WHAT WE HEARD:

Perspectives on Climate Change and Public Health in Canada

Supplementary report for the Chief Public Health Officer of Canada's Report on the State of Public Health in Canada 2022

Mobilizing Public Health Action on Climate Change in Canada

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Executive Summary

The Chief Public Health Officer of Canada (CPHO) has identified climate change as a pressing public health issue. To better understand the impact of climate change on population health, the CPHO commissioned HEC Research and Consulting to prepare this *What We Heard* report. Our report is based on the analysis of 21 one-on-one interviews and two focus groups (with four and five participants respectively) with key public health experts across Canada. Our data collection and analysis explored the contributions of public health to understanding the impacts of climate change on the health and well-being of people living in Canada, examined the role of public health systems in climate change adaptation and mitigation, and identified how public health systems need to be strengthened to undertake this work. The views expressed herein do not necessarily represent the views of the CPHO/Public Health Agency of Canada.

As evident in the words of the experts we spoke with, which are woven throughout this report, our findings show how the work of public health systems is critical to understanding climate impacts on health and well-being. We heard that there is a central role for public health systems in climate change adaptation. Diving deeper, some experts stated that while public health has a role in responding and adapting to climate change, to be successful, this needs to occur within a broader governmental commitment to mitigating the core drivers of climate change. The framing of mitigation using a public health and well-being lens was highly recommended. We also heard that there is an urgent (and corresponding) need to strengthen public health systems' visions, strategies, capacities, funding, and abilities to actively engage in decolonizing action, and embrace other systems of knowledge regarding human well-being and planetary health.

We began our conversations with the experts by asking them about their greatest hopes and fears with respect to public health system responses to climate change. Their greatest fears included the following:

- Inertia and maintaining the status quo, which included a fear of doing little or nothing and ignoring the voices that need to be heard to address the climate crisis;
- Lack of decision-maker understanding of the scale and interconnectedness of the climate change crisis and associated public health impacts; and
- Polarization and fragmentation rather than cohesion and a united effort to mitigate

and adapt to the health impacts of climate change.

While these fears may seem alarming, the experts had practical solutions, which were expressed through their hopes for a healthy, equitable future. They emphasized that such a future would be possible by having the power, capacity, and funding to:

- Embrace an "all hands on deck" intersectoral approach to the climate challenge;
- Ensure public health and climate change are a part of all conversations, policies, and decisions that are made within public health and across policy domains; and
- Proactively mobilize knowledge into action.

The experts suggest several areas of potential contributions across public health systems. These include the following:

- Greater public health leadership centring on decolonization, justice, and equity;
- Enhancing political will and public health courage in climate action;
- Strengthening intersectoral collaboration and community engagement;
- Shifting values and moving to health and well-being economies; and
- Championing upstream policy work and legislation.

Such solutions, however, are not without their challenges and barriers. The experts identified several. They recognized that there was risk associated with speaking out about public health and climate change. They wondered whether public health systems should be independently governed or at least arm's length from government structures to be free of fear of repercussions, or whether more and better work could be accomplished within these structures. The experts were seriously concerned about the challenges they were already encountering with respect to climate change disinformation, misinformation, and issues of power, politics, and polarization. Also not surprising were the expressed challenges of limited funding, material resources, and human resources for climate change action. Many noted that they were working "off the sides of their desks" rather than being permitted to focus their time and energy (and that of their staff) on the public health issues associated with climate change impacts, even when there were governmental mandates to do so. The challenges around working in silos, mandates without support, and jurisdictional fragmentation were echoed across the diverse participant pool we heard from. This led to a final key challenge that was noted: underestimating the mental health impacts from climate change, and subsequently being wholly unprepared and understaffed to address this growing issue for public health staff themselves, as well as the detrimental impacts of climate change on the mental health and wellbeing for all.

Given these fears and hopes, as well as the challenges and potential contributions of public health systems in Canada, experts who participated in this report underscored the urgent need for healthy, equitable environments. To reorient public health in Canada to meet this need, seven thematic recommendations emerged as follows:

1. Decolonize public health.
2. Embrace multidisciplinary approaches and diverse expertise in public health decision-making for climate action.

3. Create collaborative spaces for knowledge exchange on public health and climate change.
4. Establish participatory, solutions-focused climate-health training and knowledge hubs for climate action.
5. Reorient surveillance in service of local climate action.
6. Implement accountability measures for climate change inaction.
7. Offer dedicated funding and resources for climate-health work.

What we heard clearly from the experts across the public health field is that big, bold, transformative action is needed now, action that is aligned with both the science of climate change and the knowledge systems of those that have lived in good relations with the environment. Five cross-cutting themes provide the foundation and direction for articulating policies, mandates, and actions for public health systems in Canada:

1. Human health and well-being depend on healthy ecosystems.
2. Systemic drivers of negative health outcomes and climate change overlap and must be addressed.
3. Barriers to addressing climate change in public health are known and must be addressed systemically.
4. There is vision and local leadership for addressing health and climate change within the public health field, if it is given the latitude, capacity, and investment to rise to the challenges.
5. Public health and well-being must be embedded and mainstreamed in decision-making across all sectors and all levels of government.

The key messages from these public health experts underscored that public health and climate change require a focus on equity, justice, adequate funding, political commitment, and cross-sectoral partnerships. There is also an expectation that fundamental changes in our socioeconomic structures are needed to rebuild our relationships with each other and with our planet. There was clear consensus around a collective desire to target attention on the upstream determinants of health (i.e., political, economic, legal, colonial, and racist factors); the need to embrace a wider, multidisciplinary view of how public health intersects with these determinants; and the importance of giving primacy, vis-à-vis time and resources, to those often less tangible determinants.

In summary, this report is a compilation of the discussions that we held in early 2022. Experts offered thoughts on current and potential public health systems' roles and contributions, and the challenges and barriers to addressing climate change with the strength and agility needed for strong leadership in climate action. Fears, hopes, and practical solutions were discussed and analyzed. Together, these reflections offer strategic recommendations for public health leadership across all levels of government across Canada to transform how we support public health systems' actions in the climate space. Participants emphasized that this transformation is urgently needed to tackle the enormous issues confronting us.

Abbreviations and Definitions

CAPE: Canadian Association of Physicians for the Environment

CPHO: Chief Public Health Officer of Canada

IPCC: Intergovernmental Panel on Climate Change

LGBTQIA2S+: Lesbian, gay, bisexual, transgender, queer and/or questioning, intersex, asexual, two-spirit, and the countless other affirmative ways in which people choose to self-identify with their gender and sexuality

OCPHO: Office of the Chief Public Health Officer of Canada

UN: United Nations

UNDRIP: United Nations Declaration on the Rights of Indigenous Peoples

WHO: World Health Organization

Anthropogenic Climate Change: Anthropogenic climate change results from human activities. While the climate has changed throughout the geological record, anthropogenic climate change is the additional and accelerated change to the Earth's climate caused by human activity, especially the burning of fossil fuels, the removal of carbon storage through land use changes, and the release of other greenhouse gases.[1]

Decolonization: While colonization involves one group of people taking control of the lands and resources of another group, and imposing the colonizer's language, culture, and educational, legal, health, economic, and governance systems on them, decolonization is about removing or undoing the damage that colonization has done/is doing.[2]

Intersectionality: Kimberlé Crenshaw coined the term to mean "a lens through which you can see where power comes and collides, where it interlocks and intersects, not as performative questions about identity and representation but as deep structural and systemic questions about discrimination and inequity. It's not simply that there's a race problem here, a gender problem there."[3] An intersectional approach involves recognizing that a category like "woman" is insufficient for understanding the unique experiences of discrimination and oppression that an Indigenous woman might experience in contrast to a white woman, or a gay Black woman with disabilities might experience in contrast to a heterosexual, Indigenous woman who is not living with disability. Working toward health equity must be intersectional.

Intersectoral collaboration: As defined by the Public Health Agency of Canada, intersectoral collaboration is "the joint action taken by health and other government sectors, as well as representatives from private, voluntary and non-profit groups, to improve the health of populations. Successful intersectoral initiatives have early engagement…with a clearly stated purpose… of potential partners from sectors outside health, as well as from different disciplines and levels within the health sector…".[4]

Planetary boundaries: The planetary boundaries framework defines the ecological limits to a safe operating space for humans and life on earth. Nine boundaries have been proposed, and as of mid-2022, five of them have been crossed because of human activity: climate change, loss of biosphere integrity, land-system change, altered phosphorous and nitrogen cycles, and introduction of novel entities (synthetic chemicals, including plastics). Climate change and biosphere integrity are core boundaries, the crossing of which is driving the Earth into a new, inhospitable state.[5]

Planetary health science: "Planetary health is a solutions-oriented, transdisciplinary field and social movement focused on analyzing and addressing the impacts of human disruptions to Earth's natural systems on human health and all life on Earth".[6] It is "based on the understanding that human health and human civilisation depend on flourishing natural systems and the wise stewardship of those natural systems".[7] Indigenous health researchers and practitioners, Elders, and Knowledge Keepers have been engaging in planetary health science and practices that are in keeping with a healthy planet since time immemorial.

Reconciliation: Reconciliation is, at least theoretically, a vision to create common ground between Indigenous and Canadian ideals. It involves "establishing and maintaining a mutually respectful relationship between [Indigenous and non-Indigenous] peoples in Canada. For that to happen, there has to be awareness of the past, an acknowledgement of the harm that has been inflicted, atonement for the causes, and action to change behaviour".[8]

Preamble

The generative work of this report, including the extensive conversations with key experts through interviews and focus groups, has taken place across Canada, a country that is largely unceded Indigenous territories. Thus, the authors of this report, all of whom identify as white settlers, are grateful to live and work in the traditional territories of diverse Indigenous Peoples, specifically, the lək̓ʷəŋən speaking Peoples of the Esquimalt, Songhees, and W̱SÁNEĆ First Nations as well as K'ómoks First Nation and the traditional territories of the Neutral, Anishinaabe, and Haudenosaunee Peoples.[i] At the same time, we acknowledge that we are uninvited land occupiers who by virtue of our identities contribute to the multiple manifestations of settler colonialism in our society. Collectively, we have a deep appreciation for Indigenous Peoples' close and continuing relationship to the land and waters that we live upon and we are committed to a lifelong learning journey toward becoming good guests here. We begin this report with a story about this relationship that we heard from one of the experts we spoke with:

i Heather Castleden is a Professor in the School of Public Administration and holds the Impact Chair in Transformative Governance for Planetary Health at the University of Victoria; she is the Scientific Director and Principal of HEC Lab Research and Consulting; Isaac White and Jennifer Otoadese are Research Associates of HEC Lab Research and Consulting.

> “When the First People first walked this territory, they got to know the water, they got to know the land, the plants, the animals. So that was the connection to the environment and that was the primordial setting where they became mentally, emotionally, physically, and spiritually strong. […] Our ancestral story is really about how to support health, it’s about public health. … From the origins of my people, there’s been this blueprint of how to support health promotion, what to do for prevention. … I see all those things as interlinked, but really that connection to the environment is … the beginning of that foundation. And when our land, or water … the climate is changing around us … if we heal that relationship, I mean really, really taking that step way back, in terms of going upstream, going right back to the beginning … [we need to be] resetting, relearning, and also healing that relationship.”

Anthropogenic climate change is having serious, widespread, and diverse impacts on human health, from the individual to the global population, from the physical and mental, to the emotional and spiritual health of all peoples. Climate change joins biodiversity loss as a core planetary process breaching the safe operating space for human beings and non-human life on this planet unless urgent action is taken to mitigate it. The Intergovernmental Panel on Climate Change (IPCC) has declared that “the scientific evidence is unequivocal: climate change is a threat to human wellbeing and the health of the planet. Any further delay in concerted global action will miss a brief and rapidly closing window to secure a liveable future”.[9]

> “If you look at what the UN [United Nations] has been saying the last few years, they constantly talk about the triple ecological crisis. … When the WHO [World Health Organization] says it’s the greatest threat to health in the 21st century, why aren’t we taking them at their word? Why aren’t we accepting that? Why aren’t we treating it that way? If you look at all the resources we threw at COVID, which killed about half the number of people in two years that pollution kills every year … where are our priorities? If this is the greatest threat to population health in the 21st century, let’s start treating it like that.”

