done to identify Indigenous leaders in this area with outreach to individuals in the Canadian Arctic, Canada at large, the United States and Australia. This outreach was informed through advice from network members and a First Nations Elder at CAMH. The response to date, while generating some replies of interest in this area generally, did not generate a substantive engagement as of yet. However, a prominent Dene Elder who has substantial experience in both areas of homelessness and climate change activism

and response has engaged as a partner on the project alongside with project leaders with extensive contacts and experience – particularly in the Arctic where climate impacts are extensive. We will continue to explore avenues to deepen engagement in this important area. In this period we have also engaged a homelessness lived experience leader and advocate as a part of the project leadership group. Finally, with respect to getting content and process advice from a well-established global think tank, we have been fortunate to have engaged with leaders and staff of the Stockholm Environment Institute (www.sei.org) who have provided strategic advice on our work.

Think Tank #1 – January 11, 2021

A total of 20 individuals from the network generated through this project participated in the first climate-homelessness global think tank. The 4-hour event (agenda – Appendix 1) was recorded with presentations and think tank conversations thematically analysed for cross-cutting themes. These themes are summarized below.

Climate Change and Extreme Weather as a Driver of Homelessness – and the Role of Intersectionality

There was clear agreement with the group that climate change as it is reflected in a global increase in extreme weather events including storms, floods, increasing heat, dryness and fires, is leading to large numbers of individuals migrating and being displaced – into situations of inadequate housing and homelessness. “If the river floods they lose everything.” Challenges that attended large scale displacement included a lack of affordable housing stock, with trends of increasing housing costs in many countries, and an attendant loss of employment that compounds economic strain. Most importantly, in many contexts, such as Latin America and Africa, there is a lack of a “safety net” which might otherwise prevent individuals, families and communities spiraling into cycles of migration, homelessness, and severe poverty. It was expressed that such individuals are “disregarded.”

However, the discussion of weather extremes as a driver of homelessness was not one of simple associations. Climate change and extreme weather were consistently positioned as a key driver within systems of multiple forms of intersecting adversity. Drivers were described as "complex and diverse". Examples were given of Syria and multiple settings in Africa where increased draught emerged as a driver of conflict, with both leading to large populations of migrants and refugees who, in turn, end up residing in slums with inadequate supports and infrastructure. These individuals, in turn, end up even more exposed to weather extremes due to substandard and altogether lacking housing and shelter.

Exposure and Health Outcomes

Discussion concerning the health challenges that arise when individuals are exposed to weather extremes was not extensive, perhaps because those risks are obvious. Nonetheless, there was some discussion of the myriad health problems associated with (i) heat extremes and attendant chronic dehydration (e.g., kidney disease), (ii) the mental health impacts and resulting demoralization resulting from lost housing, employment and shelter, and (iii) increased mortality in highly adverse conditions such as large slums where climate and conflict migrants seek shelter – in such settings when weather extremes occur, "people die, especially the children."

Inequity, Structural Discrimination, and Malfunctioning Systems

A large part of the discussions in presentations and in the think tank session concentrated upon the need to consider the climate-homelessness nexus through rights and systems lenses. Indeed, as one participant expressed it – with a good deal of agreement – "dealing with the consequences of climate is the wrong starting point." This discussion centred on the need to address the "structural conditions that create vulnerabilities" as the main priority and with issues such as disaster response, specifically, as secondary. Within this theme, conversations included inequities with respect to water access, with lower income individuals and communities increasingly deprived of publicly accessible water across both urban (e.g., Los Angeles) and rural settings. This conversation included a discussion of large corporate interests involved in the design of public infrastructure, that might discourage access to free public water (e.g., beverage corporations). Another large, structural theme that emerged was a discussion about how, in Latin America, countries are being categorized as middle and upper middle income despite very large income disparities – leading to less attention to and resource for extremely impoverished

