

Health professionals and climate change communication:  
An exploratory study in Northern Ontario

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Health

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**Approval**

**Author's Declaration**

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

## **Abstract**

Health professionals are recognizing and experiencing the impacts of climate change in their work and understand the need to communicate this information to the people and populations they serve. Improved climate change communication, utilizing health professionals' trusted position in society, has been highlighted as a means to effectively create engagement and stimulate support for climate action. While effective methods of communicating climate change have been identified, there is a dearth of literature demonstrating how health professionals are communicating climate change in their work. In recognition of this gap in research, this study examined how health professionals, who identify as climate change leaders, perceive and communicate climate impacts and action in Northern Ontario. Key-informant interviews (n=19) were conducted with health professionals engaged as climate change leaders in Northern Ontario. The findings from this study revealed that a concerned and passionate subset of Northern Ontario health professionals exists, who understand and recognize the serious health implications presented by climate change. These health professionals viewed the impacts of climate change extending beyond physical health, impacting mental health and social wellbeing, in addition to driving further health inequities based on social determinants of health. However, the current expectations of the health professionals' role, feeling a lack of capacity and available time, and the politicization and fear of damaging the trusted relationship between clients, community and the health professional were all identified as prominent barriers to communicating climate change. Despite these challenges, participants saw potential for their role to incorporate climate change communication and offered valuable insight into how this might be achieved. Developing an approach to communication that recognises the unique context and experiences of populations residing in the North, while respectfully navigating the tricky sociopolitical landscape, will be imperative to effective communication and action engagement. That being the case, participants advocated for further education and training in regard to climate change health communication to significantly improve their capacity to incorporate the communication into their role, as well as additional resources to support the development of context-specific messaging they could use in their daily practice. These tools would help participants, and health professionals across Northern Ontario, improve their capacity to effectively engage in climate change communication to improve the health of the populations they serve.

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## **Chapter 1: Background**



## **Introduction**

The cumulative impacts of climate change are being felt through social and environmental dimensions, creating new health concerns and amplifying existing health inequities (Watts et al., 2019). This climate crisis is widely acknowledged as simultaneously the greatest health threat and opportunity of the 21<sup>st</sup> century, presenting all health professionals, those who work to maintain human health through primary or preventative measures, with the urgent and complex challenge of improving health and health equity in the midst of a rapidly changing environment (Costello et al., 2009; Watts et al., 2015; WHO, 2018). Health professionals and their governing bodies have recognized the need to understand the complex, interconnected relationship between health and climate change, and communicate the health impacts and solutions to the populations and communities they serve (CAPE, 2019; CMA, 2010; CPHA, 2019; Doyle, 2019; Martin & Vold, 2019). Inspired by the need for greater climate action among health professionals, this thesis offers a focused examination of how health professionals perceive their role to communicate the health impacts of climate change and stimulate engagement for transformative change in a rural context.

## **Research Goal and Objectives**

The overarching goal of this research was to examine how health professionals who self-identify as climate change leaders perceive and communicate climate impacts and action in Northern Ontario. The study aimed to achieve the following objectives:

1. To describe trends and key issues among health professionals, with respect to their perceptions of climate change and climate mitigation in Northern Ontario;
2. To identify if and how health professionals communicate and engage with the issue of climate change in Northern Ontario;
3. To develop practical and applicable recommendations to improve climate change communication in order to inspire and support new health leaders;
4. To identify opportunities for strengthening the role of health professionals in climate change action.

### **The Challenge and Rationale**

The health impacts of climate change are momentous, interconnected and projected to increase in frequency and intensity in the absence of appropriate action (Costello et al., 2009; Hess et al., 2014; Kipp et al., 2019; Verner et al., 2016). For example, extreme weather events can lead to incidents of substantial flooding and destruction, causing physical injury, mental health complications and waterborne illness, while extreme heat events result in droughts, crop destruction, more frequent incidences of heat stroke and increased air pollution. Furthermore, environmental degradation and shifts in ecosystems have a myriad of profound impacts, significantly aggravating critical social determinants of health which threaten to reverse substantial population health achievements (Watts et al., 2019; Whitmee et al., 2015).