The health impacts of climate change are resulting from extreme weather events (e.g., heat domes, droughts, flooding, tornadoes), wildfires, sea level rise, permafrost thaw, and increased risk from zoonotic and vector-borne diseases. These threats have direct, environmentally-mediated, as well as indirect, deferred, and displaced health impacts, including: heat-related illness; insecurity in access to water, food, and medicines; respiratory disease; cardiovascular disease; stress, uncertainty, and mental illness (including post-traumatic stress disorder); and exposure to infectious disease.[10]

While all people living in Canada are affected by climate change, not everyone is affected in the same way or to the same extent. Social and ecological determinants of health – economic stability, education, health care, clean air, safe drinking water, sufficient food, and secure shelter – are inequitably distributed across populations. Structural factors (e.g., for those experiencing poverty, stigma, and discrimination, living in less safe neighbourhoods, and working in occupations with higher risks), as well as sociodemographic factors (e.g., gender, age, sexuality, and disability), all impact health risks and are exacerbated by climate change.[11–16]

Introduction

Each year, the CPHO produces an independent report on the health of people living in Canada, which is provided to the Minister of Health for tabling in Parliament and released publicly. The report is an opportunity to examine the state of public health in Canada and to stimulate dialogue about priorities. The 2022 report, titled Mobilizing Public Health Action on Climate Change in Canada, focuses on the health impacts of climate change as well as the role of public health systems related to climate change.

To inform the report, the Office of the CPHO (OCPHO) requested the development of this *What We Heard* report to gather a range of perspectives on issues of climate change and public health. The views expressed herein do not necessarily represent the views of the CPHO/Public Health Agency of Canada. Through interviews and focus groups, we spoke to 30 university-based researchers, public health practitioners, leaders of non-governmental public health organizations, municipal to federal government public health employees, community leaders, and medical practitioners (see Annex A–E). Their collective and consistent message is distilled in this statement:

> “Climate change is the greatest threat we have to our collective health.”

Given the urgency of mitigating climate change and reducing adverse health impacts, the CPHO was particularly interested in the current and potential contributions and roles of public health systems related to climate change, as well as the opportunities to act and challenges in doing so. This urgency was eloquently articulated by one of the participants we spoke with:

> “This is not an exercise in ecological modernization or greening business as usual that’s going to carry us through the gathering storms on the horizon. And by gathering storms, I don’t mean stuff our grandchildren are going to have to face. Barnosky and colleagues have a paper from 2012 in the journal *Nature* that showed cascading ecosystem collapse sometime between 2025 and 2045.[17] This is imminent, and we’ve mostly sat on our hands for the last 20 years. Public health still labours under this egregious fiction that some combination of moral suasion and better data and surveillance systems will carry the day. And yet, we’ve got decades of evidence that it’s far from that. Not only does it not carry the day, but it’s also actually been actively used to postpone action under the guise that we always need better data and better surveillance systems and better monitoring and all the rest of it.”

Scientific consensus and reporting on health and climate change has increasingly implored nations to strategically embed climate change into all decision-making, including public health (see the recent Health Canada report titled Health of Canadians in a Changing Climate: Advancing Our Knowledge for Action.[1,18] The candid interviews and insightful reflections on the current state of public health and climate change provided in this report offer guidance for the pivotal role public health leaders, practitioners, researchers, and policy-makers can have in transforming action on climate change in Canada.

> “The game that we’ve been hesitant to get into is that kind of more uncomfortable game that lobby groups in general are happy to deal with, whether they’re on our side or not on our side. And I understand and I can accept a part of that reserve. But I don’t have to accept that [a CEO of a company] has the latitude to say whatever … they want, and I’m going to say only the things that I have a reference list of 50 peer reviewed papers to back up, it doesn’t make any sense. So, I come back to our moral authority and what we have in terms of position in society is based on the fact that people trust us. Especially as physicians, part of our job is to exercise judgment, exercise that clinical judgment that we work for 10 or 15 years to develop and then lifelong to improve.”

From the experts' responses to our questions, we have woven their research, experiences, stories, hopes, and fears into a clear call for action. Intersectional theory[ii] inspired our approach to identifying key experts across Canada.[19] They bring an understanding of their own intersectionality and an opportunity to begin to explore some of the many diverse perspectives on the health impacts of climate change.

Their words can inform the foundation for the necessary bold, structured, systematic, creative, exploratory, and experimental pathways to a healthier environment for all people living in Canada. Through their narratives, decision-makers at all levels of government have the opportunity to further conversations and inform action, including enacting networks, guidelines, policies, legislation, education, and the necessary support structures to implement transformative systems for climate change mitigation and adaptation.

ii We employed Kimberlé Crenshaw's (1989) influential scholarship on the meaning of intersectionality with respect to how race, class, gender, and other individual characteristics "intersect" with one another and overlap – not as performative questions about identity and representation but as deep structural and systemic questions about discrimination and inequity. Please see the Abbreviations and Definitions section for an elaboration of this term and other key terms.

Why Public Health and Climate Change?

We asked the experts why they agreed to participate in this *What We Heard* report. From all their responses, it was clear that they saw climate change as the most significant threat to public health of our time and that public health systems need to raise awareness and act on climate change as a public health issue.

> "Climate change is the most quintessentially important priority for public health, to start finding its feet in becoming a much more prominent, bold voice for taking action on the certain population health implications of a changing climate.
>
> The majority of people believe that [climate change] affects them in some way, but they don't actually recognize that climate change is a health issue. … So [this report can] raise awareness about the idea that climate change is a health issue … to move people's needle on what they'll support in terms of public policy … because we care about our families, we care about ourselves."

Public health experts across the country in a variety of positions – chief medical officers, Canada Research Chairs, leaders of relevant non-governmental organizations, spanning urban, rural, and remote contexts, and involving Indigenous and racialized public health experts – spoke about why they chose to participate.

> "We need to really fight for the needs and the well-being of the generations that are not yet here. [They] that are not yet born to fight for their own needs will still be impacted by the decisions that are made today.
>
> Public health does not have climate change really on its radar. And further, [it is] not prioritizing how Indigenous people are getting impacted by climate change. That's a really big concern because Indigenous communities are going to suffer some of the worst impacts of climate change in Canada."

Many stressed the linkages of public health with ecosystem health, planetary health, and planetary boundaries, and a desire to situate public health and climate change in this larger context. They vocalized the importance of recognizing planetary health as essential to human health, and they want all people living in Canada to recognize that climate change is a health issue.

> "We need far more work on [ecological impacts], particularly for the planetary boundaries … both in the science first of all, and then in translating that into public policy."

Many stressed the complex linkages that have always existed in our living systems, but cannot be a barrier to action.

> "Climate change is a fact, the impacts are real, there are a million and one uncertainties. … We need to learn to navigate complexity without it inhibiting us to the point where we're not saying what needs to be said."

While experts generally focused on climate change adaptation as the priority for public health action, many explained that work on adaptation is eroded without mitigation efforts. Without life-sustaining ecological targets, the impacts on critical Earth-system processes remain, and undermine the adaptive capacity of communities and the public health adaptations proposed.

Hopes and Fears: Public Health and Climate Change in Canada

We asked the experts to share their greatest fears and hopes with respect to the future of public health and climate change. Understanding these fears and hopes reveal strengths and weaknesses in public health structures in Canada. Additionally, participants have drawn a detailed picture of the opportunities for – and threats to – an effective Canadian public health response to climate change that supports the solutions we identify later in this report. What's interesting here is that while the expressed fears may seem alarming, the experts also had practical solutions, which were expressed through their hopes for a healthy, equitable future. For each fear and hope, we summarize what we heard and provide illustrative quotes from many perspectives.

Greatest Fears

Participants' fears were largely an extension, or a compounding, of existing barriers with respect to efforts to address climate change in the public health sphere. Three key fears emerged:

1. **Inertia and retention of the status quo,** which included a fear of doing little or nothing and ignoring the voices that need to be heard to address the climate crisis.

> "Have you seen the movie *Don't Look Up?* … There you go, it's in that movie. And I literally, I feel like we're almost there."

Participants stated that current practices are increasingly insufficient to adapt to climate-i nduced public health risks. Barriers to equitable and transformative adaptation policies include maintaining governmental silos, continuing with outdated public health and climate science education, privileging the power of fossil fuel companies, persisting with the dominant economic model of extraction and growth, and prioritizing a western way of knowing. (See also the "Challenges and Barriers" section under "Key Findings" later in this report.)

> "It's really about the foundations of our society, the capitalist system, the culture of extraction – and we need to change that. How do we do that?
>
> We just keep reporting data back … but as a physician, I can't just keep coming into the office clinic room and saying, 'Your blood pressure is elevated today, see you later.' We need a care plan, and we need a care plan with our communities and our patients in ways that are going to make a change."

2. **Lack of decision-maker understanding and action concerning** the scale and interconnectedness of the climate change crisis and associated public health impacts. Participants said that without an integrated, whole-systems approach to health and climate change, there will be insufficient near- and long-term planning, implementation, and coordination across Canada leading to inequitable and ineffective responses.

> "My biggest fear is that we just keep on going as is and we don't actually do anything. Because I think the lives lost, the lives harmed, and the extreme human suffering … it will be unimaginable for people to actually see what happens I think we're already in an era of loss and damage, we're just watching endless loss of life, endless suffering, and the species, like it's just in this really horrible place. And yet, somehow, we're still okay with it."

While the above quote refers to a general lack of public health action around the climate crisis, the following quote from another participant speaks to the type of political action that is needed and yet is not undertaken:

> "One thing that's been frustrating is to see the limited scope to take into consideration the health consequences of decisions, such as expanding the use of fossil fuels. I'd say that one of the concerns that I have is that I and a lot of my colleagues and a lot of other people we deal with, see a very great relevance, and that doesn't really have a place to be recognized."

3. **Polarization and fragmentation,** rather than cohesion and a united effort to mitigate and adapt to the health impacts of climate change by focusing on core drivers.

> "Public health is under attack in some provinces … and there's this climate change denial that we all know is being fuelled by the fossil fuel sector. So, my worry is that with public health that we won't actually be able to get out there and do what we need to do."

Experts noted the lack of equitable, inclusive, and participatory approaches that integrate climate action into public health decision-making in a cohesive, community-driven effort.

> "I really think that diversity-related initiatives in public health related to who's in positions of power and who's around the table are important. So, including women, there's evidence that shows that when you increase the number of female decision-makers, they're generally speaking more likely to make pro-environmental decisions, and also making sure that racialized communities, Indigenous communities are at the table, and also making sure that young people are at the table all the way up.
>
> To me, societal collapse is not at the end of the day about constrained energy or food shortages, or whatever. Societal collapse is really about a failure to work together in a spirit of 'we can roll up our sleeves and do this,' and that's the part that scares me the most."

Finally, there was a shared sentiment from many experts regarding the fear of neglecting the core drivers of the global public health emergency that is climate change. Specifically, they reference the fundamental problems of economic growth, capitalism, and colonization.

> "We're not going to turn this fundamentally unsustainable ship around by just doing emergency response risk management … that doesn't fundamentally question the core drivers.
>
> If we don't address capitalism, if we don't address colonialism, racism, the patriarchy, et cetera, we're going to tread water for a long time until we eventually drown … I can't see how much longer we can make believe that we're doing our job as public health practitioners with regard to climate change without addressing those fundamental systemic underpinnings of what got us here and what's continuing to lead us in the wrong directions."

These core drivers of climate change – extraction, capitalism, and colonialism – were also described as the root of polarization and fragmentation witnessed recently in public health. The hopes described below provide insights and propose resolutions, or antidotes, to counter the fears identified above, notably creating equitable spaces for designing integrated strategies, policies, and actions.

Greatest Hopes

Hope, as Jonathan Lear described it, "can be the foundation for collective social and political action."[20] The hopes expressed by participants encompassed such a vision of collectivism, with four central themes highlighted.

1. **Envisioning a sustainable, equitable future that centres the health and well-being of people and natural systems.** Experts shared ideas around visioning a post-carbon world. This included using a scenarios approach to imagine what could be created by building community, linking food, infrastructure, health, and well-being.