populations that are struggling to the greatest extent with climate impacts. Such structural inequities and the associated lack of resources compound climate and weather related risks. For example, safety in a disaster response situation requires access to resources such as a cell phone, transportation, temporary housing, and documents – resources to which homeless and marginally housed individuals have very limited access. Furthermore, structural inequities *within* homeless populations were described as not uniform or equal for all. For example, individuals with physical disabilities will face considerably greater challenges coping with climate change and adjusting to and escaping weather extremes – both in terms of immediate safety and also in terms of housing with accommodations and access to medications in disaster situations. Gender was also addressed in this context, highlighting that women and girls face immediate gender-based violence risks in the marginal situations individuals face in weather extremes – alongside a constellation of risks that emerge from longstanding exposure to systematic inequities and discrimination that girls and women face globally. The discussion of how these structural inequities persist concentrated on "political apathy" related to homeless populations – due, in large part, to such individuals, families, and communities having minimal if any power and influence within societies and political systems.

Research

There was a general agreement that the topics of climate change and extreme weather as they intersect with homelessness is fundamentally under-researched. This was considered to be true across specific topic domains and geographic contexts – there is a clear lack of data to inform service, system, and policy response and to inform advocacy and awareness-raising. Relatedly, there was a discussion about the lack of platforms and networks through which experts might communicate and collaborate and limited funding for the kind of research that is needed – particularly in some of the hardest-hit regions, such as is the case in Africa. With respect to research methods, one point of discussion in terms of population-level data was how difficult it can be to generate accurate information regarding the prevalence and living conditions of homeless and transient populations. Regarding methods to provide information relevant to risk mitigation and intervention strategies specifically, there was wide agreement that there is great value in co-creating solutions with individuals with lived experience and engaging in a sufficient

depth of inquiry to ensure that a given intervention is relevant to homeless populations – for whom standard types of approaches seldom transfer effectively.

Risk Mitigation and Response

The discussion about approaches to prevention and response efforts related to climate change, weather and homelessness concentrated more on general principles than specific activities. These general principles included:

-Embedding approaches within existing models and networks and avoiding adding new work and content into already under-resourced sectors.

-Integrating a trauma-informed approach in any work in this area, something considered necessary given the very high prevalence of trauma amongst homeless and marginally housed populations.

-Taking a holistic approach to both inquiry as well as intervention design wherein the process of inquiry can assist with healing along with the interventions themselves. This included designing approaches that encompass humans and non-human organisms and the land – with examples given from Australia wherein Aboriginal engagement greatly assisted with this process.

-Further to who should be engaged, expanded discussion on the topic of Indigenous engagement highlighted the many strengths of Indigenous communities in responding and adapting to change and challenges, including traumatic experiences – with examples given from Australia where core roles for Indigenous collaborators were very beneficial. More broadly, “listening to lived experience” and engaging individuals who are or have been homeless was deemed essential. Examples were given across global contexts where, for such populations, crises are being experienced “all the time,” and climate and weather pressures were often considered (if at all) as just one more crisis on top of many others. This served as a reminder regarding the gap that can happen between researcher, provider, and policymaker intent and what is relevant for and actionable in ‘real world’ contexts. Finally, lived experience engagement was described as an effective tool if employed properly to break through policy maker and public apathy.

Regarding specific initiatives, some of those discussed included the development and testing of a peer-peer model for outreach related to weather and disaster risk in Australia that included co-designed resource kits and provider education. There was also some discussion of the success of disaster-related efforts to reduce domestic violence in Sri Lanka and the potential for solution generation in Africa should some of the fundamental structural and information gap challenges be addressed.

Implications

Weather extremes, which are increasing in frequency and reflect global climate change, are a pervasive cause of human suffering and mortality and decreased economic output (Watts et al., 2020). Downstream impacts, such as threatened food security, further threaten human health and wellbeing. Most germane to the current project is the manner in which climate change and associated weather extremes intersect with and exacerbate existing economic and social disparities. This project has explored the issue of homelessness as it intersects with climate change, building upon the centrality of adequate shelter as one of the fundamental determinants of health. Homelessness is a pressing global concern affecting millions (United Nations, 2005), with inadequate shelter leading to far greater vulnerabilities to weather change and extremes and factors such as drought, severe storms, and rising water levels leading to climate-driven migration and homelessness. To date, this work has included two systematic reviews of the academic literature and a virtual think tank in which international experts on the climate-homelessness connection participated.

