



The public health emergency of climate change: how/are Canadian post-secondary public health sciences programs responding?

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Abstract

Objective The Intergovernmental Panel on Climate Change recently issued a statement that the fate of human society and human health is at serious risk of catastrophic impacts unless we take bold action to keep global warming under 1.5 °C. In 2015, the Canadian Public Health Association noted emerging efforts to embrace intersectoral approaches to global change in public health research and practice. In this study, we question the extent to which Canadian Graduate Public Health Sciences Programs have kept pace with these efforts to see climate change surface as a new frontier for training the next generation of researchers and practitioners.

Methods Semi-structured interviews (19) were conducted with Department Heads (or equivalents) of graduate-level Public Health Sciences Programs at 15 Canadian universities concerning the place of climate change in their respective curricula. Interviews were designed to elicit participants' institutional perspectives on the importance of climate change in the Public Health Sciences and identify perceived challenges and opportunities.

Results Despite wide recognition among participants that climate change is a public health “crisis”, very few reported having substantive curricular engagement on the topic. Key challenges identified were lack of resources, organizational issues, and political barriers. Key opportunities to adapt curricula to address this new frontier in Public Health were faculty interest and expertise, cross-disciplinary collaboration, and pressure from the institution.

Conclusion Our findings provide evidence for post-secondary Public Health Sciences Programs to understand the need to address their own sluggishness when what is needed are bold, even radical, shifts to existing curricula.

Résumé

Objectif Le groupe d'experts intergouvernemental sur l'évolution du climat a récemment publié une déclaration que le destin de la société humaine et de sa santé font face à de graves risques des conséquences catastrophiques, à moins que nous ne prenions des mesures audacieuses pour maintenir le réchauffement planétaire à moins de 1,5°C. En 2015, l'Association canadienne de santé publique a pris note des efforts en cours pour adopter des approches intersectorielles du changement planétaire dans la recherche et la pratique en santé publique. Dans cette étude, nous nous demandons dans quelle mesure les programmes d'études supérieures des programmes de sciences de la santé publique canadiens ont suivi le rythme de ces efforts pour faire en sorte que les changements climatiques deviennent une nouvelle frontière pour la formation de la prochaine génération de chercheurs (euses) et de praticiens (ciennes).

Méthode Des entretiens semi-structurés (19) ont été menés avec les chefs de département (ou équivalents) des programmes d'études supérieures de sciences de la santé de 15 universités canadiennes sur la place du changement climatique dans leurs programmes respectifs. Les entretiens ont été conçus de manière à obtenir les perspectives institutionnelles des participants sur l'importance du changement climatique dans les sciences de la santé publique et à identifier ce qu'ils voient comme défis, obstacles et voies de changement.

Résultats Bien que les participants aient largement reconnu que le changement climatique était une « crise » de santé publique, très peu de participants ont signalé un engagement substantiel avec le sujet dans leurs programmes. Les principaux problèmes identifiés étaient le manque de ressources, les problèmes d'organisation et les obstacles politiques. Les principales opportunités pour adapter les programmes d'études à cette nouvelle frontière de la santé publique sont l'intérêt et l'expertise des professeurs (es), la collaboration interdisciplinaire et les pressions exercées par l'institution.

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Conclusion Nos résultats démontrent que les programmes d'études supérieures de sciences de la santé doivent comprendre la nécessité de traiter à leur propre lenteur, alors que nous avons besoin d'un changement audacieux, même radical, vers les programmes existants.

Keywords Public health · Post-secondary institutions · Climate change · Curriculum · Qualitative inquiry

Mots-clés Santé publique · établissements d'enseignement postsecondaire · changements climatiques · programmes d'études · enquêtes qualitatives

Introduction

Youth-led climate strikes took place in 150 countries around the world during the fall of 2019. Global protest on this scale is long overdue. The human health and environmental effects of climate change have been felt for over two decades and scientists have been studying climate change for over 30 years (Intergovernmental Panel on Climate Change, n.d.). In 2014, the United Nations Secretary-General Ban Ki-Moon remarked that “the defining issue of our time is anthropogenic climate change”. The changing climate is the planet’s response to our misguided attempts to colonize her; it is a real-world “wicked” problem with no simple solutions (Kreuter et al. 2004).