> "In my more hopeful moments, I think that this crisis, plus our capacity to be proactive, will be the combination that we need to move … into [a future] that steps into the fullness of the challenge of living in sacred reciprocity with all life."

This proactive design work advocated by experts revealed a desire for spaces to be created within public health to put knowledge of climate change and well-being into practice. For example, experts recommended designing public health responses with health, equity and environmental co-benefits, as well as doing scenario work that embraces other ways of knowing and therefore expands the menu of proactive response options.

> “In western futurism, we are used to thinking about a dystopian world, where with the impacts of climate change, we wouldn’t have access to food anymore, we would be invaded by aliens, or there would be an apocalypse or whatever. But Indigenous futurism – and Afrofuturism – recognizes that we are already living the apocalypse, we’ve already lived through an alien invasion that has taken control of our world and destroyed it. … Indigenous futurism offers a way of imagining the future without colonization and asking ourselves how we can get there.”

Expanding on the ideas of embracing other ways of knowing, many experts stressed that supporting Indigenous self-determination, recognizing Indigenous Peoples’ rights, and supporting adaptation based on Indigenous knowledges are critical to reducing climate-change-related health risks. The hopes expressed included embracing Indigenous understandings and practices in public health, by linking health with healthy natural systems.

> “Indigenous leadership is central. … The lands managed by Indigenous people have been significantly healthier biodiversity-wise and otherwise than lands managed by non-Indigenous people … because Indigenous people, what is connecting them is that connection to the land, and their perception of how understanding health is connected. So planetary health is only touching it superficially … planetary health is getting close to really realizing that we need to take care of the environment to be healthy. But Indigenous people are understanding that … we need to find the balance and live better. That sort of stuff should be in public health.”

2. **Having the power, capacity, and funding to embrace an “all hands on deck” inter-sectoral approach** to climate change and public health, recognizing that public health crises are connected. Experts agreed that the current ways of being and doing in public health are increasingly insufficient to adapt to climate-related health risks, losses, and damages. With sufficient funding and direction, the opportunity for public health includes centring health and well-being in decision-making across sectors, and advocating for equitable and transformative adaptation policies that safeguard it. Decentralizing power to place-based, community-level work was also a common thread.

> Government changes every four years, right. I think we need to decentralize public health action into municipalities and local governments to really have some kind of action here. And there's very good examples of such action. For example, in Quebec, there's the Direction de santé publique de la Montérégie, who has worked on Health Impact Assessments of municipal projects that were not health related, totally support municipalities to design different projects and have positive impact on population health … I think this is where public health should put their efforts.
>
> [We have] opportunities like this to design a better future, design a better way of doing business or different economies, different energy systems, different technologies related to how we connect and move. … And so, if there were ways for us to [support] people starting to drive big system changes where they can be trialled in small locations.

3. **Enacting integrative conversations, policies, and decisions across all sectors.** We heard participants express a clarity of vision to achieving public health for all. A common sentiment is that inclusive processes involving multiple and diverse knowledge-holders as well as coordination across institutions are key to a resilient public health system in Canada under current and future climate scenarios.

   We also heard examples of participants' intersectoral leadership approaches. Those individuals commented that their success resulted from a convergence of years of personal and professional experience coupled with a vision for what a healthy future could be.

> Public health is doing all this work that is totally related to climate change … the intersections are there. …Some health units are doing really well, really engaging in land use planning and transportation planning, where we become a partner in co-developing policies and plans and strategies that fold all of the things that we need to create healthy, sustainable communities into our work.

4. **Moving knowledge into action by utilizing the reports, assessments,** and work we have and getting to the actions and recommendations resulting from this work. We heard from all participants that public health must be bold and courageous in its advice and actions regarding climate change.

> "We really need to stop with the information gathering because we already have all the information we need. It's out there already. Stop with the information gathering and the report writing and actually start moving into the training, the funding, the resourcing."

Specific actions emerged from experts' reflections on their hopes, including (i) moving knowledge into action, by building on existing climate change and health expertise within the public health field; and (ii) codifying the WHO statement – that climate change is an urgent and existential threat to health and well-being – in policies, decisions, and public health promotion.

Key Findings

In our interviews and focus groups, we asked the experts to speak about the current and potential roles and contributions of public health in climate change adaptation and mitigation. As we learned about what they saw as the main possibilities, we asked if they saw any challenges or barriers to operationalizing the work needed to achieve the contributions. There were many barriers identified, and we have outlined these in the report. But the experts did not stop at just identifying the challenges and barriers. They also offered practical solutions and several recommendations, which we detail toward the end of the report.

Across this rich data set, our findings are presented along with representative quotes from participants. During our analysis we listened to where there might have been differences of opinion amongst the experts. For the most part, their messages were congruent. We did see that there were differences in the perspectives of the scope of public health responsibilities in relation to climate change adaptation and mitigation (i.e., ranging from support for health promotion messaging to systems-level transformation). Another difference of opinion arose as to whether there was a need for more data or more surveillance on the connections between human health and climate change to make policy decision. The overwhelming majority felt that additional research is not a precondition for immediate action on public health and climate change.

Current Roles and Contributions of Public Health in Addressing Climate Change in Canada

An early area of focus during our data collection was the current role of public health systems in Canada and the contributions they make concerning climate change adaptation and mitigation. The experts we spoke with were enthusiastic about the public health champions already doing the work. They noted that these champions need clear mandates, networking opportunities, endorsement from senior administration, and protected time to focus on advocacy.

> Making adequate space for climate change and the ecological determinants of health has been a bit of an uphill battle in public health circles … [but] there are some champions, as there are on many issues, in a number of health units who are really chomping at the bit to do more. They're ahead of the curve, and they just need a bit of legitimizing rhetoric to give them the space to do what they already know needs to be done. … What we need to be doing is figuring out how we embolden the champions and connect them to each other so they don't feel so isolated, because many of them are the only ones in their area that are really chomping at the bit to do this work.

An example of such championing was described by one of the focus group participants:

> I participated with the [municipality's] climate mitigation plan … and whenever I sit around these large multi-stakeholder tables, I always feel like I'm trying to bring a health lens to the topic, but also a health equity lens.

Predominantly, we heard that the current roles of public health in climate change adaptation and mitigation include advocating for health equity, increasing awareness about the public health impacts of climate change, building bridges with other departments (e.g., agriculture, transportation, infrastructure, heritage, conservation), and convening tables for knowledge-sharing, vulnerability assessments, and action plans.

There was also general agreement among participants that public health should be focusing on prevention, rather than just disaster response management, as can be seen in the following representative quote:

> We don't spend nearly enough or not the same amount of resources, anyway, on things like health promotion, which are actually intended to do the prevention upstream, before they become things that we have identified as problems.

Moving upstream to concentrate on the broad determinants of health requires public health systems to embrace a holistic or comprehensive systems-thinking approach. Public health should have a strong leadership role in this regard, but according to participants, this has yet to extend to the intermediate and distal determinants of health:

> If you try to move, so-called upstream … and you say, 'Well, housing, where's public health in the housing conversation?' Well, it's not. It hasn't been really a prominent voice, and so climate change is even more distal or upstream than that, and all-encompassing.

The desire to address these determinants was clearly shared among participants but having to deal with public health issues as acute emergency responses is the reality for most, from the local to the national scale.

> "There's an aspirational role that I think public health can have, and then there's the practical role that is, in fact, ending up attending to crises that create a very proximal emphasis and a very linear emphasis of where there's a technical focus on how can we prevent hazardous exposures as compared to how can we promote the living systems we depend on to continue to do it, and to exist?"

According to the experts, two of the main easons public health systems have not yet taken on strong leadership roles in the upstream determinants of health are time and capacity to work at the interface of disciplines and sectors.

> "The role of public health to be able to have time and capacity to attend to those less proximal and more distal and upstream issues has been extraordinarily constrained.
>
> [It] would be very valuable for people to understand that for public health to really be effective [it requires] good policy people who are working across departments or across jurisdictions or across disciplines to work on policy changes that we need, that are good for population health, as well as for climate change."

While the experts noted the current contributions of public health in the context of climate change adaptation and mitigation in relatively positive terms, the contributions themselves were limited and so were the experts' remarks.

> "I don't think [public health] takes the next step at all. … I don't think it's made that leap to any extent that I can see meaningfully. It remains in that space where it's responding to the healthcare system … it's not responding to climate change."

In essence, when we asked about the current situation, most went straight to speaking about the *potential* role and contributions of public health systems in terms of responding to the need for climate change adaptation and mitigation.

Potential Roles and Contributions of Public Health in Addressing Climate Change in Canada

An exceptional breadth and depth of responses concerned the potential role and contributions of public health systems to address climate change adaptation and mitigation in Canada. We grouped the responses into five areas of potential roles and contributions:

- Increasing public health leadership that centres on decolonization, justice, and equity
- Enhancing political will and public health courage in climate action
- Strengthening intersectoral collaboration and community engagement
- Shifting values and moving to health and well-being economies
- Championing intersectoral policy work and legislation

Each of these areas are expanded on below with examples and quotes from participants.

Increasing Public Health Leadership that Centres on Decolonization, Justice, and Equity

While the experts expressed serious concerns about the limited role and current contributions of public health systems in relation to climate change in Canada, there was substantial enthusiasm, passion, energy, and desire to see public health take on climate action leadership roles with a strong focus on justice, decolonization, and equity. Notably, experts said there is no singular approach to climate change. For that reason, public health ought to engage with diverse knowledges and perspectives in all adaptation and mitigation interventions. Several experts raised the point that public health must not only appreciate the wealth of Indigenous knowledges in understanding and addressing climate change but find ways to strengthen relationships with First Nations, Inuit, and Métis leadership, from the local to the provincial, territorial and national levels.

> "The Public Health Agency of Canada can do a lot better in working with the major national Indigenous organizations. It's a huge gap with all levels of government. … It's important to talk to the three national bodies, but each of the provinces and territories have Indigenous leadership that's really, really important because it's a different perspective to live in different regions and have different needs. The different cultural and geographic and climatological histories and current situations are really important. So that is essential, you need the Indigenous leadership there and guiding the way on that."

The experts underscored the problematic relationship between injustice, systemic racism, and climate change vulnerability. They also noted who needed to be taking responsibility in these spaces.

> “All of the measures with health co-benefits, or a lot of them, are starting to be integrated into public health work to a relatively large extent, and that’s great … and that’s where we start to think about power, and power will push back, and that’s where we need to get much, much braver. And so, we’re starting to see a little bit of that around conversations around environmental racism, which is great. But it should not be Indigenous communities that are having to make that point; it should not be racialized communities that are having to make that point.”

They explained that it will be the most vulnerable populations who will face the most severe health impacts of a changing climate, such as those from the global south, Indigenous Peoples, racialized people, people facing housing or food insecurity, people with disabilities, the LGBTQIA2S+ community, older adults, children, and other groups experiencing inequities.

> “The poorest, the most vulnerable will be hit harder. So we have a duty to protect the population and this is through working on inequities. There are many studies [that] have shown that the less inequities in societies, the more resilient is the population and less hard it will be hit when a crisis comes.”

The troubling relationship between climate change and health consequences related to weather variability, such as extreme heat, was particularly noted as an issue for public health. At the same time, they noted a lack of policy-oriented and action-based decisions in this area.

> “It is the vulnerably housed and the unhoused who are already facing the real consequences of weather-related climate … climate-induced weather variability, things like heat, heat waves. … [There’s] very little conversation about [those] health impacts, and so public health, from a national level on down, needs to be at that table and part of the conversation and really using its leverage and influence to be pushing for more investment where the investment is needed most.”

Along these lines, some experts specifically detailed the potential for an increase in adverse health outcomes related to housing vulnerability and inadequacy as severe weather patterns intensify because of climate change. They recommended using the available data to understand and communicate the risks as well as focus interventions using evidence-based decision-making.

> "The 30-degree heat per se is not going to kill people. Thirty-degree heat experienced by people who are underhoused, socially isolated, materially deprived – this is the killer. I think that the more and more we can bring that data out, we can understand the risk and direct our interventions effectively, especially when we still are presented with such a finite basket of resources to direct to the issue."

The experts recognized that there are and will be many challenges around climate refugees as climate change intensifies. Yet only a few of the experts discussed the ways in which public health needs to develop structured plans to prepare for and support both internal and cross-border climate refugees who experience diverse health effects. This conspicuous "silence in the data" was noted in a participant's quote below.