Where to Start

The problem that climate change poses with respect to homelessness is, fundamentally, a wicked problem (Walls, 2018). It is wicked given the large number of interacting variables and processes that comprise the climate-homelessness nexus and its many health, social, environmental, and economic outcomes. Accordingly, as is the case with wicked problems, a dynamic systems lens (Sterman, 2012) is arguably the most helpful way to understand the problem and its possible solutions. Applying a systems analysis has several implications:

1. Prevention strategies should be prioritized. Interventions to reduce the harms of extreme weather faced by individuals experiencing homelessness face many substantial barriers to implementation and effectiveness. Providing evidence-based strategies, such as housing first (Aubry et al., 2015) and evidence-informed slum upgrading strategies (Hensen et al., 2020), to reduce or altogether prevent marginalized, impoverished people lacking adequate shelter from the elements hold a great deal more promise. Prevention efforts would also extend to establishing methods for predicting climate-driven migration (Robinson, 2020) and initiating strategies to either support adaptations that allow individuals and communities to stay in place or plan organized relocation into adequate housing and infrastructure – preventing relocation into

outright homelessness, slums, and refugee camps. The conditions surrounding climate change as it relates to homelessness, from a systems perspective, are ones of risk and damage increasing exponentially through a positive feedback loop (Sodhi, 2016) – referred to in some forums as a 'vicious cycle.' In such a system, the complexity, expense, and effectiveness of intervening follows the same curve – with cost and challenge increasing exponentially the further action moves away from the time in which preventing and mitigating risk might have taken place (Sodhi, 2016; Sterman, 2012).

2. Recognizing the reality that the opportunities for prevention in its purer form have passed in most contexts and actions must be taken in the context of wicked problem-type systems, identifying and acting upon points of leverage will be essential in the generation of solutions. Herein is the rationale for the generation of better data with which simulations of various climate-homelessness risk scenarios might be formulated. Given the human and economic costs associated with "real world" experimentation, evidence-derived simulations will likely be critical to identifying leverage points for different problems/contexts to target tests of interventions (Zellner & Campbell, 2015).

3. Apathy and resistance to addressing problems like homelessness as it relates to climate can arise due to several factors. Some likely relate to the stigmatized, disenfranchised, and disempowered nature of those directly affected and a tendency for societies to neglect the complex interdependencies that place the housed within the same system as those who are not housed. As stated by systems scholar John Sterman (2012): "We cannot have healthy firms, a healthy economy and healthy people if growth and the pursuit of profit destroys the environment, and we cannot have a healthy environment if people live in poverty, ill-fed, without decent housing, healthcare, education, or economic opportunity" (p. 26). This inclination towards "othering" reduces the motivation to act and is readily evident in responses to forced migration (Grove & Zwi, 2006). Apathy and resistance can also arise from the fundamental nature of systems themselves, which do not align well with cultures of policymaking. Systems characteristics such as their evolving and non-linear nature, with complex interdependencies and feedback loops, trade-offs and counterintuitive processes, confound common policy intervention narratives and the motivations of policy makers (Sterman, 2012). The implications of these considerations related to policy as it relates to addressing the climate change-homelessness

connection include (i) emphasizing the importance of connecting homelessness-related responses to larger, systems-focused efforts to address climate change, and (ii) through the generation of better systems-level data, education, and advocacy, promoting the shift towards leveraged, systems interventions that are likely to be far more effective than those to which current policy practices gravitate. In the current pandemic context, COVID has perhaps illuminated systems dynamics to the public and policymakers moreso than has been the case for many decades – herein may be the opportunity to promote fundamentally different approaches to climate change in line with the commentary above (Watts et al., 2020).