In a special report from 2018, the Intergovernmental Panel on Climate Change (IPCC) detailed the many effects of global warming of 1.5 °C, including severe health impacts such as respiratory death due to air pollution, heat-related morbidities, and the spread of vector-borne diseases (IPCC 2018). These risks are elevated for Indigenous peoples, particularly those in the Arctic, those living in the Global South, and those already living with food, water, and energy insecurities, and these inequalities are projected to increase (IPCC 2018). The situation is urgent—in 2018, the IPCC gave us only 12 years to turn this around.

The Lancet released a report in 2017 detailing how climate change would undermine the last 50 years of progress in public health, and a response would be “the greatest global health opportunity of the 21st century” (Watts et al. 2018; p. 10). In Canada, climate change is being integrated into public health discourse, policy, and action. The Canadian Public Health Association listed the changing environment as a critical future direction for health system renewal in Canada (CPHA 2019; p. 15). The core functions of Public Health in Canada are health protection, health promotion, surveillance, disease and injury prevention, population health assessment, and emergency preparedness and response, each of which is necessary in responding to climate change (Haines et al. 2006). However, the traditional “risk management” approach often maintains the status quo, so while there are precedence and desire for action within public health (see Clarke and Berry 2012), we need to prepare for transformative action that will likely challenge and disrupt the capitalist, colonial system in which public health operates.

We situate public health education (PHE) as part of the field’s collective response to climate change by presenting findings from an exploratory study of graduate public health education programs in Canada. We sought to answer the question: to what extent are Canadian Graduate Public Health Programs (CGPHPs) engaging with climate change in their curricula, and what are the perceived challenges and facilitators to engagement? We hope this paper acts as a call to action for educators and leaders in PHE to boldly shift their efforts to intellectually prepare public health trainees as they enter the professional field of practice, many of whom will become active in upstream intervention (i.e., through research, teaching, and frontline practice) concerning the health equity impacts of climate change at local, regional, national, and global scales.

Background

Within the environmental health sector, epidemiological methods are already being utilized to support field developments such as OneHealth, EcoHealth, and planetary health (Buse et al. 2018). Trevor Hancock (2017), a senior public health physician and scholar, writes that the mode of thinking required of those in the public health field can be of great utility beyond the field itself—including addressing climate change and its health impacts. Climate change is a wicked socio-ecological problem, requiring complex intersectoral collaborations (see Adams et al. 2019; Kreuter et al. 2004) in which public health is already inserting itself. What begs recognition is that since climate change is such a wicked problem, the scope of public health will not always be clear. Fox et al. (2019) found that the public health response to climate change has been promising in terms of assessment, whereas policy development, monitoring, and enforcement could be improved. There are factors that currently mediate the engagement of public health professionals with climate change: belief that climate change is not “urgent or solvable”, insufficient understanding, and lack of public health capacity, authority, and leadership (Gould and Rudolph 2015; p. 15649). Gould and Rudolph recommend collaboration, increased education, and improved communications to create space for engagement. But how can PHE keep pace and be engaged as part of intersectoral solutions to addressing climate change and its resulting impacts?

PHE programs have had a varied history, and so they will be at different places and capacities when it comes to approaching these issues. While optimistic about the progress made so far in PHE, nearly a decade ago Massé and Moloughney (2011) drew attention to the lack of evaluation of educational programs and outcomes. In their review of PHE, Tao et al. (2018) found that there is a relatively limited amount of literature that critically engages with theories and practices of PHE, a gap we also identified especially in the Canadian context. Some have called for a collaborative space to critically evaluate PHE (Merzel, Halkitis and Heaton 2017; Massé and Moloughney 2011).