> "The issue of climate refugees … it's not yet part of the discussion and it's something that I really want to put in the discussion. But I have to do some convincing around my organization that this is going to be a public health issue and that we have to start preparing now. We should have started a long time ago."

Those who did raise the topic underscored the fact that public health must approach all climate refugee interventions with an equity lens.

> "The global south will continue to be disproportionately affected by climate change. And yet it's the global north and the developed countries who are the biggest contributors to climate change. And so, having this on the radar of yes, there's a lot of local work for us to do, but it's also being mindful that every new refugee immigrant new to Canada, new to our region, is coming with additional health effects of climate change because of this global systemic issue."

Enhancing Political Will and Public Health Courage in Climate Action

The potential for enhanced political will and public health courage in climate action was a dominant theme among the experts we heard from. Specifically, several experts expressed how amplified public health voices and collective climate action from the local to the national is crucial for adaption and mitigation.

> We haven't created the space for public health people to be courageous. I think it's a big, big shift that needs to happen, where we support and actually demand that public health step firmly into the prevention territory. And I don't think public health is firmly occupying that space in Canada.

Considering the accelerated rate at which climate change is intensifying, many experts described how public health should address climate change adaptation and mitigation with the same urgency and concerted effort as COVID-19.

> There should really be a political will [for climate change], the same way that it stepped up to deal with the challenge of COVID in Canada in a fairly respectable way.

Some of the experts wondered how to communicate best practices across jurisdictions so that public health officials, professionals, and practitioners can make informed decisions about how best to care for populations while taking necessary action on climate change adaptation and mitigation.

> How can we spread and scale best practices to give public health doctors the courage to be able to truly speak on behalf of their patient population, on issues of real relevance to power and to politics? Because right now, they're just not doing it.

In response, others described how public health needs to be more courageous with respect to immediate action on climate change.

> I think we've tended to be constrained by what I will call the 'tyranny of the feasible.' We've tended to look at what we can do in our own bailiwick … but if we stay stuck under the thumb of this kind of tyranny of the feasible, I think we're not blue-skying it enough and we're not being bold enough. The scale and boldness of our responses don't match the scale and urgency of the challenges we're facing.

Many of the experts also emphasized that public health has a role to play in collecting data and evaluating the health impacts associated with resource extraction and fossil fuels. Experts noted the current lack of public health presence in spaces where decisions are being made that could have adverse health consequences for humans and non-human species, as well as the overall health and biodiversity of ecosystems and the environment. Experts further shared that public health has the potential to have a greater voice in such spaces and take on heightened data collection, communication, and advocacy roles related to the varying health impacts associated with fossil fuels and resource extraction.

> "The major conversation around mitigation we're not having here, is questioning … support for the fossil fuel industry in terms of subsidies, in terms of just turning a blind eye to the public health relevant externalities. … Public health in Canada needs to start making noise and collecting data on the local health impacts of resource extraction, creating policy proposals associated with that, and making sure that those studies integrate traditional knowledge as a partner to western knowledge because we actually need it."

Strengthening Intersectoral Collaboration and Community Engagement

Several experts supported the idea that addressing climate change adaptation and mitigation effectively will require greater intersectoral collaboration and community engagement. Many specifically spoke of the ways in which public health could take on stronger leadership roles in this area by bringing people together to implement rapid and collective climate change action.

> "Public health more than any other sector … has always pushed the notion of 'health in all policies,' and so by that alone, public health, ostensibly, would want to be involved in any kind of intersectoral collaboration or response when it comes to a whole global, whole ecosystem kind of threat to human health and well-being. … So Canada's national housing strategy, for instance. Where is public health in that? … Where is [public health in] adapting Canada's housing strategy to the certain consequences of a changing climate when it comes to housing [and] housing standards?"

We heard the potential for public health to work across sectors, with communities, and engage with planners and emergency services to develop and implement adaptation and mitigation plans at local and municipal levels.

> If we don't work together with people who are planning the wastewater management system and the drinking water management system, and the forestry and the emergency services and the fire service, if we don't work together around public health, we keep co-creating problems that just escalate and accumulate. Everybody relates to health, so public health could really be in the leading role of bringing people together.

Despite the desire for intersectoral collaboration, many participants recognized that there were challenges to operationalizing that desire due to departmental and bureaucratic boundaries.

> Practically speaking, a lot of public health people want to be making the connections, but they are literally not given the mandate or the permission to because it's not seen to be within their box.

Many experts identified the ways in which public health is well positioned to facilitate strong community engagement and intersectoral collaboration to operationalize climate change action – if they are provided the mandate and resources to do so. However, it was heavily emphasized that public health needs to increase efforts toward implementing strategic plans to work synergistically across sectors in support of swift and bold adaptation, mitigation, and overall emergency preparedness.

> There's going to have to be something that allows public health people to help other people to do their work because working upstream means public health people have to work with non-health-sector allies, to enable them to achieve what they can in public health. Them doing their job is going to help public health do their job, and that's going to have to be a partnership.

The notion that public health cannot address climate change in isolation from government and non-public-health sectors was expressed by several of the experts we heard from. Notably, many stated that public health could play a potential role in generating increased collaboration with different levels of government and partnerships with allies outside the public health sector to work on climate change adaptation and mitigation from the ground up and the top down.

> You have to work the ground and work with people and understand where they are … and public health actors should be working as the elevators between the levels, the facilitators between the levels, the translators between the levels, because on-the-ground issues are intersectoral. On the top, they're silos. So you have to make them work together.

Several experts also highlighted the potential for public health to enhance its role in working intersectorally toward greening infrastructure and the built environment.

> "We should be supporting the emerging green economy. So public health should be finding ways to partner with low-meat agricultural systems and diet and food premises. It should be finding ways to partner with clean green transportation systems, obviously, with public transportation, with people who are building affordable sustainable housing, with obviously clean green energy systems. … We want that [emerging green] economy to replace the old economy."

Shifting Values and Moving to Health and Well-Being Economies

Many experts we heard from highlighted the importance of shifting dominant societal values and transitioning to health and well-being economies if meaningful action is to be taken on climate change adaptation and mitigation. Experts noted the potential for public health to take on leadership roles in this area and advocate for the types of value shifts that would foster equity, health and wellness for human and non-human species, as well as robust ecosystems and environments.

> "Ultimately, there are three core values in western society, and for that matter, in global society, that have to change. One core value is about growth and materialism. The second core value is liberty and individualism, which has to be rethought because the kind of individualism that is preached by neoliberals is part of the problem. It advances the individual over the collective, it says 'as long as I get what I want, bugger you,' and it leads to a huge number of problems, and it undermines the collective process. A third core value that has to change is around our separation from nature, and somehow, we're separate and apart from nature. And I'm sure there's two or three other important ones, but those to me are the three most important."

The above-noted core values, which are undermining public health and well-being, are known. But public health systems have been successful in reorienting societal values. For example, public health research and communications have changed our societal relationship with tobacco products.

> "We've actually done core values shift in public health. We did it around tobacco … so, what's a health-based perspective on liberty, on growth, on relationships with nature? And that latter one in particular, a lot of connection there to Indigenous values, Indigenous beliefs and understandings and all of that. … How do we shift to a one-planet society? We can't do it if we don't shift those core values … and if we don't, then we are well into that existential threat and large population die-offs on the horizon."

Some experts noted opportunities for public health to increase their voice in conversations about economies and the metrics used to evaluate and measure success in Canada. We heard about the potential for public health to collect data and construct narratives about the healthy co-benefits of transitioning to health and well-being societies.

> "I've helped to put together a letter with the Canadian Public Health Association … calling for an overall transition to a well-being-oriented economy, so that we can all at least have that set of metrics as a sort of overall evaluation of our achievement as a country and as a society. Because I don't see how we're going to otherwise de-silo enough and also direct funding in the most helpful ways if we don't really transition our society to a well-being focus."

Championing Intersectoral Policy Work and Legislation

Several of the experts we heard from emphasized the need for public health systems to not only advocate for but engage in upstream, intersectoral policy work on health and climate change adaptation and mitigation. Many drew explicit attention to the ways in which public health and climate change should be a fundamental aspect in all decision-making processes pertaining to policy development.

> "There should be a climate lens to everything. Every major ministerial portfolio has climate change impacts and that is essential to consider, so having a 'health in all policies' lens and a 'climate in all policies' lens that moves through. I think that's where you need the kind of major leadership from public health, and for the other governments to shore them up to have the ability to do those sorts of things."

Some experts also noted that centring human health in any and all policy proposals can be an effective means of influencing and strengthening public support for climate change initiatives.

> "We know that framing policy proposals in terms of health … it's one of the most effective ways to build public support for these policy changes."

Experts also highlighted strategies to develop intersectoral policy and legislation that would encompass public health and climate in all policies.

> "Obviously, you need to be developing healthy public policy, so they would do well to take a look at the Geneva Charter for Well-Being and take the actions under there, particularly the first three, which are basically to make peace with nature, to redesign the economy, and to develop healthy public policy."

For the most part, participants also spoke of the need to use a health equity lens in any decisions pertaining to policy development and implementation.

Challenges and Barriers Facing Public Health in Climate Change Adaptation and Mitigation

Similar to the enormous breadth and depth of responses concerning the potential for public health systems to address climate change adaptation and mitigation in Canada, we heard about a wide range of challenges and barriers facing these systems with respect to how they are currently trying to address climate change. Several key themes emerged, each of which are highlighted here and then described below with representative quotes.

- Public health power: The risks of speaking up and speaking out
- Climate change disinformation/misinformation and issues of power, politics, and polarization
- Lack of funding and material resources
- Limited human resources and ad hoc climate change action
- Silos, mandates, and jurisdictional fragmentation
- The underestimated mental health impacts from climate change

Public Health Power: The Risks of Speaking Up and Speaking Out

Many of the experts talked about the professional risk they felt and observed in others from speaking out on the importance of addressing climate change, and how they have often been hamstrung in doing so because of the political climate. In their own words:

> "As a regional health official, I would say that in some provinces there might be some degree of central control to when local public health officials could speak on a given issue."

Further, many experts described how being subject to political direction also creates challenges around effective public health advocacy, wherein public health is unable to freely advocate on issues implicated in the health of populations, both in the present and future.

> "There's also the barrier of being subject to political direction, which makes it hard to be the advocate that public health should be. … It's not about toeing the line on energy policy, it's about what's good for the health of the public, both now and in future generations."

They also underscored the tension between speaking out on particular issues and the risk of having funding withdrawn for their work. One expert specifically described the difficulty of balancing fulfilling their job against the risks associated with losing funding or being fired for conducting work that contradicts political interests.

> “Anything that pokes at power is difficult to get funded because it’s risky and funders are scared of it, public health is scared of it, clinicians are scared of it. … People are worried about their programs getting defunded, people are worried about actually getting fired, people are worried about whisper campaigns to discredit them if they continue doing work that may go against political interests. … Public health docs are often concerned about the degree to which their work is politically constrained. And so, what structural changes can we make within public health and Canada to protect public health officers so that they’re able to be as independent as possible?.”

These professional risks, real or perceived, were clearly articulated with concrete examples, including this one:

> “A dear mentor of mine, he’s now retired … he was the chief medical health officer for [metropolitan city] for years. He used to say, ‘You know, if you’re not in danger of getting fired, you’re not doing your job.’ … We walk a very public, very political line … it’s an area with a lot of risks.”

Many also highlighted that unlike non-governmental advocacy organizations, public health employees are often limited in terms of what they can say from a political perspective on issues of climate change and health.

> “I know there’s certain things we can’t say from a political perspective that I could say at CAPE [Canadian Association of Physicians for the Environment].”

In addition, some experts noted the degree to which public health is preoccupied with needing the granular data before they are willing, in their professional capacity, to speak out and act boldly on issues of climate change and health.

> “I feel like public health is too small-c conservative, like it almost waits until there’s slam dunk evidence, until the evidence is staring us in the face, before acting. And so I feel like, quietly, public health individuals and public health staff are supportive, but publicly, in some ways, they can be hamstrung for a variety of different reasons.”

Although the political climate can hamper public health professionals in their advocacy on climate change adaptation and mitigation, the experts highlighted the importance of finding ways to balance those tensions while maintaining credibility with all rights-holders.