There is an increasing sense of urgency among academics investigating the health impacts of climate change, who have recognized the disproportionate ways these impacts are experienced, and are calling for immediate climate action before health challenges and inequities are further amplified (Costello et al., 2009; Watts et al., 2015, 2018). In this research, the definition of climate action is informed by the United Nations Sustainable Development goal for climate action, and includes a broad range of activities, such as adaptation, mitigation, advocacy, and any effort to increase one's personal understanding and relationship with climate change (Rosa, 2017). Significant and immediate action is imperative to address the problem of climate change, however climate inaction persists (Ekstrom & Moser, 2014; Field et al., 2014; Moser & Ekstrom, 2010; Watts et al., 2018). This wide inaction is recognized in climate science as an 'action deficit', wherein the current level of action directed at mitigating and adapting to climate change does not meet the threshold to effectively address the many perpetuating climate change drivers and health impacts (Field et al., 2014). Recent research, aimed at addressing the climate action deficit, has identified inadequate and ineffective climate change communication as an important contributing factor (Moser, 2014, 2016; Wibeck, 2014). Moser and Dilling (2012) argue that in order to promote engagement with climate change and empower support for climate action, the impacts of climate change on health must be conveyed in a meaningful way. To this end, the interdisciplinary field of climate change communication has continued to advance, as in-depth research has furthered understanding of the theory and practice to generate action (Ballew et al., 2019; Mah et al., 2020)

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A critical component of climate change communication is understanding the audience and tailoring messages to people, populations, and places. Messaging that resonates with a specific population, based on social factors such as class, culture, or socio-economic status, help ensure effective communication (Moser & Dilling, 2012). Recognizing that the social determinants present in Northern Ontario (the North) compound to create a contextually specific experience of greater vulnerability to the impacts of climate change, presents the opportunity to further study an underexamined region where targeted messaging could be more effective in stimulating engagement.

Many health professionals recognize the need to improve their understanding of the ways in which climate change is and will increasingly impact human health. This includes how mitigation activities, action that works to prevent long-term climate change impacts, as well as adaptation activities, action aimed to reduce the risk of harm of climate change impacts, may decrease the burden on the healthcare system (Haines et al., 2007; Sarfaty, Kreslake, Casale, et al., 2016; Smith & Balakrishnan, 2009; Smith & Woodward, 2014). While the health field has been focused on climate-health adaptation research for decades, and engaged in work around how to cope with the impacts of climate change, the connection to mitigation and the accompanying health co-benefits is an emergent field that presents many opportunities for novel contribution. Encouraged by this opportunity to contribute, this thesis intentionally focused on mitigation. Understanding the way in which climate change mitigation, in addition to adaptation, reduces health impacts allows health professionals to deliver more appropriate, preventative care. However, there are many different understandings and approaches that make advocating for and implementing climate action a complex and controversial matter (Field et al., 2014).

Within this field of climate change communication, an emerging area of interest has developed around the perceived credibility, trustworthiness, and knowledge of the individuals delivering the message (Moser, 2016). Climate change communication researchers have recognized health professionals as potentially optimal messengers to communicate the health impacts of climate change to a wide, diverse group of people (Abelsohn et al., 2008; Sibbald, 2013). Utilizing their trusted position in society, health professionals can apply their leadership and reach to educate their clients and the public around climate change and the impacts on health (Haines et al., 2009; Hathaway & Maibach, 2018; Kreslake et al., 2018; A. M. Moser et al., 2017; Xie et al., 2018). Moreover, research suggests that framing climate change

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as a health issue may aid in how a message is received and utilized, furthering the potential role that health professionals can play by leveraging their knowledge and experience in the health field (Adlong & Dietsch, 2015; Humphreys, 2014; Myers et al., 2012; Roser-Renouf et al., 2014). These factors allude to the potential health professionals can hold to effectively raise awareness surrounding climate change impacts to health and encouraging individuals to engage and take action. However, key knowledge gaps exist, including practical insight into how health professionals can effectively communicate the immediate and long-term health threats posed by climate change and stimulate engagement to address the current climate action deficit (Hathaway & Maibach, 2018). This thesis further examines the motives, messages and techniques used for communicating the health impacts of climate change, will address important knowledge gaps within the field of climate change communication, and may help to strengthen the role health professionals play in addressing the wicked problem of climate change.

### **Literature Review**

Although the topic of climate change communication has recently come into focus as an emerging area of study, there is limited scholarly literature that discusses or analyses the ways in which health professionals communicate the effects of climate change (Kreslake et al., 2018; Maibach et al., 2011). However, previous literature in areas such as the health impacts of climate change and professional and public climate change knowledge is helpful to inform the emerging findings around climate change communication to establish a foundation on which to base this research. In this section, I will review the literature that has formed the starting point for my research by highlighting the health impacts of climate change, the health co-benefits of climate change mitigation, the present knowledge of climate change impacts and action among the general public and health professionals, and the research dedicated to exploring effective communication of climate change.