4. In parallel with the rationale for considering the homelessness-climate nexus from a dynamic systems perspective, is the need to apply a rights-based framework in the generation of systems-oriented responses. The Human Rights Based Approach (HRBA) is one such framework that embraces a systems lens (Mann et al., 2016) and aligns with much of the thinking in this area as was observed in the systematic reviews and the think tank undertaken in this project. Within the HRBA framework, extreme poverty and individuals living without adequate shelter is a human rights violation, making prevention and intervention an obligation as opposed to charitable activity as homelessness response is too often framed. HRBA solutions are articulated at three levels: Accountability and Rule of Law; Participation and Inclusion; and Equality and Non-discrimination. This orientation can help guide efforts from a rights perspective and are likely to produce better outcomes on all levels – be it leveraged design, rigour of engagement, or ensuring the engagement of those most affected.

5. Considering the systematic review findings, those from the global think tank, and the systems and ethics framing of how the climate-homelessness connection might best be considered, the meaningful engagement of Indigenous leaders and communities are also indicated. There are two overarching reasons why Indigenous engagement will enhance efforts to prevent and intervene in the climate change, extreme weather – homelessness problem. First, Indigenous peoples globally are amongst those most affected both by climate change and homelessness due to histories of genocidal colonialism – in terms of human and environmental impacts. As central stakeholders in this domain alongside the ethical prerogative to address these abuses, Indigenous engagement will be crucial. The second major reason why Indigenous engagement is important relates to the cultural embeddedness across Indigenous communities

and histories of understandings of responsibility, justice, and ecological interdependencies (Ali et al., 2021; Whyte, 2018). Such framings of issues pertinent to the climate change implications for homelessness align far better to the dynamic systems theory and human rights-based approaches discussed above than the predominant public and policy discourses that have, to date, failed to rise to the global climate emergency (Watts et al., 2020).

Recommended Actions

Most broadly, recommendations that emerged in both expert discussions and in the systematic reviews lined up with systems recommendations about how to address homelessness generally. There was recognition of the need, especially in the beginning, to ramp up prevention activities while continuing to develop and apply crisis services with the expectation that as prevention activities engage the need for crisis response will gradually decrease. In the think tank there was a consensus that efforts to reduce and eliminate homelessness is the priority, thus reducing the numbers of individuals exposed to weather extremes. This approach is the most leveraged – engaging individuals before the above-mentioned 'vicious cycle' of adversities place individuals in situations that are much more difficult to address. While a priority, there is also clearly a need to intervene with individuals who are already homeless and with the large numbers forced from their homes due to climate change, weather extremes, and intersecting adversity (e.g., violence and infrastructure decay).

Thematically, there was a good alignment with the Human Rights Based Approach (HRBA). At the accountability and rule of law level, while there is clearly work to be done to address varying degrees of political apathy and limited response to climate change, the role of government was described as crucial to: (i) establish funding mechanisms for intervention and research broadly as well as prioritizing the transfer of funds to low income contexts between and within countries while assuring the responsible use of funds at local levels, (ii) establish policies (e.g., building practices with respect to structures and housing locations, affordable housing) to support both climate risk mitigation and housing access, and (iii) develop strategies from prevention to disaster response based on risk modelling that is intentional in efforts to include

individuals lacking housing and other subpopulations who face greater adversity such as girls and women, and Indigenous populations. On the themes of participation and inclusion, there emerged a general agreement on the need to prioritize the engagement of individuals who have experienced homelessness in both risk mitigation and emergency response strategy development. This was seen as essential to the design of approaches that are relevant and to facilitating access to those who are most exposed – who would be overlooked or otherwise not engaged in efforts that do not properly account for impoverished people. Other considerations in the HRBA domain of participation and inclusion, alongside equality and non-discrimination, include targeted engagement strategies for specific subgroups (e.g., girls and women) and ensuring that strategies don't further marginalize (e.g., the problem of green space and water access approaches implemented in high-income locations or driving housing costs up). This latter domain (and, likely others) may involve the need for policymaker decisions to counter corporate interests. Considering stakeholders at the level of countries and regions, it is clear that there are representation disparities (e.g., the least research has been done in some of the most affected locations, such as the African continent). This reinforces the need for the HRBA framework to be applied at the global level, again drawing on the centrality of systems interdependencies and the likely failure of policies that reflect xenophobic public and political perspectives (Ribot, 2020).