> We know that as employees of health systems, there are limitations to how much we can say and do. Particularly as a public health specialist and a medical health officer, I can't align myself strongly with an advocacy organization because I need to ensure that we remain credible. And so understanding how we work together with those partners is also really important to make change.

Many experts highlighted that a major barrier for public health is that it does not occupy a space that has independence to freely report on the factors affecting the health of populations.

> What I would like to see would be public health to become some kind of arm's-length, sort of Crown corporation type of setup that had independence. Or another way to go would be to make the Chief Public Health Officer equivalent to an auditor general and have them report to Parliament and be an independent officer of Parliament. So they can report to Parliament on the health of the population and the factors affecting it.

One expert described an example in their jurisdiction of how public health can not only continue to rely on evidence but also have the power to promptly operationalize meaningful climate actions:

> The public health officer [in my province] is independent from government, it's not a political person, because if they need to take a position against what government is doing, they should have power and independence to do that. … I think that moving forward, we will need a very powerful structure that is evidence based, working on evidence, that has a political role, that has the power of our government to really implement the transformation we need in scope and in time.

The across-the-board challenge, though, is that there is a lack of understanding (or acknowledgement) about the ways in which power operates in the field, thus stymying true and lasting climate action:

> "One of the things that shocks me in public health as a field, but also in public health education, is that we almost never talk about how power operates. We might let acknowledgements in a very general vague way of power seep into our conversations about policy change or the intransigent nature of drivers of ecological degradation and climate change, [but] rarely do we talk about how power works actively to block change and to co-opt efforts."

Climate Change Disinformation/ Misinformation and Issues of Power, Politics, and Polarization

Many of the experts we heard spoke of the challenges for public health to be able to work toward climate change adaptation and mitigation because of issues stemming from climate change denial, disinformation, and misinformation. In particular, some detailed the challenges for public health to gain public support and understanding that climate change is a pressing health issue, while also being able to effectively communicate credible information to the public on the varying potential health effects.

> "I think that public health is completely unprepared to be a strong actor and strong advocate in these bigger dynamics of polarization, disinformation, and information manipulation. I think we need to understand these dynamics and really develop new ways of working, new ways of communicating that would allow for this kind of effective action we need to see."

Several described how denial and disinformation are currently being supported by powerful groups that have vested interests in not making changes to adapt to and mitigate climate change, such as the fossil fuel industry. Experts perceive that such narratives of climate change denial and disinformation are a threat to public health systems and will continue to inhibit public health from being able to do the work that needs to be done on adaptation and mitigation in time and in scope.

> "I'm worried that we won't get the job done on mitigation because here in Canada, the fossil fuel industry is extremely powerful, [and] pushing up against them can have personal costs. … They're just way better than we are at lobbying."

Drawing attention to the role that social media has in polarizing attitudes, one expert identified the need for new skills when taking bold action:

> "One threat to public health is the kind of polarization we've seen… around vaccination, for example, or around public health measures. … So there's something we do not understand really well around the tactical use of social media to polarize some groups. … I think that we have a very political and organized dynamic around economic interest, disinformation. … How do we play with the current structure to really be influential in this very harsh dynamic where there will be a lot of resistance and opposition? So, if we decide to take bold action with regards to climate change, we can expect to have some groups mobilizing against this action. … I don't think we're prepared for that."

Lack of Funding and Material Resources

Every expert we spoke with brought forward, the issue of funding for public health systems.

> "Public health is chronically underfunded."

Often at the outset of the interview or focus group, the challenges associated with the lack of funding and resources for public health systems in general, and for public health and climate change more specifically, were raised. We heard things like:

> "Funding, funding, funding. Seriously, if you really want to make change, the dollars have to come with it. We have [paid] so much lip service to this area."

Even when climate change adaptation and mitigation plans are politically desirable, they are not feasible because funding has not flowed. Indeed, there is a mismatch between vocalizing climate as a priority and implementing any sort of action through protected funding in depart-mental budgets:

> "The [city] desires to do a climate adaptation plan, but I've seen it sit on their funding list for many years now, and they just don't have the funding for it."

Moreover, there is a chronic issue around jurisdictional responsibilities about who will fund the work needed to be done, which can lapse into inaction as a result.

> "We try to engage our stakeholders and work with them, but there is the funding question of who's going to fund it? Well, it's not municipal dollars, maybe it's provincial dollars, but that's a different budget line or a different ministry. So, it gets into that intersectoral challenges of actually operationalizing."

Considering the challenges surrounding lack of funding, the experts emphasized the need for dedicated pools of funding from all levels of government, especially provincial and federal.

> "Active transportation was federal funding, most of the public health is provincial funding, but it needs to be coming from both levels to provide that kind of programming that allows public health practitioner hours to engage with communities to start doing something."

Many experts also drew attention to the amount of funding dedicated to the primary healthcare system compared to that which public health receives. These experts explained that if funding is dedicated to public health to work on prevention and protect and promote health in the first place, then not only would the primary healthcare system require less funding but staff would be less overwhelmed in their duties, especially as health issues related to climate change intensify.

> "It's not sexy to spend money on public health, we're at like 1% of the budget [in my regional health authority] for public health. It's just, it's staggering … because when people are well, they're not complaining. People who are complaining get more human and financial resources, and so it's really shifting that mindset to we've got to put a lot of money to keeping people healthy in the first place."

Hand in hand with funding, experts also spoke of insufficient resources available for public health professionals to do work on climate change. Many stressed the urgency for resources to be put in place for public health systems to proactively address climate change adaptation and mitigation:

> "If climate change is not a priority within the Public Health Agency, from local to national, if the resources devoted to the Public Health Agency aren't adequate to allow them to get to be more of a proactive agency it's intended to be, and if people have a lack of education about climate change, then the federal government needs to address the lack of resources, to make it possible that the Agency can deal with this crisis."

Situated within this context, the experts stressed the need for equity in the distribution of any current and future funding and resources.

> "[Public health] is underfunded and there are really limited resources across the country, particularly in rural and remote and northern regions. We have extremely limited public health services here and in other parts of the north … and it's also unequally distributed throughout the country … especially in some of the remote communities."

Limited Human Resources and Ad Hoc Climate Change Action

The experts indicated that to meaningfully work on climate change adaptation and mitigation in structured and systematic ways, there must be dedicated staff positions and (as above) funding to do the work. Many emphasized that they have been pleading for additional staff and resources to address adaptation and mitigation plans, but their calls are not being met.

> "We're heading into a summer season, launching a heat alert response system, and I have 0.5 of a staff to help me … who's responsible, whose primary role within public health is climate change? … We are 85 years ago in that regard, we should have a team of 10 people working with local governments – how can we still be here?"

Several of those we spoke with also highlighted the need for dedicated staff that could build relationships and collaborations across departments and jurisdictions to address climate change adaptation and mitigation.

> "What we really need are staff in health units who are dealing with the real issues that are coming at us every day, and who can develop relationships across departments. … It's making certain that we have staff that have the expertise, the policy expertise, to participate in some of these processes, and some expertise on climate change, health risks, and causes and solutions."

The challenge to finding such staff is at least two-fold. First, there is a lack of skills. Second, there is a lack of time.

> "If you don't have the skill sets and you're trying to do it off the side of your desk … it's really hard to lift it off the ground."

They gave some examples of how to recruit the right people to positions that can act as resources for the entire organization, rather than in simply siloed positions doing their work in isolation from others.

> Similar to social determinants of health-related work, if you have one person or two people or three people who are deemed the health equity specialists within the organization, it shouldn't necessarily be up to them to do any kind of work that has to do with the social determinants of health. They should be resource people for the rest of their organizational system, and it should be something that then is intended to be built into everybody's work. I would like that to be the case of climate change.

In instances where climate change work is occurring within public health units or authorities, it is predominantly described as being sporadic, inconsistent, or "off the side of the desk." However, some of the participants outlined that there is potential for enhanced collaborations and structured effort on climate change adaptation and mitigation if such work is given priority.

> Public health, provincially, has priorities and of course in some of the smaller regions it's often the issues of the day that take priority, like the communicable diseases [and] the boil water advisories. I would say most of my colleagues here in [this province] don't get to this work, right? They don't have the luxury of working on [climate change].

A substantial challenge to doing structured and strategic work on climate change, many of the experts noted, is the ongoing priority and attention given to COVID-19.

> The problem right now is that everybody's so busy … but even outside of COVID, even when COVID [was] not an issue … there might be one person in a public health unit who sees climate change as their responsibility. I think we need to broaden that and help people understand that climate change is everybody's responsibility and everybody should be thinking about how they fold it into their work.

Silos, Mandates, and Jurisdictional Fragmentation

Across the many interviews and during both focus groups, institutional, ministerial, and epistemological silos were identified as deeply problematic in making any progress on public health interventions in climate change.

> There's quite a tradition of institutional silo-ization which prevents public health from really finding its feet in a leadership role, in demonstrating and responding to what have already been pretty widespread climate-induced health impacts.

One of the greatest challenges inhibiting public health from taking proactive leadership roles is the lack of internal and intersectoral collaboration underpinning climate action.

> “Climate change was not framed as a health problem or a public health problem … but now … everyone’s waking up and saying, ‘Well, no, it’s actually everyone’s business,’ and it has to be cross-cutting and there has to be a climate change lens to all public health interventions.”

The experts also commented on challenges associated with antiquated legislative mandates. They highlighted that public health is well suited to take action on climate change through health and health equity lenses, as long as it has the mandate to do so. But they said public health authorities and units are constrained in their ability to move across roles to engage in climate change adaptation and mitigation measures because they do not have the mandate or permission.

> “Climate change is complex because it absolutely is an equity issue and it absolutely is an environmental issue. … I really can underscore that I think the public health workforce is well suited to doing this if people were just given the mandate, if they were given permission to have an equity and an ecological focus at the same time. … [But] I think there’s always going to be this tension for public health about what is its legislative role and what’s its potential role. And operationally … a lot of public health is tied to these legislative roles. And the legislative roles are really dated … and they are constrained in terms of being able to actually commit time and resources … so climate change is now in the mandate letters, but it’s not funded.”

If funding does begin to flow, and some experts anticipated it would, they said the new challenge would be around distribution of those funds:

> “I can assure you, because funding is going to be associated with it, health authorities are going to be having wrestling matches within themselves about who’s going to ‘own’ climate change.”

The Underestimated Mental Health Impacts from Climate Change

Health researchers and practitioners are reporting climate anxiety, ecological grief, depression, and suicide amongst their patients and relations. Several of the experts that we heard from emphasized the importance of including mental health in public health interventions to climate change.

> "We have really underestimated the mental health impact of the [climate change] information itself because what we're in essence talking about is a distressing diagnosis that impacts all of us, all of the patients we will ever treat, our family and our friends."

Some experts specifically focused on the implications of climate change on youth physical and mental health:

> "One of our recent campaigns … was focusing on climate action with a youth engagement focus, reflecting our concerns, not just about physical health implications of climate change but also the heavy, heavy, emotional and mental health toll on young people of this existential crisis."

They were predominantly concerned with the effect that multiple channels of messaging, which have largely emphasized fears over indicators of hope through action, were having on young people in the form of climate grief.

> "I'm concerned that the conversation around climate change at the moment is preaching so much doom and gloom … which makes me afraid for my own kids and their futures. … And in fact, there's some evidence … that is demonstrating that we are doing really good things … slowing down some of the impacts that we thought were inevitable. … So I think we need to focus on those things to give our children hope because we're seeing that climate grief is a real thing and that some of our youth are really struggling as they get older, and they see the thing that they've been born into that they had no part of, and now feel the pressure to be the ones to, like, shift this big beast around, that we offer them hope that their efforts are not for nothing, right?"

Some even described the underlying complexity of the ways in which climate change is having an impact on their own mental health.

> “There’s a different level of mental health overlay to it for us as practitioners than for a lot of other things. … [We need to] acknowledge the emotional impact of the data and a hands-on component, which helps people understand their agency and the specific areas in which they can have an impact.”

Many experts also stated the need for public health systems to measure, monitor, and collect data on climate change and mental health impacts.