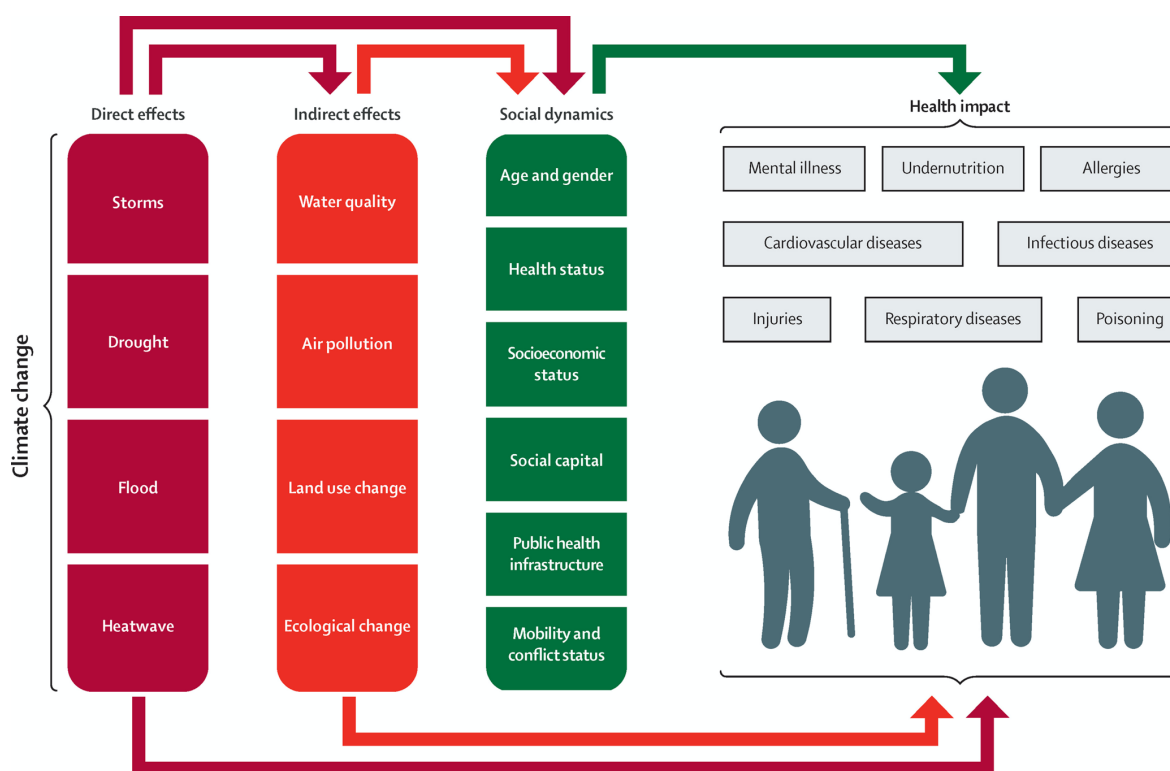
### **Health Impacts of Climate Change**

As our knowledge of climate change has grown, the impacts of climate change on human health has increasingly been viewed as a global problem with significant implications (Watts et al., 2019). Although health impacts are difficult to predict, there is consensus among health professionals that climate change has substantial negative health impacts that will worsen with

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further climate change (Dennekamp & Carey, 2010; Watts et al., 2015). It is difficult to accurately establish causation between climate change and health outcomes, yet research advancements reducing bias and accounting for confounding variables have allowed for strong inferences surrounding the connection of climate and health impacts (McMichael, 2013; Rosenzweig et al., 2008; Sauerborn & Ebi, 2012). Studies have identified numerous areas of health that are negatively impacted by climate change through a variety of complex, interacting pathways (Smith et al., 2014; Watts et al., 2015, 2018). These pathways can be separated into three groups based on method of exposure: direct impacts, indirect impacts mediated through natural, ecological systems, and impacts mediated by human social systems, shown in Figure 1 (Watts et al., 2015).