Yet, evaluation of how future public health practitioners are prepared for work, especially on new frontiers like climate change, remains sparse (Silverman 2019). Yassi et al. (2019) attribute this to public health programs being “frozen in old paradigms” and suggest interdisciplinarity and engagement with new methods (p. 40). Other suggestions to transform PHE include education on broader systems and policy analysis skills (Erwin and Brownson 2017), as well as re-creating a new vision of PHE to be relevant, inclusive, and ongoing past the academy (Sullivan and Galea 2017). Innovative pedagogical strategies have also been suggested by Runnerstrom and Koralek (2018) who argue that PHE ought to move beyond an evaluation of skills to focus more on what helps public health trainees actually retain concepts, for example, extending learning to settings outside the classroom. Skinner (2019) writes that critical inquiry in public health pedagogy requires beginning anew, radically implementing and re-examining curriculum, adding new lenses, and accommodating new methods (see also Galea et al. 2015). Within this small body of literature, there is agreement that PHE should be reformed and modernized. The ideas and drive to change PHE exist, but so too do significant challenges.

Certainly, there is precedence for climate justice education on a broader scale based on the mandated “Core Competencies” framework outlined by the Public Health Agency of Canada (PHAC 2008). The Core Competencies framework indicates that “all public health professionals share a core set of attitudes and values such as... commitment to equity, social justice and sustainable development, recognition of the importance of the health of the community as well as the individual, and respect for diversity, self-determination, empowerment and community participation” (PHAC 2008; p. 3). Yet, these values are not nested within the competency “skills” section and may not necessarily be operationalized in post-secondary graduate education. There are many topics competing for space in PHE, and utilitarian concerns may dominate due to university culture.

While there is rising awareness in public health and PHE around climate change and its effects, we know there are significant challenges that face those who wish to make important *systemic* and *structural* changes. We know, for example, from the work of Antonio and Brulle (2011) that

neoliberal politics present the most serious opposition to climate issues, preventing the necessary critical discourse needed to respond to the climate crisis. These politics are alive in the post-secondary system, having changed knowledge production from a social relationship to a deliverable, a change that has resulted in precarity in a “publish or perish” culture (Luka et al. 2015; p. 191). Resisting neoliberal forces by engaging with content that connects the broad determinants of health (i.e., climate change) with the capitalist system is in and of itself an activist approach.

Trevor Hancock (2015), renowned for his research at the nexus of health and the environment, writes that public health advocacy often faces political and corporate opposition, which ultimately impacts the health of the population, so there is a moral and ethical obligation for activism in the face of neoliberalism (think: fossil fuel divestment). In order to make the necessary broad changes to the world, educators, researchers, and academics must first identify the barriers and facilitators to change and resist the policing culture of the university (Rhodes, Wright and Pullen 2018) to then see this extend past the academy with a transformed public health field that can effectively address climate change. There is no denying that there are many educators and departments within the PHE sector advocating for change. We do not wish to minimize their efforts; rather, we elevate in our findings the issues they and others are encountering.

Methods

The research we report here is part of a larger study seeking to explore how Indigenous health, Truth and Reconciliation, and climate change surface in CGPHP curricula. While this paper focuses on climate change, our ethical application was based on considerations around all three themes. We received clearance by our institution’s General Research Ethics Board in June 2019. We began recruitment and continued beyond data saturation, as our goal was to gain a comprehensive understanding of what CGPHPs were doing across the country. The initial inclusion criteria were based on PHAC’s identified guidelines for MPH programs in Canada; we expanded to include MSc programs in Community Health and Epidemiology, which also train future public health professionals. Twenty-five possible CGPHPs were approached to participate.

In our first round of recruitment, eight Department Heads (or equivalents) agreed to participate, and seven referred us to a delegate. Although we did not receive any outright refusals, 11 Department Heads did not respond to our invitation; we ceased contact after three attempts. Of the 25 CGPHPs approached, 16 institutions participated, with 20 individuals participating in interviews (three institutions identified two or more respondents given the size and scope of their CGPHP). One participant withdrew their data after their interview, citing

discomfort with speaking about the other areas of our larger study. The findings below thus represent the views of 19 final participants (13 female, 6 male) and 15 institutions. We did not apply a gendered analysis to our data, nor do we identify participant responses by gender in order to maintain privacy to the greatest extent possible.

Interviews occurred via telephone, and each participant consented to an audio recording. Interviews were planned for 45–60 min, although many went over, as participants often spoke more in depth than anticipated. Participants were offered the opportunity to review their transcripts and quotations in context to enhance the credibility of the findings. Twelve participants elected to review their transcripts, and the same 12 elected to review their quotes in the context of our findings. Two questioned their quotes but were satisfied once reminded of where they made statements in their transcripts; another corrected our interpretation of their perspective.