> “What are the metrics of the rising mental health crisis? My public health colleague came up with some data … I think it was just Ontario primary care providers reporting the uptick in the number of people coming through the door with climate anxiety. But if we had that data more robustly collected and mobilized … because it’s anecdotal, right? [Yet] people see it.”

Some participants recognized the importance of surveillance data to support evidence-based public health decision-making in this context.

> “I think the mental health aspect of climate change … we need to start measuring that more because it’s playing a factor that we can’t even quantify. … I can talk about it anecdotally, but this is having a major effect and we don’t even have the ways to measure it. So that’s a big area where I feel the mental health impacts of climate change are some of the first that we’re seeing, and we need to do a better job measuring it.”

The experts noted the ways in which climate change and mental health ought to become a government priority, particularly with respect to policy development and implementation. Specifically, we heard about the importance of climate change and mental health lenses informing all policy processes.

> “So [mental health is] something that is cross cutting across many, many things. But we’re not grappling with it seriously enough, we’re not funding it, but, yeah, everybody wants to talk about it, which is really, really amazing. And from the public’s perspective, so much interest, so much global interest, so much media interest, it’s a huge topic for people. But, governments … are not talking about it. So, at some point that needs to shift where it becomes a government policy and focus. … We need mental-health-informed climate trauma lenses on everything.”

Solutions

People living in Canada depend on a healthy environment and equitable access to it. We heard from the experts that solutions must first involve addressing systemic issues (i.e., capitalism, colonialism, racism), which drive common inequitable outcomes for public health and nature. The knowledge that First Nations, Inuit, and Métis Peoples have in understanding the linkages between healthy lands (which encompasses water, air, and other-than-humans) and healthy peoples is paramount. The key role that Indigenous Peoples have as rights-holders and carers of the natural world was highlighted by participants. For public health systems, this means doing the work to be good partners in terms of engaging with Indigenous Peoples’ expertise. To achieve a healthy and equitable environment, they made seven recommendations for public health systems:

1. Decolonize public health.
2. Embrace multidisciplinary approaches and diverse expertise in public health decision-making for climate action.
3. Create collaborative spaces for knowledge exchange on public health and climate change.
4. Establish participatory, solutions-focused climate-health training and knowledge hubs for climate action.
5. Reorient surveillance in service of local climate action.
6. Implement accountability measures for climate change inaction.
7. Offer dedicated funding and resources for climate-health work.

Decolonize Public Health

As noted earlier in the report about potential contributions of public health systems, one of the areas experts agreed on was the limited scope of framing the system from a western lens alone. As we heard repeatedly, decolonization of public health is essential to make progress on climate action.

> “I think there’s a whole other layer we’re not talking enough about, which is really needing to decolonize ourselves from the western paradigm. … If I could see one thing before my dying day, it would be public health along with so many other sectors embracing living in sacred reciprocity with all life as their prime directive, as a relational worldview from which everything else stemmed. Then we would take care of everyone and everything as if it was sacred, as if it deserved our attention. There wouldn’t be expendable people, there wouldn’t be migrant workers who were just raked over the coals until they collapsed and then [were] sent home. There wouldn’t be all this two-tier health system and all the rest of it, we would get our house in order. We wouldn’t just be putzing around with risk management. To me, the crux of risk management is we will do our best, our level best to deal with the fallout of the current system without ever calling the current system into account for itself, and naming it and naming those drivers and seeking actively to dismantle them and build the alternatives that need to be built.”

While we did not explicitly ask the experts to elaborate on a practical level about how to undertake decolonizing work, the following quote illustrates the depth and breadth of work public health systems need to do:

> “Decolonizing public health spans the whole gamut. … [It] is the important work of not only reconciliation but resurgence and meaningful allyship, not performative allyship, and LandBack. So repairing, restoring, and centring Indigenous communities and their right to self-determination, and their leadership on these fronts is essential.”

The remaining recommendations all point to concrete ways to implement decolonizing approaches to public health systems; each of these is elaborated below.

Embrace Multidisciplinary Approaches and Diverse Expertise in Public Health Decision-Making for Climate Action

Experts we heard from emphasized the notion that public health must embrace social scientific and multidisciplinary approaches if meaningful action is to be taken on climate change. Specifically, they described the difficulty and complexity of influencing behavioural change and gaining public trust and support using purely quantitative data.

> "Public health is used to only using pure science and not enough social science, qualitative science; they are not used to forming relationships with communities. They expect that they can just come out with advice and people will follow it. But no, to get people to follow you, you have to have an ongoing relationship with people so they can trust you."

It is evident in the perspectives of the experts we heard from that public health ought to move beyond its existing paradigm to foreground multidisciplinary and solutions-based scientific (both qualitative and quantitative) approaches to transformative climate change adaptation and mitigation. Notably, several experts identified the need for greater engagement of social scientists and applied social sciences in solutions-based approaches to climate change adaptation, mitigation, and overall preparedness.

> "Public health needs to be multidisciplinary because it's not enough to have epidemiologists, virologists, et cetera. It's also important to have historians, to have anthropologists, to have Indigenous Elders, to have Black Elders, to have representatives from several communities, to have people who are experts in decolonization, to have a plethora of people so that we can approach and tackle problems with several solutions."

We heard them detail the ways in which public health systems need to engage with different knowledge systems, and with different ways of doing that centre diverse, solutions-based approaches to climate change from the local to the national level. Experts expressed concerns over the predominance of clinical experts currently populating public health and the paucity of other areas of expertise. Many experts emphasized the need for public health to fully appreciate and embrace the diversity and complexity of Indigenous, Black, and global south perspectives and worldviews, which are often relational worldviews. This does not mean simply integrating diverse perspectives into western models, but creating something new that builds on ways of knowing that honour the wellbeing of our human and non-human relations.

> We need to find ways to centre Black and Indigenous voices, and global south perspectives. [It's] the core foundational ways of being and relating that are essential … the core of Indigenous and Black and Ubuntu and other ways of knowing and being is that it's fundamentally a relational worldview, and western ways of knowing are essentially transactional in nature.

> We need to be really conscious that our spaces, our western spaces and our ways of consulting, themselves, can constitute structurally disadvantaging procedures. If we're going to interact with an Indigenous community, ask them how long they think something should take, and ask them where they want to do it, and stop doing things like trying to have a consultation sharing table with Elders in 45 minutes.

Create Collaborative Spaces for Knowledge Exchange on Public Health and Climate Change

The experts identified a practical step for public health in terms of convening. What we heard is that public health ought to dedicate adequate time and space to build respectful and ongoing relationships with people that have the knowledge, expertise, or lived experience with climate change and its various impacts. They shared that public health should commit efforts to convening tables or attending spaces where opportunities exist for collaboration and the sharing of diverse worldviews, perspectives, and potential solutions on climate change adaptation and mitigation.

Two-eyed seeing was an approach that the experts saw as a way to create collaborative spaces of co-learning across disciplines, sectors, and worldviews. An English translation from the Mi'kmaw word, Etuaptmumk, Two-eyed seeing is "learning to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of western knowledges and ways of knowing… and learning to use both these eyes together, for the benefit of all".[21]

> Two-Eyed Seeing … teaches us that, even though we think that we have these distinct and separate worldviews that sort of clash, that ultimately there's these places where we can come together to understand one another, and it's in those spaces that we can have conversations where we learn.

Establish Participatory, Solutions-Focused Training and Knowledge Hubs for Climate Action

Many of the experts we heard from identified the lack of climate change and health training that public health professionals and practitioners are currently receiving. To address this, several experts called attention to the need for enhanced public health education as well as climate change and health training and resources.

> "One of the first immediate steps is to ensure that public health professionals are being trained. They're not even being trained … it's not even in their curriculum… to not even have public health trainees, even when they demand it, not getting it, not getting the training, so [the universities are] not responding."

Further, it was noted that there is great space and opportunity for public health to engage in collaborative and participatory intersectoral education to strengthen efforts on climate change adaptation and mitigation.

> "[Have] the Public Health Agency of Canada work with key stakeholders and groups to develop the resources that health professionals can access when they need it for professional development."

Appropriate public health education and training was emphasized by many experts as critical if the field of public health is to take effective and lasting action on adaptation and mitigation.

> "Most programs in Canada don't have a required course on climate change or the ecological determinants. Many programs don't even have an elective on that, and if they do, it's certainly not taken by the majority, even though the majority of our graduates will be facing those issues and be on the front lines as first responders what many of those issues will generate."

Notably, experts we heard from underscored that public health education should be a collective and participatory undertaking that focuses on solutions.

> I think we need a solutions-focused orientation as well because too often … and we find this in environmental training programs more broadly, that people just feel overwhelmed and it leads to analysis paralysis... The problems and the scale of the issues are substantial.

Public health engagement in internal climate change and health education can facilitate opportunities for external educational communication and advocacy to the public around related health risks.

> The number one role [for public health education], and it's probably the role that we will do the best but we need to be funded to do it, is we need to do education around health risks: here's what you need to do to manage those risks or to prepare for them in your own home.

Several experts we heard from stated that expanding the list of current core public health competencies is paramount for undertaking bold and strategic action on climate change adaptation, mitigation, and preparedness. For example, they highlighted that public health must develop and implement the necessary knowledge bases and corresponding training for public health trainees, professionals, and practitioners so that they are able to execute the work that needs to be done on issues of climate change and health.

> We have a moral responsibility to step up and start providing the kind of education that we know our graduates will need for the kind of world that we'll be releasing them into. Right now, they're woefully unprepared for that.

Along these lines, some experts identified not only the degree of insufficient public health education and training around climate change and health issues, but the complete lack of education and training for public health professionals and practitioners in Indigenous public health, which aligns with findings from recent studies.[22, 23] The experts we heard from emphasized the need for public health to address undeveloped core public health competencies. This included critical education and training on climate change, the ecological/eco-social determinants of health, and Indigenous public health. These experts outlined that public health professionals and practitioners require the appropriate education and training on such public health aspects to effectively prevent and respond to issues of climate change and health, from the local to the territorial and national levels.

> Indigenous public health – huge gap; ecological public health – huge gap. … We need to be training people to be competently in charge of anticipating and responding to what's going to be happening to our communities.

Reorient Surveillance in Service of Local Climate Action

A few of the participants identified the value of public health surveillance in climate change adaptation and mitigation. Climate hazards and vulnerabilities will have different geographical and social underpinnings that can be understood at the local level. We heard that localized, place-based health promotion and interventions will better ensure responsiveness to community needs, disrupting the current homogeneous, one-size-fits-all approach. This included data-linking in the healthcare system (i.e., health reporting and diagnoses by healthcare providers and hospitals) to gather the evidence needed to go beyond anecdotal data to the statistics often required for government and decision-makers to act.

> "All of those evidence bases need to be taken into account in every single interaction that we put into the community. And to this point, we've done a really, really horrible job of that. I think that if we start to do a better job of that, we're going to see huge, huge uptake and inroads because people are motivated. They just are scared and they don't know what to do."

Looking specifically at the surveillance of health-related consequences from climate change impacts, this expert stated:

> "We're hoping to expand [surveillance] to air quality, specifically around wildfire events and then also to winter events, to storms, to floods, to other things that might impact … and again, not in such an obvious way as a heat-related emergency room presentation, but other changes in mental health events, other changes in emergency room visits due to substance use and alcohol and other things during winter events when people might be isolated from their communities."

Some experts drew attention to the importance of gaining public support for public health action in the context of climate change. They explained that if public health can collect and communicate data (i.e., surveillance) to the public that helps them understand climate change as a health issue, it might influence the public to invest in adaptation and mitigation measures.

> "I would love to see … strong climate change and health messaging. And also positive messaging, too … framing things in terms of opportunity, as opposed to threat, so saying, these are all the positive things that will happen if we take action on climate change with this policy, here are all the co-benefits. … So focusing on health, focusing on opportunity, and also focusing on current impacts seems to be the most effective way to get people to change."

However, other experts, while supportive of the notion of more data, were skeptical that collecting more granular data would lead to an increase in public support for climate action.

> "If people were listening to the data, we would have been doing something a long time ago, differently. But I think we still need to bring the data forward. Municipal government leaders need to convince the public to spend money on this [and] the data shows how health is affected."

In some cases, the participants were against the need for more investments in surveillance data.