Direct impacts refer primarily to changes in the frequency and intensity of extreme weather. Instances of flooding, forest fires, heat waves, and other extreme weather events due to climate change have a direct impact on the health of the populations who experience them through increased morbidity and mortality. One of the most notable examples of a direct impact is extreme heat, when elevated ambient temperatures contribute to illnesses such as heat stroke and hyperthermia. This thermal stress presents significant threats to public health, with greater impacts on marginalized populations (Portier et al., 2010). Although there is a common perception that increased temperatures would benefit areas with colder average temperatures in preventing cold related health impacts, it does not account for other seasonal factors which contribute to the occurrence of colder days (Ebi & Mills, 2013). Increased temperatures also cause the ice roads needed to travel to and from remote Northern communities to become inaccessible. As a result, these communities experience food insecurity and other health inequities due to the inability of food and other necessary supplies to be brought in, and for community members to access more specialised health services outside of the community (Ford, 2009; Hori et al., 2018). Another example of a direct impact is flooding, which is a common type of natural disaster experienced in Canada due to excess precipitation or snowmelt increasing the incidence of floods (Burn et al., 2016; Thistlethwaite et al., 2018). Health is negatively impacted as a result of injuries, death by drowning, and respiratory emergencies. Flooding poses a real threat to health, especially to communities located on or near bodies of water (Furgal & Prowse, 2009; Lemmen & Warren, 2004).



**Figure 1:** Exposure pathways for health and well-being impacts of climate change (Watts et al., 2015)

Changes to the ecosystems indirectly impact health as seen through increased allergens, incidences of vector-borne diseases and pollution. Vector-borne diseases, including infections carried by mosquitos and ticks, have been widely studied in relation to climate change (Berrang-Ford, 2009). Warmer, wetter climates are favourable for disease proliferation and lead to increased incidences of disease outbreaks across Canada, such as Lyme disease carried by ticks (Ogden et al., 2010; 2017; Soucy et al., 2018). Warmer temperatures are also leading to increased waterborne infections and food related illness, amplifying toxic algae bloom and harmful water contamination incidences (Lake et al., 2009). Negative health implications, such as asthma and other respiratory complications, are now impacted by even small amounts of air pollution (Health Canada, 2017; Judek et al., 2005; Kantor et al., 2010). The frequency of prolonged ozone exposure, aeroallergens, and particulate matter from forest fires have all increased with climate change (Ebi & McGregor, 2008; Finlay et al., 2012).

The third and final pathway is characterized by climate change impacting social and economic systems by altering how communities function in a way that can be detrimental to

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health. These health impacts include alteration to nutritional, occupational, and mental health. For example, climate change affects agricultural production, which in turn affects food prices, quality and availability, resulting in more malnourished people (Guyot et al., 2006; Kuhnlein & Chan, 2000; Wein & Wein, 1995). Occupational health is greatly impacted by heat, causing a reduced ability to work which then impacts livelihood (Ford, 2009; Kiefer et al., 2016). The increased stress of workers, operationalized in their anxiety, depression, and external distress for the ongoing loss of the environment, negatively impacts their mental health (Portier et al., 2010). Beyond occupational health, mental health outcomes related to climate change including post-traumatic stress disorder, environmental grief, and anxiety are also of concern, particularly among younger populations, with feelings of worry and hopelessness for the future predominant among children, youth, and young adults (Hayes et al., 2019).

Populations in Northern Ontario are at a heightened risk compared to the rest of the province, as environmental and socially constructed conditions have made many communities more vulnerable to the health impacts of climate change (Abelsohn et al., 2008; Smith & Woodward, 2014). The social constructs that shape how different populations experience the effects of climate change is a political issue and a climate justice issue, as the rights of vulnerable populations to a healthy environment are being neglected (Levy & Patz, 2015). Climate change vulnerability is constructed by many factors, which vary depending on region, health status, age, socioeconomic status, and many other social determinants of health (Melill et al., 2014; Menezes et al., 2018). Geographic location contributes to many direct impacts, such as susceptibility to flooding and extreme heat events, and indirect impacts such as access to services and food. Northern Indigenous communities, who are already experiencing significant climate change impacts, now face additional health challenges that are related to climate change (Furgal & Prowse, 2009; Furgal & Seguin, 2006). These vulnerable communities are often geographically isolated, which contributes to social and health disparities and makes access to reliable health care challenging. Isolated communities that have depended on natural resources for livelihood and well-being, such as hunting, fishing and forestry, must now take extra precautions as a result of increased incidences of waterborne and food-borne infectious diseases (Abelsohn et al., 2008; Furgal & Seguin, 2006). Fluctuating temperature extremes disproportionately impact isolated Northern communities through decreasing ice coverage and stability, impeding access to communities accessible primarily by ice road, decreasing food security, and access to external

health and social services. While many more centrally located communities may be able to adapt to some climate change impacts, the isolated Northern communities might not have this ability, which only increases their vulnerability.