Starting from the frame of prevention as it relates specifically to climate change associated risks, several specific activities emerged. **These included:**

-The development of climate change adaptation strategies in rural areas to prevent, where possible, migration to urban environments where homelessness or inadequate shelter leaves individuals and families more exposed to weather-related threats and the exponential challenges that mount for displaced and impoverished populations.

-Generating strategies to address energy insecurity (e.g., cost of cooling) that contribute to evictions, migration, and homelessness.

-Recognizing the deleterious health impacts associated with the stress of having to make trade-offs between basic needs for food, water, housing, and energy; generating strategies to ensure

adequate access to the means of meeting these basic needs. This will include the provision of adequate and appropriately located land and housing for low-income urban groups. New low-cost housing should be designed in alignment with the strategies employed by the urban poor to adapt to the climatic demands of their regions. City-based rent control policies should be explored alongside incentives for landlords to improve low-cost rental housing quality.

-Addressing building modifications and standards in the anticipation of the impacts of increasing temperatures generally and heat wave events. While this is a general recommendation, it will be important to ensure that these modifications encapsulate dwellings pertinent to homeless populations such as shelter and support environments alongside temporary and supported housing settings.

-Preventative policy recommendations extended beyond building standards to include urban planning and regulatory frameworks on land use and infrastructure standards, referencing green infrastructure. These were domains in which risks were flagged with respect to uneven distribution and paradoxical impacts on impoverished communities (e.g., driving up housing costs). Intentional and inclusive design in this area will be essential to ensuring that risk mitigation efforts do not leave homeless and marginally housed individuals unable to benefit or experiencing further inequities as a result. This is an example of an area where inclusive planning will be an essential consideration. It was also noted that green infrastructure strategy generation has concentrated largely on European and North American urban contexts and greater efforts are needed to consider how they might transfer to low-middle income cities where some of the greatest climate change impacts are occurring.

-The generation of data-informed prevention activities with specific attention paid to generating data on the risks faced by marginalized populations. Given the histories of marginalized groups being excluded from most large-scale data generation activities, in most jurisdictions targeting and re-designed data strategies will be necessary. More inclusive data will lead to improvements in regional and local climate modelling, development of effective early warning systems, and application of the geographic information system to improve vulnerability assessment, hazard and risk zonation, and land-use planning – with relevance to low income populations. This will include national policies to support preparation for climate change-related migration – policies

that accept that migration could be domestic or international and account for regional capacities and inequalities.

-All of the prevention activities described above will require multisectoral collaboration within and between governments, adequate funding, and consistent engagement with vulnerable groups.

Considering approaches that are less in the frame of prevention and more aligned with crisis response, several intervention domains were highlighted:

-Considering climate-driven migration, it may be the case that the most marginalized and impoverished may not be able to feel compromised areas. The needs of these individuals, likely living in states of crisis, need to be factored in to response planning.

-It would seem well-established that, as a function of their lacking shelter and living in particularly exposed locations (e.g., urban heat islands, slums), homeless and marginally housed individuals experience particularly deleterious outcomes due to weather extremes and climate change. These impacts arise at points of intersecting risks – related to the weather itself, secondary impacts such as violence, food insecurity, disease, and compromised health that reduces physical and psychological resilience. Accordingly, these populations have pressing and unique intervention requirements in terms of food and water security, means of escape from weather extremes in various forms, and the ability to engage with and be found through conventional relief efforts. If the climate-related risks of homeless populations are to be addressed, targeted risk assessments will be required alongside intervention tailoring to ensure that these populations do not fail to benefit from or are further harmed by climate response efforts.

-Some specific strategies to consider in this area include increasing access to cooling and warming centres with emergency power generators, improved host strategies, tailored methods for disseminating public health messages for homeless populations, engaging in outreach activities to provide basic necessities, and educating service providers regarding climate-related risks and responses.

-The processes through which specific interventions, such as those described above, should be intentional with respect to including the most marginalized generally but also specific in recognizing the unique needs of the multiply marginalized (e.g., girls and women; individuals with physical disabilities). Planning likely needs to address the fact that, for individuals experiencing homelessness, being in crisis is a constant state and there be less recognition of climate change needing attention and as relevant given the demands of daily survival.