> "There is this fictional narrative that moral suasion and better data and surveillance will carry the day, which is a self-serving argument for academics to make because it just gives us more money for more studies. I think we need to go a whole lot further than that, and part of that is going to require problematizing and questioning the taken-for-grantedness of our own approaches in this field. We have shown, generally, a remarkable resistance and reluctance to do so."

Implement Accountability Measures for Climate Change Inaction

We heard that accountability measures should be implemented to hold decision-makers and people in positions of power accountable for all decisions and actions implicated in negative climate and health consequences.

> "I think decision-makers appropriately have a responsibility to make consequential decisions, and they should have an accountability for those decisions, which we could argue is adequate or inadequate. But they should at least be forced to be very explicit about the information that they're dealing with, and if they choose to ignore it, let them be accountable for that decision. But by denying the relevance of health in those decisions, it really undermines the idea that we should be looking at the health consequences of climate change."

Experts seriously questioned the lack of existing climate action from governments, non-governmental organizations, industry, and those in positions of power, especially given the surplus of evidence and data showing that climate change is the greatest threat to health. Some experts proposed the development of incentives for climate action, or the creation of penalties for inaction.

> "There's only so long you can keep reading 'climate change has a big impact on health'. Every report says it, we know that. So, it's about creating that strategy that is locally and regionally appropriate, but also has national teeth. And that actually has resources behind it and has both incentives and penalties. … I think that could be a major role in mitigation."

Offer Dedicated Funding and Resources for Climate-Health Work

In cases where experts identified successes with respect to dedicated work on climate change adaptation and mitigation, it was largely due to dedicated funding and resources. For example, several experts discussed the importance of the HealthADAPT program. This multi-year capacity-building program, which ended in March 2022, granted up to $3.6 million in partnerships with 10 health authorities in five provinces and territories.[24] The experts we heard from underscored that extended funding and resources for HealthADAPT would contribute to secured public health efforts on climate change adaptation and mitigation.

> "A lot of our climate work has flowed from the HealthADAPT program. This was that Health Canada–funded program described with projects right across the country, trying to initiate or drive forward work in health and health adaptation and climate. … That grant funding helped us to have a permanent staff person (and) … because they were hired by the grant, they were probably one of the only people on my team that was not pulled over into the COVID response.
>
> Public health people who are involved in [HealthADAPT] projects, they are finding them incredibly valuable. Extending the funding for that and the resources for that, that's incredibly valuable. And I think that that's something that we need to do right away."

Concluding Comments

Public health has been at the forefront of the world's attention because of the COVID-19 pandemic. People living in Canada have relied on public health expertise at the global, national, sub-regional, and local levels to navigate this health crisis, and attention has increasingly turned to the role public health could and should play in the climate change crisis. Where public health and climate change advocates had previously struggled to be heard, a space has opened for these conversations to become more prominent. Public health can take clear practical steps to help mitigate and adapt to climate change, as the evidence in this report has shown.

What we heard clearly from the experts across the public health field for this report is that big, bold, transformative action is needed now, action which is aligned with both the science of climate change and the knowledge systems of those that have lived in good relations with the environment.

> "We should adopt a planetary health approach, where we work on inequities, we work on population health, we work on climate … we support action that will not harm the environment in other ways. We really need a holistic approach and not silo the climate challenge. If we do that, we are perpetrating the same way we've been working. We need to change our paradigm."

Five guiding messages emerged to inform such bold and transformative action for public health in Canada:

1. Human health and well-being depend on healthy ecosystems.
2. Systemic drivers of negative health outcomes and climate change overlap; white supremacy, capitalism, colonialism, and racism must be addressed.
3. Barriers to addressing climate change in public health are known and must be addressed systemically.
4. There is vision and local leadership for addressing health and climate change within the public health field, if it is given the latitude, capacity, and investments to rise to the challenges.
5. Public health and well-being must be centred in decision-making across all sectors and all levels of government.

The key messages we heard underscored that public health and climate change require a focus on decolonizing, justice, and equity, adequate funding, political commitment, and cross-sectoral partnerships, with the expectation that fundamental changes in our socioeconomic structures are needed to rebuild our relationships with each other and with our planet.

ANNEX A:

Opportunities for Action

The following are a synthesis of ideas for action offered by participants. Many of these actions will require intersectoral collaboration.

1. What we heard about adopting equitable, inclusive participatory approaches that integrate climate action into decision-making.

    - Make innovation grants available for people in public health to drive big system changes.
    - Have whole-systems level conversations/ forums and design for public health co-benefits.
    - Attend to the social fabric of Canada and tackle polarization.
    - Provide protection and safeguards that will allow the Chief Public Health Officer and everyone working on public health and well-being to safely speak to the evidence of future risks if decision-making does not integrate climate change projection.
    - Integrate climate action as central piece of chronic disease prevention, and then work together with those focusing on infectious diseases and environmental health.
    - Value health promotion alongside environmental health.

2. What we heard about enacting equitable and transformative adaptation policies on sustainable and resilient land use, consumption patterns, economic activities, and Indigenous-led nature-based solutions[4], such as:

    - Actively design initiatives that are good for climate change, are good for equity, and result in co-benefits.
    - Engage in future scenario work and back-casting from a future vision of public health in 2050. What are the steps needed to work toward that?
    - Chart out at a micro level more sustainable, attractive, and pleasant alternatives, and start to appreciate those as feasible. Public health work is also community building, such as working with local food systems.
    - Actively question the foundations of our society, the capitalist system, and our culture of extraction.
    - Develop integrated policies that go beyond individual behaviour.
    - Counter climate change denial and disinformation by promoting evidence-based information on public health and climate change.

3. What we heard about urgent support for self-determination for First Nations, Inuit, and Métis Peoples in public health, recognizing Indigenous rights, and supporting Indigenous knowledge–based adaptation, such as:

    - Uphold Indigenous Peoples' inherent and Treaty rights and implement the UNDRIP (United Nations Declaration on the Rights of Indigenous Peoples) standards.
    - Integrate Indigenous futurism to imagine the future without colonization and ask ourselves, "How do we get there?"
    - Acknowledge that Indigenous worldviews are the original planetary health worldviews and learn from this expertise.
    - Embrace the leadership that many Indigenous Peoples and Nations are demonstrating around (planetary) health through resurgent reclamation, revitalization, and resilience practices.
    - Engage public health in the challenge of living in sacred reciprocity with the land (encompassing air, water, and all other-than-humans).

4. What we heard about coordinating across sectors and jurisdictions to support equitable and effective climate solutions, such as:

    - Establish long-term, pan-Canadian capacity to track and monitor health and well-being and the impacts of climate change.
    - Move beyond information gathering and report writing to the training, funding, and resourcing needed to centre public health and climate change.
    - Centre public health and well-being in all decisions and policy-making across sectors and jurisdictions.
    - Adequately resource public health organizations to prevent worsening mortality and morbidity from climate change and inequity.
    - Partner with existing initiatives and advocacy organizations to take advantage of synergies and capacity within the entire spectrum of public health.

ANNEX B:

Methodology

Introduction

The research associated with this *What We Heard* report explored a wide range of perspectives from key public health experts concerning the contributions of a public health lens in understanding the impact of climate change on population health. We used one-on-one interviews and focus groups to gain these perspectives. The questions we explored involved both the experiences of select experts in undertaking climate action in their work, as well as their perspectives on the role that public health does and can play.

Data Collection Method #1: Interviews

The range of participants for interviews included people whose work primarily intersected between climate/environment and public health. The recruited participants included people situated in non-governmental organizations, research institutions, and public health organizations. Selection of participants took into account intersectional criteria (e.g., Indigenous/distinction-based, racialized communities, youth, LGBTQ2S+, people living with disabilities, minority language communities, migrants) as well as geographical representation (e.g., rural/remote northern, rural/remote other, urban, coastal). We drew inspiration from intersectional theory in the recruitment of participants, and participants were also considered based on the following inclusion criteria:

- Some understanding of the broad facets of public health (e.g., essential public health functions);
- Some understanding of climate change as a health issue;

- From one of the priority sectors, occupations, or disciplines (see paragraph above); and
- Secondary criteria relating to diversity/inclusion.

Potential participants for this work were selected in collaboration with OCPHO. With only six weeks to gather data, our plan was to invite at least 25 individuals to participate, with the aim of recruiting a minimum of 15 participants. The first round of recruitment started in April 2022. We sent email invitations and a letter of information to individuals who fit the inclusion/exclusion criteria.

A second round of email invitations were sent to those who did not initially respond. It was our intention that if we did not receive a response after the third attempt, we would turn to a secondary list of potential candidates with similar expertise and experience. However, we did not turn to the secondary list as we received several additional excellent suggestions from participants (i.e., snowball sampling), which led to our exceeding the minimum target of 15 participants.

By the end of our data collection period (i.e., six weeks), we had interviewed 21 key experts from across the country. At the outset, we agreed that we would continue to collect data beyond the point of saturation (hearing no new information) and only stop recruiting when our project schedule required us to shift to data analysis. As a modest gesture of appreciation for their invaluable contribution, each participant received a $30.00 honorarium.

Zoom video interviews were approximately 45–60 minutes in length. Semi-structured interviews were carried out, guided by a common set of interview questions, to elicit participants' perspectives on public health and climate change.

Data Collection Method #2: Focus Groups

Two focus groups were conducted with interested Medical Officers of Health (MOH). The MOHs were recruited via the Urban Public Health Network (UPHN), with the OCPHO helping to facilitate the recruitment process. A generic invitation email and letter of information was circulated through the UPHN listserv. Interested individuals were directed to a registration/sign up portal.

Zoom video was used to conduct two focus groups, which were each approximately 120 minutes in length and consisted of one group of four people and another group of five people. The first focus group took place on June 9th, and the second focus group took place on June 17th. Similar to the semi-structured interviews, the focus of our data collection was guided by a common set of interview questions.

Data Analysis

Thematic analysis was used to organize and analyze the data from the interview and focus group transcripts. Thematic analysis is a qualitative approach that involves categorizing coded data based on patterns that are evident within the data set and comparing such themes to the study purpose, pre-existing concepts related to public health systems, and relevant scholarly and grey literature. After reading each of the interview and focus group transcripts multiple times, a set of thematic codes was developed to code text from the transcripts. The interpretation of the data and the development of such thematic codes was discussed and confirmed within the team to enhance the rigour of the analytic process.

ANNEX C:

Participant List

Expert Participants

1. Abernethy, Paivi
2. Allison, Sandra
3. Anonymous
4. Aubin, Louise
5. Brouselle, Astrid
6. Cunsolo, Ashlee
7. Hancock, Trevor
8. Howard, Courtney
9. Kaiser, David
10. Laplante, Odette
11. Lem, Melissa
12. Lewis, Diana
13. Martin, Debbie
14. Masuda, Jeff
15. McDowell, Andrea
16. Muecke, Cristin
17. Muzumdar, Pemma
18. Newhouse, Emily
19. Odenigbo, Chúk
20. Ouimet, Marie-Jo
21. Parkes, Margot W.
22. Perotta, Kim
23. Phipps, Erica
24. Poland, Blake
25. Potvin, Louise
26. Richards, Lisa
27. Rizzuti, Franco
28. Schwandt, Michael
29. Spiegel, Jerry M.
30. Waters, Shannon

The report authors – Heather Castleden, Isaac White, and Jennifer Otoadese - would like to express our tremendous gratitude to these experts who so generously volunteered their time and expertise to this report; without them, it would not have been possible.

ANNEX D:

Letter of Invitation for Interviewees

What We Heard: Report on Intersectional Perspectives on Climate Change and Public Health in Canada

Information Letter

Each year the Chief Public Health Officer of Canada (CPHO) produces an independent report on the health of Canadians that is provided to the Minister of Health and Canadian Parliament. This report is an opportunity to examine the state of public health in Canada and to stimulate dialogue about public health priorities. This year's CPHO report focuses on the role of public health systems related to climate change.

To inform this report, the CPHO has requested the development of a 'What We Heard' report to capture a range of perspectives on this issue. Heather Castleden is leading this work; she is the Scientific Director of HEC Research and Consulting and a Professor and Impact Chair in Transformative Governance for Planetary Health in the School of Public Administration at the University of Victoria.