Populations made vulnerable to climate change are within this study defined as those whose health will be, or is being, disproportionately impacted by climate change. Vulnerability to the impacts of climate change is not inherent, it is constructed. An individual's vulnerability to the impacts of climate change is a result of social and politically generated forces that dramatically impact an individual's exposure, sensitivity and capacity to adapt to climate impacts (Katz et al., 2019; Smith & Woodward, 2014). Literature investigating climate change impacts across Northern Canada frequently identifies First Nations, Metis and Inuit peoples as the populations most vulnerable to the impacts of climate change, however it is critical to understand and acknowledge the purposeful structures which have marginalized these specific populations to avoid perpetually blaming the populations made vulnerable for their vulnerability (Ford et al., 2010; Furgal & Seguin, 2006). Of importance in Northern Ontario, historic and ongoing impacts of economic exploitation, racism, colonization and colonialism, including forced land displacement, trauma from residential schools and embedded economic, legal and political disadvantages have generated devastating health inequalities and are a result of purposeful decisions by groups or populations in power (Brittain & Blackstock, 2015; First Nations Information Governance Centre, 2018). Recognizing that external conditions drive vulnerability is central to understanding and addressing the health implications of climate change and must be incorporated into all work exploring the intersection of climate change and health (Buse, 2018; Katz et al., 2019).

### **Health Co-benefits of Climate Change Mitigation**

The ways in which we understand and experience the impacts of climate change informs how action is taken. While adaptation action must be taken to reduce the impacts to individual and population health, mitigation action presents an understudied opportunity to address the health impacts of climate change in a sustainable way. Climate change mitigation, defined as “an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases” (Watson & Albritton, 2001), offers a range of co-benefits. In addition to reducing greenhouse gas emissions, climate mitigation can have a positive impact economically, through lessening our



dependence on expensive fossil fuel extraction. As well, mitigation can present many positive opportunities to improve human health (Markandya et al., 2018; Smith & Haigler, 2008; UNECE, 2016; G. Watts, 2009; Watts et al., 2015).

Our relationship with the environment is part of a complex, interconnected system, wherein changes made in one area produce changes in another (Capon & Rissel, 2010; Haines, 2012; Patz, 2016). Climate change mitigation can lead to improvements in social and environmental determinants of health, which then lead to an increased protection of overall human health (Dennekamp & Carey, 2010; EarthCare, 2015; Labbé et al., 2017). These mitigation strategies work to address climate change while also contributing towards health co-benefits, the additional health benefits that result from climate action (Patz, 2016). For example, the promotion of active transportation through the creation of safe, walkable communities aims to reduce greenhouse gas emissions and air pollution, while increasing physical activity and also decreasing risk of cardiovascular disease (Cheng & Berry, 2013; Haines et al., 2009; WHO, 2009). Population knowledge about, and experiences with, health co-benefits have demonstrated positive impacts in motivating climate action and reducing the overall impact of climate change on health (Capon & Rissel, 2010; Haines et al., 2009; Markandya et al., 2018; Watts et al., 2015). Further changes in several policy sectors, including food and agriculture, and energy generation, could better support climate action with health co-benefits. For example, the promotion of a plant-based diet has many benefits to individual health, such as lowering the risk of cardiovascular disease and type 2 diabetes, in addition to reducing the carbon-impact caused by red-meat production and distribution. Shifting energy production from the burning of fossil fuels to more sustainable methods, such as renewable energy generation, will improve respiratory health by reducing air pollution and carbon emissions (Woodcock et al., 2009).

Although health co-benefits can be found in both mitigation and adaptation measures, the perceived, one-time, immediate low cost of implementing adaptation measures compared to the long-term, higher cost of mitigation efforts, has made adaptation measures more readily available to study and examine (Hof et al., 2014; Marcellesi & Cartwright, 2018; Margulis & Narain, 2010). Although it remains incredibly important for health professionals to advocate for adaptation policy to moderate harm, preventative action to mitigate climate change is needed to ensure protection of individual human health and the environment in a lasting, sustainable way. Health impacts as a result of climate change are difficult to predict, as global temperature and

greenhouse gas emissions increase non-linearly (Watts et al., 2015). Any action taken without consideration for the future is reckless, as we need to be able to adapt to unforeseen climate disruptions (Tong et al., 2016). Climate mitigation presents a way to consider the unpredictability of the future, while still engaging in preventative action with co-benefits to individual health.