Descriptive analysis was undertaken through a first round of open exploratory coding to identify key ideas present in the data. We then turned to focused coding for category development where key statements and concepts were highlighted and coded. From the coded text sections, we abstracted common themes, mainly under what we identified as challenges and facilitators to change in CGPHPs. To maintain rigour and credibility in the findings, all authors were involved in the analysis process to reflect, thus enhancing interpretation.

In the following section, our findings are organized to highlight institutional representatives' perceptions of challenges and facilitators to responding and adapting their curricula to climate change at individual, institutional, departmental, and systemic levels. This kind of multilevel analysis has been argued to be essential to public health research (Rutter et al. 2017) and helped us to identify the complex factors that influence change in PHE, so that educators and leaders can move forward on developing strategies to address barriers and support facilitators. We do not identify participants; we refer to participants as P-1, P-2, and so forth when quoting them.

Findings

Perceived challenges

We identified three layers of challenges in addressing climate change in CGPHP curricula:

1. Individual: challenges for operationalizing climate change based on the individual's expertise, history, or personal experiences
2. Institutional: challenges for operationalizing climate change based on department-/school-level barriers

3. Structural/systemic: challenges that stem from political issues, existing paradigms, or the broader context of Public Health as a field.

These categories are not mutually exclusive and there are interactions between the levels. While we focus more on institutional and systemic barriers, we begin with individual challenges so that educators may read and reflect on these as well.

Individual challenges

While most of the challenges that participants identified were institutional or structural, two individual-level barriers stood out. First, several participants identified that incorporating climate change into CGPHP curricula was difficult because current faculty would not have received substantive education during their own training, nor was there inherited content from former professors available regarding climate change. One participant stated:

I think that's the biggest barrier [...] it's not in the textbooks. It's not... in the standing curriculum we've inherited, or the syllabi we've inherited. So it's just the work of figuring out, 'how do I do this well' and the little bit of fear that it's not my area, and I know it's important, but I don't want to, I want to make sure that I do a really good job. (P-4)

A second challenge seemed to be semantic in nature. Participants recognized that their faculty used "anthropogenic change", "climate change", "environmental health" and so forth. By using different terminologies, participants found it difficult to determine how the professoriate were implementing content. For example, one participant said:

What was an environmental health course, that's now getting changed to call it ecosystems health [...] and it includes content related to climate change, vulnerable populations [...] we thought that the content was reflecting more on the whole perspective of ecosystem health, that there was a tendency to think of environmental health from the specifics of what an environmental health officer does [...] and we also wanted to be current with the language, with the public health language of the day. (P-12)

Another noted:

It's, of course, a crowded landscape now because we have the rather sudden emergence of 'Planetary Health' and its framing around the Lancet group and the Rockefeller Institute Foundation and uh, we have,

of course, also ‘EcoHealth’ and ‘One Health’ and so it’s an interesting playing field at the moment. (P-16)

These data reflect the considerable variation among programmatic orientations related to the health impacts of climate change, with overlapping content, variations in practice, and sometimes inconsistent terminologies.

Departmental/institutional challenges

Participants identified several institutional challenges: lack of human resources, distraction from methodological focus of the program, and low priority in terms of strategic focus. Many participants noted that a large barrier to operationalizing climate change in their curricula was the available expertise in their department, whether that they did not have enough people to teach a new course in climate change, or that they did not have a faculty member who had expertise in climate change. One participant noted:

There’s been a few barriers, one is the fact that, we’ve lost a couple of environmental health people over the last couple years, so it’s a matter of a recruitment strategy... and trying to bring people back into that discipline. (P-7)

Another concern, noted by several participants, was that the curriculum was already too packed and it would be onerous to add more content. For example:

We haven’t integrated [climate change] into our curriculum, um explicitly [...] There’s a limited number of courses that the students have, we want to make sure that they all have a good solid foundation. (P-6)

An interesting outlier perspective from one participant indicated that topical courses were less important than methods training.