You have been identified as someone who holds unique expertise and experience in this area and have some understanding of the role of public health systems. Here is some background information on public health systems from last year's CPHO report, which includes an explanation of how public health systems work in Canada.

We are hoping you may be willing and able to accept our invitation to contribute your perspective to this report by participating in a short (30–45 minute) phone or zoom video interview with Heather. If you agree, during our conversation, you can share as much or as little as you like. Your participation is entirely voluntary and there is no need to participate if you do not want to. There are no repercussions for declining to participate. If you would like to give a reason for declining, we would appreciate the feedback.

The approach to the *What We Heard* report will be to identify, document, understand and synthesize a range of perspectives across multiple sectors in Canada. We are looking at the current and potential contribution and role of public health related to climate change. We will be seeking your thoughts on the following areas:

- What comes to mind when you think about public health and climate change?

- What roles do public health professionals and/or systems play in addressing or responding to climate change?
- What roles *should* the public health system play and why?
- How would the public health system need to be strengthened to better support these roles?
- What are some immediate practical steps to get there?

There are no direct benefits to sharing your perspective for this report. We hope, though, that you will find value in participating, knowing that your perspective will ultimately strengthen Canada's public health system response to the climate crisis. To thank you for your invaluable contribution, we will send you a $30.00 e-transfer for you to enjoy a lunch on us somewhere in your local 'hood'.

With your permission, the interview will be recorded and transcribed. The final report will be delivered to the OCPHO on August 15th, 2022. You will receive a copy of the report at that time. Only HEC Research and Consulting will have access to your recorded interview and transcript.

Associate members of HEC Research and Consulting have signed confidentiality agreements. This electronic information (data) will be securely (password-protected) stored on a device in the HEC Lab until April 1, 2023. After that date, the data will be entirely removed from the device.

The CPHO WWH reports do not attribute quotes to specific individuals within the report, but they do include a list of interviewees. We want to alert you to the reality that there is always a small chance that any quote may be attributed correctly/incorrectly to you. We will do our utmost best to remove any identifiers to quoted materials.

If you have any questions about this invitation, please contact [email] or [phone number].

ANNEX E:

Interview Guide

Questions for Individual Interview Participants

I'm always curious to learn why people agree to participate in research. Could you tell me why you agreed to participate in this interview/focus group discussion?

- Probe: What is your connection to public health and climate change?
- Probe: How does public health and climate change relate to your work?

What do you think about the current role of public health systems in Canada?

- What do you think are the current contributions of public health systems in Canada?
- What do you think are the potential roles and contributions of public health systems in Canada?

What comes to mind when you think about public health and climate change?

- What is the current role of public health systems in understanding climate change and in climate change adaptation and/or mitigation?
- What are the current contributions of public health systems in understanding climate change and adaptation and/or mitigation?
- What should the potential roles and contributions be for public health systems to play, and why?

What are some challenges or barriers facing you and/or other public health professionals and/or systems in carrying out work relating to climate change?

- Why do you think those barriers exist?

What are some immediate practical steps for public health systems (from local to national) to better work on climate change?

- Can you provide a few examples to clarify your response?

What are your hopes for the future with respect to public health and climate change adaptation and/or mitigation?

On the opposite end of the spectrum, what is your biggest fear? And can you provide any suggestions or solutions?

Thank you, those are all the questions I have for you, but maybe you wanted to touch on something that I haven't during the interview. Do you have any final thoughts you'd like to add before we wrap up the interview?

ANNEX F:

Focus Group Invitation

What We Heard: Report on Intersectional Perspectives on Climate Change and Public Health in Canada

Information Letter

Each year the Chief Public Health Officer of Canada (CPHO) produces an independent report on the health of Canadians that is provided to the Minister of Health and Canadian Parliament. This report is an opportunity to examine the state of public health in Canada and to stimulate dialogue about public health priorities. This year's CPHO report focuses on the role of public health systems related to climate change.

To inform this report, the CPHO has requested the development of a 'What We Heard' (WWH) report to capture a range of perspectives on this issue. Heather Castleden is leading this work; she is the Scientific Director of HEC Research and Consulting and a Professor and Impact Chair in Transformative Governance for Planetary Health in the School of Public Administration at the University of Victoria.

Through a collaborative candidate search between Heather's team and the Office of the CPHO, we identified the Urban Public Health Network (UPHN) as a collective of members who would likely be able to provide valuable perspectives in this area. Specifically, we are seeking to recruit members who have some experience and expertise and/or professional responsibilities that engage in public health systems' responses to climate change adaptation and mitigation. Here is some background information on public health systems from last year's CPHO report, which includes an explanation of how public health systems work in Canada.

We are hoping you may be willing and able to accept our invitation to contribute your perspective to this report by participating in one of two 90-minute focus groups with Heather and her team. If you agree, during our conversation, you can share as much or as little as you like. Your participation is entirely voluntary and there is no need to participate if you do not want to. There are no repercussions for declining to participate. If you would like to give a reason for declining, we would appreciate the feedback.

The approach to the *What We Heard* report will be to identify, document, understand and synthesize a range of perspectives across multiple sectors in Canada. We are looking at the current and potential contribution and role of public health related to climate change. We will be seeking your thoughts on the following areas:

- What comes to mind when you think about public health and climate change?
- What roles do public health professionals and/or systems play in addressing or responding to climate change?
- What roles *should* the public health system play and why?
- How would the public health system need to be strengthened to better support these roles?
- What are some immediate practical steps to get there?

There are no direct benefits to sharing your perspective for this report. We hope that you will find value in participating, knowing that your perspective will ultimately strengthen Canada's public health system response to the climate crisis.

With your permission, the focus group will be recorded and transcribed. The final report will be delivered to the Office of the CPHO on August 15th, 2022. You will receive a copy of the report at that time. Only HEC Research and Consulting will have access to your recorded focus group and transcript. Associate members of HEC Research and Consulting have signed confidentiality agreements. This electronic information (data) will be securely (password-protected) stored on a device in the HEC Lab until April 1, 2023. After that date, the data will be entirely removed from the device.

The CPHO WWH reports do not attribute quotes to specific individuals within the report, but they do include a list of participants. We want to alert you to the reality that there is always a small chance that any quote may be attributed correctly/incorrectly to you. We will do our utmost best to remove any identifiers to quoted materials.

If you have any questions about this invitation, please contact [email] or [phone number].

ANNEX G:

Focus Group Guide

Questions for Focus Group Participants

First off, I'm always curious to learn why people agree to participate in research. Could you tell me why you agreed to participate in this interview/focus group discussion?

- Probe: What is your connection to public health and climate change?
- Probe: How does public health and climate change relate to your work?

What do you think about the current role of public health systems in Canada?

- What do you think are the current contributions of public health systems in Canada?
- What do you think are the potential roles and contributions of public health systems in Canada?

What comes to mind when you think about public health and climate change?

- What is the current role of public health systems in understanding climate change and in climate change adaptation and/or mitigation?
- What are the current contributions of public health systems in understanding climate change and adaptation and/or mitigation?
- What should the potential roles and contributions be for public health systems to play, and why?

What are some challenges or barriers facing you and/or other public health professionals and/or systems in carrying out work relating to climate change?

- Why do you think those barriers exist?

What are some immediate practical steps for public health systems (from local to national) to better work on climate change?

- Can you provide a few examples to clarify your response?

What are your hopes for the future with respect to public health and climate change adaptation and/or mitigation?

On the opposite end of the spectrum, what is your biggest fear? And can you provide any suggestions or solutions?

Thank you, those are all the questions I have for you, but maybe you wanted to touch on something that I haven't during the interview. Do you have any final thoughts you'd like to add before we wrap up the interview?

References

1. Pörtner, H-O, Roberts, DC, Adams, H, Adler, C, Aldunce, P, Ali, E, *et al*. Climate Change 2022: Impacts, Adaptation, and Vulnerability. Intergovernmental Panel on Climate Change; 2022.
2. Tuck, E, Yang, KW. Decolonization Is Not a Metaphor. Decolonization: Indigeneity, Education & Society. 2012; 1(1):1-40.
3. Crenshaw, K. Kimberlé Crenshaw on Intersectionality, More Than Two Decades Later. Columbia Law School; 2017.
4. Public Health Agency of Canada. Key Element 6: Collaborate across Sectors and Levels. In: Population Health Approach: The Organizing Framework: Government of Canada; 2016.
5. Steffen, W, Richardson, K, Rockström, J, Cornell, SE, Fetzer, I, Bennett, EM, *et al*. Planetary Boundaries: Guiding Human Development on a Changing Planet. Science. 2015; 347(6223):1259855.
6. Planetary Health Alliance. Planetary Health. Planetary Health Alliance; Available from: https://www.planetaryhealthalliance.org/planetary-health.
7. Whitmee, S, Haines, A, Beyrer, C, Boltz, F, Capon, AG, de Souza Dias, BF, *et al*. Safeguarding Human Health in the Anthropocene Epoch: Report of The Rockefeller Foundation–Lancet Commission on Planetary Health. The Lancet. 2015; 386(10007):1973–2028.
8. The Truth and Reconciliation Commission of Canada. Honouring the Truth, Reconciling for the Future: Summary of the Final Report of the Truth and Reconciliation Commission of Canada. The Truth and Reconciliation Commission of Canada; 2015.
9. Pörtner, H-O. Climate Change: A Threat to Human Wellbeing and Health of the Planet – Taking Action Now Can Secure Our Future. IPCC News; 2022.
10. World Health Organization. Protecting Health from Climate Change: Connecting Science, Policy and People. Geneva: World Health Organization; 2009. p. 32.
11. Redvers, N, Poelina, A, Schultz, C, Kobei, DM, Githaiga, C, Perdrisat, M, *et al*. Indigenous Natural and First Law in Planetary Health. Challenges. 2020; 11(2).

12. Masuda, J, Lewis, D, Poland, B, Sanchez-Pimienta, CE. Stop Ringing the Alarm; It Is Time to Get out of the Building! Canadian Journal of Public Health. 2020; 111(6):831-5.

13. Lewis, D, Williams, L, Jones, R. A Radical Revision of the Public Health Response to Environmental Crisis in a Warming World: Contributions of Indigenous Knowledges and Indigenous Feminist Perspectives. Canadian Journal of Public Health. 2020; 111(6):897–900.

14. Jones, R. Climate Change and Indigenous Health Promotion. Global Health Promotion. 2019; 26(3_suppl):73–81.

15. Cook, C, Demorest, SL, Schenk, E. Nurses and Climate Action. AJN The American Journal of Nursing. 2019; 119(4).

16. Blaiklock, A, Williams, C, Jones, R. Chapter 21: Climate Change and the Right to Health. In: Knowlton K, Sorensen C, Lemery J, editors. Global Climate Change and Human Health: From Science to Practice. Hoboken, NJ: John Wiley & Sons; 2021. p. 393–406.

17. Barnosky, AD, Hadly, EA, Bascompte, J, Berlow, EL, Brown, JH, Fortelius, M, *et al*. Approaching a State Shift in Earth's Biosphere. Nature. 2012; 486(7401):52-8.

18. World Health Organization. 2021 WHO Health and Climate Change Survey Report. World Health Organization; 2021.

19. Crenshaw, K. Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics. University of Chicago Legal Forum. 1989; 1989(1).

20. Lear, J. Radical Hope: Ethics in the Face of Cultural Devastation. Harvard University Press; 2006.

21. Bartlett, C, Marshall, M, Marshall, A, Iwama, M. Chapter 10: Integrative Science and Two-Eyed Seeing: Enriching the Discussion Framework for Healthy Communities. In: Hallstrom LK, Parkes MW, Guelstorf N, editors. Ecosystems, Society and Health: Pathways through Diversity, Convergence and Integration: McGill-Queen's University Press; 2015. p. 280–326.

22. Castleden, H, Darrach, M, Lin, J. Public Health Moves to Innocence and Evasion? Graduate Training Programs' Engagement in Truth and Reconciliation for Indigenous Health. Canadian Journal of Public Health. 2022; 113(2):211-21.

23. Castleden, H, Lin, J, Darrach, M. The Public Health Emergency of Climate Change: How/Are Canadian Post-Secondary Public Health Sciences Programs Responding? Canadian Journal of Public Health. 2020; 111(6):836-44.

24. Health Canada. HealthADAPT. Government of Canada; 2020.