-To generate relevant and effective interventions, it is recommended that individuals with lived experience of homelessness be meaningfully engaged at all levels – from researching needs and approaches through to peer-peer outreach and policy design.

-With respect to system and care provider engagement on climate and weather-related crises, it will be important to design approaches that align well with existing resources, systems, and perspectives – recognizing that in under-resourced and fragmented service contexts, implementing new approaches is extremely challenging.

-Given the traumatic nature of homelessness, regardless the cause, it is recommended that all approaches to address the climate and weather-related crises of this population take a trauma informed approach. This framework is increasingly in the centre of homelessness responses globally, and involves fundamentals such as the awareness of the influences of trauma on individuals and groups, an emphasis upon safety, opportunities to rebuild control, and strengths-based approaches (Hopper et al., 2010).

-With respect to research regarding crisis response, domains of focus should include in-depth, comparative studies looking into specific and unique vulnerabilities, both generally and as they emerge in disasters, alongside tests of the effectiveness of interventions. Research should also include examination of how communities experiencing homelessness perceive risk, prepare for disasters, and respond to warnings, supports, and crisis response.

Conclusions

The work on this project to date focussing on the climate change impacts and implications for homeless populations has provided what is likely a reliable synthesis of the academic literatures on this topic and some preliminary guidance from international experts. Several major themes have emerged through these sources of information. First and foremost, it would seem clear that climate change and associated weather extremes present significant and immediate risks for populations lacking shelter and, moreover, would seem to contribute to the prevalence of homelessness through migration, poverty, and other intersecting stressors. These problems are likely worsening as the climate change emergency worsens. Additionally, these trends and impacts would appear to be complex – both in terms of the number of intersecting challenges that apply as well as diversity along subpopulation, geographic, and climate risk domains. However, there is a shortage of reliable data and analyses on these risks and how they are unfolding, which hampers prevention and crisis response planning, policy development, and risk modelling.

Second, there would appear to be a consensus that effective efforts to intervene should concentrate on systemic responses to inadequate housing and a lack of shelter. This would seem to be the far more leveraged and impactful approach to reducing the impacts and threats that climate change poses for impoverished populations. Such prevention work, in most contexts, will need to occur alongside crisis response activities given the large and growing number of individuals displaced by weather extremes and exposed to the elements while lacking shelter and with compromised health. Inclusion and equity in crisis response will require advocacy and education in most contexts where homeless individuals are not considered in disaster planning and other risk mitigation efforts (e.g., green urban infrastructure). Planning and implementation should involve close collaboration with direct service providers and individuals with lived experience to develop effective ways of engaging these marginalized populations and implementing strategies that are relevant to a given context. While these activities that are targeted to homeless and at-risk populations will be essential to reducing mortality and morbidity associated with climate change, it will be essential to integrate this work in broader risk

mitigation and response efforts. Artificially considering homelessness as a somehow separate entity will likely lead to ongoing stigmatization, inefficiencies, and reduced effectiveness.

Knowledge Mobilization

Knowledge mobilization activities related to this project will include:

1. Publication in open-access peer reviewed journals of the two systematic reviews (at the time of this report one is completed and another forthcoming).
2. Developing a website to be used for disseminating all outputs from this project: https://www.homelesshub.ca/climate-homelessness. The Homeless Hub is the largest repository for homelessness-related research, practice, and policy guidance.
3. Generating evidence briefs for policy and practice audiences that will be translated in multiple languages. These briefs will be shared with global networks through general and targeted approaches. As well, efforts will be made to engage relevant Canadian policy makers, specifically, on the implications for Canada.
4. Collaborating with project leads and network experts to develop a letter calling attention to these issues to be submitted to a high impact publication.
5. Giving a webinar and talks at a range of meetings/forums on the work completed to date.
6. Using CAMH and Homeless Hub media channels to engage the public on key findings and implications.
7. Exploring points of collaboration for future grants and initiatives.

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