We’re principally a methods [program]. I don’t even think we teach descriptive epidemiology enough. Because the, the... the focus of our Department is etiological epidemiology, like, identifying risk factors. [...] And, I think we need a course in health promotion and we don’t have that either. So, to me, those courses [...] they’re more important... than a course in climate change and health [or a course in] Indigenous health, it’s not to say they couldn’t be woven in them. (P-1)

The bureaucratic nature of the institution was also identified as a slow-down to operationalizing climate change content, as one participant noted:

We just went through a strategic planning process for the coming five years, and a number of key theme areas were identified...and one of those is around climate change and the ecological determinants of health... But we’re still in the development phase... for who would lead these areas, and we’ve not heard yet the status of that, so that’s actually created a bit of an interruption to our more organic, initial process... So, I can’t really say quite how it’s going to unfold, except it’s an identified area that the school will be investing resources and time into developing further. (P-16)

Other Institutional challenges participants identified had to do with what the department considered to be its professional identity. Several participants noted that climate change was not a “priority” area, or it was not in their “mandate” and required a concerted strategy or effort:

I would argue that a lot of that is not brought into the courses themselves but needs to be, and somehow we have to think of a strategy to do that. To date we haven’t really done that unfortunately. (P-7)

One participant noted that while massive strides had been made within their department to address this, there was still much more that could be done to provide a more fulsome understanding of climate justice and health for students:

On environmental determinants, the courses have been, pretty piecemeal - just reflecting faculty interest and capacity. So a couple of us developed a few years ago, a course on ecological public health [...] And then we have a whole, kind of, environmental health division within the school but its focus is very much on toxicology and environmental exposures and occupational health and so it is not engaged very fulsomely with the social sciences, or issues of, environmental justice, etcetera. So, there’s a big gap there, that still needs to be addressed. (P-16)

At the end of the interviews, participants were asked to grade their school/departments’ efforts in addressing climate change. Grades were as follows: A = 2 participants; B = 7 participants, C = 3¹ participants, and D = 2 participants. Five participants declined to answer, with one explaining their refusal as “it’s not part of our mandate” (P-6), another saying, “it’s not part of our strategy [...] University departments don’t really respond. And if they do respond at all, it’s really slowly and it’s probably from external pressures” (P-1), and still another declining because, “it’s not a conversation I’ve had yet” (P-4).

¹ Upon reviewing their transcript, one participant revised and asked to change their answer from a B to a C.

Systemic/structural challenges

A key structural challenge identified by several participants was the need to embrace academic freedom among the professoriate. They felt that they could not compel others to teach about climate change, or they felt that academics should not have to change what they are teaching to accommodate climate change. One participant said, about curriculum change:

It's a very collective, kind of messy process, we talk, and we decide [...] one of the great things about, in academia, is that, you know instructors have freedom to teach, and I mean you don't want to make it too rigid, then it's not fun. (P-8)

There were also political barriers. The political context was seen as too vitriolic for some to feel comfortable substantively engaging in conversations about climate change, for example:

You know [there is] controversy that sometimes comes with it in [my regional] context [...] I think there's a growing recognition for a need to understand climate change, there's always a balance of associating it with our economics as a province and what is the proper balance of maintaining that. (P-7)

And another participant stated: “The biggest [barrier] being the donors to most of the universities [...] Every university I know of is invested in fossil fuels” (P-10), which suggests that for this participant, there is a political and economic disincentive to engaging in climate change teaching and action.

Several participants expressed a sense of hopelessness about what they could do, and a sense of hopelessness about what public health as a field can do. For example:

If we pay attention to what public health research tells us [...] very rarely are people moved to action by mere fact. We can tell people till we're blue in the face that the planet is heating up to the point that we are looking at probably global systems collapse in our lifetimes. They're not waiting to hear that, they're not going to be like 'oh my god, I didn't know it was so serious'. They are not moved to action by facts. (P-19)

Another participant noted that climate change was “not really seen as being... within the purview of what public health itself could deal with. It was kind of, branded as an environmental health issue, not a health issue, or we'll deal with the health impacts.” (P-16).

Finally, in broader systems-thinking, one participant expressed the general failure to engage the ways in which

health care itself contributes to climate change and the lack of critical engagement about its unsustainable future:

Health care is not independently polluting. I mean, it is to some extent, but the vast majority of the negative environmental impacts of health care is... the infrastructure of transportation, energy, and product of the supply chain, that health care relies on. [...] [Students] don't learn about [the built environment] (laughs loudly). They don't! There's nobody here who cares—that's not true. There are very few people here who care about the built environment. (P-15)

While the perceived barriers were substantial, participants did express some areas of enabling work that are supporting the operationalization of climate change in CGPHPs; these are discussed below.

Perceived facilitators

Some leaders in CGPHPs perceived their programs to be engaging more substantially with climate change and health in their curricula. Individual faculty interest and expertise emerged as an important individual facilitator. Participants often spoke about having a departmental champion of climate change, someone who actively advocated for climate change discourse in the department, in both formal and informal settings. Department champions were often the ones to initiate climate change into the curriculum, especially—as many of these participants noted—public health is late to the game in responding to climate change. One participant reflected:

We've done a little bit better in [teaching climate change] in the last couple of years since I've been here because that's been my emphasis. And, so I think we're moving in the right direction. (P-3)

Another participant described the process of trying to bring climate change into faculty meetings:

When I say things like that to my department, everybody smiles and nods and says, 'yeah' but well, am I actually going to get pushback? I have no idea.” (P-4)

And another described their championing as an “uphill struggle” (P-15). Further elaborating, they said:

I first brought the environmental issues to faculty meeting in 2016. That's when I started pushing very actively in these kind of spheres and committees in starting to think about our role [...] I do not know how effective that was [...] I mean, I think we can have an impact...

you know, I hate this, I hate going to them and saying (very loudly) ‘is there going to be any changes?!’ (P-15)

While some felt frustration in their advocacy for climate change content, others spoke of growing interest within their departments to engage more with climate change. Individual-level expertise and interest often led to departments creating space for climate change.

Many participants, Department Heads and champions alike, spoke about having research seminars, hosting climate change-related conferences, and creating research centres and opportunities for innovation on climate change. These activities often engaged faculty and students from across the university and beyond, leading to intersectoral and interdisciplinary collaboration.

Student interest was also cited as a facilitator for engaging with climate change. For example, one participant noted:

When I talk to some... last term, there were a number of students that said, ‘you know climate change is one of the biggest public health issues and um [they] wish we had more programming in that area. (P-13)

Many participants also spoke about the importance of collaborative spaces not only to bring about more research on climate change but also to support each other’s teaching. One participant said:

Let’s just share stories and try to encourage and support each other, aside from the research. Like, what’s the attitude, what’s the posture, what are the complexities, what are the tensions we have to navigate, what are the encouragements we can share? (P-4)

Top-down pressures from the institution also facilitated engagement with climate change. A few participants noted that climate change was a part of their department’s strategic priority. One participant noted:

It’s on the agenda, it’s being acknowledged. [...] We have one course that I mentioned on the books, we have two additional courses that are going through the various councils. (P-20)

Some participants spoke about institutional pressures for local public health units to include climate change as part of their mandate. As the role of PHE is to build capacity for these units, university programs have a responsibility to train their students to address climate change, as it is a critical public health issue. Though not 100% unanimous, by and large, participants were enthusiastic about including climate change education in the Core Competencies. Despite the many systemic and institutional challenges, there is momentum in bringing climate change into PHE.

Discussion

Our research explored the extent to which CGPHPs are engaging with climate change in their curricula and what Department Heads (or champions) see as the challenges and facilitators to engagement. Our findings reveal how leaders in CGPHPs feel they have (or have not) kept pace with broader and bold (er) efforts to see local-to-global climate change being embraced through intersectoral approaches in public health research and practice. These efforts impact the next generation of public health researchers and practitioners in terms of their ability to act through public health efforts on addressing the 10-year window remaining to limit global warming to 1.5 °C. That we found few leaders of CGPHPs perceiving their programs to be actively engaging with climate change in the classroom, let alone with bold or radical action, is alarming.

Most participants spoke about utilizing climate change as an example or case study in class because of its intersections with traditional material. Inclusion through examples is not nearly enough to translate meaningfully into professional practice (Silverman 2019). Some claimed that they did not have room for special topics and instead focused on methodologies (i.e., epidemiology) that could be universally applied to any public health issue. While skills in these areas are important for training, applying these skills without sufficient knowledge of certain content areas is problematic. These results provide some empirical support to the ideas put forward by Silverman (2019), who argued that a lack of educational preparedness is the main barrier to optimizing public health’s response to climate change. “Climate change and health” courses are not required in most CGPHPs (yet); participants identified the barriers to this consisted largely of institutional inertia, linking to the neoliberalization of the academy, lack of academic expertise and confidence to take on this “wicked” topic, and deflecting responsibility to “deal with” climate change in the environmental disciplines.

An unexpected direction of the research was participants’ commenting mainly around adaptation, whereas we were anticipating there would be substantial foci on mitigation, prevention, and more upstream efforts. When participants did mention prevention or mitigation, it tended to focus primarily on individual behaviour change. We had expected there would be more intellectually rigorous (i.e., critical public health theory) and action-oriented stances (i.e., what can we *do*, not just what do we *think* about) on the systemic roots and upstream causes of climate change, its health impacts, and inequities. Prevention is a core organizing concept in public health, and while the scope of public health has more clarity in terms of adaptation, we challenge educators and professionals to consider how they may move their practice upstream, be it through methodological innovation or activism.

Indeed, this research reveals what a “wicked problem” climate change truly is. But engagement with climate change in

public health requires more than shared understandings and shared commitments. We need top-down and bottom-up forces working in concert to create the conditions necessary for CGPHPs to engage in robust “climate change and health” scholarship. With structural and system-wide pressure to see climate change in the curriculum, CGPHPs could be in a position to respond with gusto to this global crisis (Fox et al. 2019). Galea et al. (2015) show that strategic planning processes and bottom-up leveraging provide financial, political, and moral direction for fundamental curriculum reform. As Hancock (2015) notes, and we referenced earlier, there is a moral and ethical obligation for activism in public health, from curricular reform to mass protest, and everything in between. Such action currently includes calls from students for radical change and can draw on the strengths and expertise of existing teaching faculty, targeted hires where expertise is lacking, and institutional support once they are in place.

At the same time, the importance of maintaining academic freedom and the challenge of internal/external politics within a neoliberalized post-secondary institution still have a bearing on what may or may not change in CGPHP curricula. Academic freedom can be operationalized to prevent engagement in politicized issues, especially with urgent socio-ecological issues where there may be a “duty to teach” (Fahrenwald et al. 2007; p. 191). Galea and Vaughan (2019), however, illustrate how public health is largely inseparable from politics and argue that those in the field must not only recognize this but also act on it. Again, we assert the importance of advocacy to public health by offering the words of leading public health scholar Trevor Hancock: “We grant tenure to academics in the name of academic freedom, but what is that but the freedom also to speak out—and not just the freedom to speak out, but surely an obligation to do so. Why else would we grant the extraordinary privilege that is tenure—a job for life. Great privilege brings great obligations” (2015; p. 88). Echoing Rhodes, Wright, and Pullen (2018), we believe a bold and radical change not only to curricula but also to departmental operating procedures and institutional commitments is necessary for PHE to begin to prepare future professionals to address climate change. One of our participants reflected: “More conversation at our department level is probably needed in terms of how we continue thinking about climate change and what that means for our teaching in our classes” (P-11). This is one of many starting points for moving forward on climate change, to build on existing interest, growing momentum, and have those difficult conversations.

Conclusion

Our aim here is not to highlight individual failings of CGPHPs or the lack of political will among representative participants. Rather, we are looking at the institutional structures that give

way to conditions that promote the current non-interventionist attitudes about climate change that surfaced during many of the interviews. The perceived challenges far outweighed the facilitators to implementing education about climate change and human health, thus emphasizing the need for top-down departmental and institutional pressures and bottom-up student protest, much like what we saw around the world during the global School Strike for the Climate in 2019. Our findings highlight the need for CGPHPs to respond and radically, or at least boldly, reform their curricula to adapt to this new frontier in public health. One of the core functions of public health is emergency preparedness, and climate change is the biggest global emergency of our time. The clock is ticking, and so here in Canada, here in public health, “we need to do more” (Greta Thunberg to Prime Minister Trudeau, September 24, 2019).

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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