While many mitigation strategies can effectively contribute to reducing greenhouse gases, they are not unanimously valued by the general public (Leiserowitz et al., 2013). An example of this tension is the introduction of active transportation as a means of primary transportation, which would lower our carbon emissions, reduce air pollution, and bring about substantial health benefits including reduced cardiovascular disease, serious injury from motor vehicle accidents, depression, type-2 diabetes, and dementia (Hosking et al., 2011; Woodcock et al., 2009). Although these outcomes all positively impact individual and population health as well as reduce greenhouse gas emissions, this strategy requires the prioritization of pedestrians and cyclists, which goes against our current social hierarchy of modes of transport on the road, particularly in Northern mid-sized cities and rural contexts (Pucher & Buehler, 2017; Winters et al., 2018; Woodcock et al., 2009).

### **General Public and Health Professional Knowledge of Climate Change Impacts and Action**

Though the literature shows an increase in public acknowledgement and understanding of human-caused climate change, there continues to be misunderstandings and disagreements about health impacts, the urgency of the problem, and climate action (Ballew et al., 2019; Cameron et al., 2020; Health Canada, 2017; Milfont et al., 2017; Neuman & Bruce, 2014; Thompson, 2017). Climate action often encounters resistance and generates confusion, as pessimism and climate change denial are well-documented barriers that may lead to the perpetuation of misinformation (Maertens et al., 2020; Prasad, 2019; Watts et al., 2015). Despite the fact that improving health care ranks among the highest of Canadian public policy priorities, people feel distanced from the impacts of climate change, as research indicates they are unaware of the immediate personal impacts (Awuor et al., 2020; Health Canada, 2017; CEC, 2018). More research is needed to investigate the unintended consequences of climate inaction and gain a greater awareness of the strategies and benefits within the process of policy creation and implementation (Hornsey & Fielding, 2019; Kingsley & EcoHealth Ontario, 2019; Kipp et al., 2019; Watts et al., 2018).

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Though the majority of people believe climate change will impact the environment and future generations, when considering the health specific impacts of climate change, the knowledge of the general public is limited (E. Field et al., 2019; Environics Research Group, 2017; PHAC, 2017). The general population is less likely to associate the indirect impacts on health, such as longer allergy seasons or increasing rates of vector-borne disease, to climate change, however they have been able to attribute direct effects, such as respiratory problems and illness, injury, or death due to extreme weather events (Cameron et al., 2020).

Nationally, Canadians are not making the connection between climate change and health, which research argues is due largely to their inability to understand the complex ways in which environmental impacts contribute to health (Cardwell & Elliott, 2013; Health Canada, 2017). Among Canadians, there exists a long-standing lack of understanding when it comes to climate change terminology, perception of vulnerability and possible behavioural changes (Akerlof et al., 2010; Cardwell & Elliott, 2013; Health Canada, 2017). A common perception among Canadians is a sense of concern, however many feel their individual contribution will not make a difference and withdraw from any form of behavioural change (Cardwell & Elliott, 2013; Luis et al., 2018; Ostapchuk et al., 2015). Nevertheless, many scholars remain optimistic about the opportunity to reposition climate change as a public health issue in order to increase engagement (e.g. Buse, 2018; Fox et al., 2019; Kreslake et al., 2018)

Although the research on climate change perceptions among health professionals is limited, particularly in Canada, the small but emerging body of research shows that there is a strong consensus among health professionals that climate change is already negatively impacting health (Hathaway & Maibach, 2018; Paterson et al., 2012). A majority of health professionals from clinical and population health professions see evidence of impacts, most notably through heat-related illness, intense weather events leading to inconsistent care, increased mental health complications and decreased air quality intensifying asthma and cardiovascular disease (Maibach et al., 2008; Roser-Renouf et al., 2016). However, research has shown that many health professionals have a desire to further their learning on health impacts of climate change as they feel a lack of knowledge on the topic (Hathaway & Maibach, 2018; Kreslake et al., 2018). Health professionals are increasingly advocating for a greater emphasis on the education of climate and health impacts through various forms of continuing education and curriculum modification (Hackett et al., 2020; Hathaway & Maibach, 2018; Watts et al., 2018). Many health professionals

demonstrate a desire to learn and manage the associated health risks of climate change to provide the most appropriate care and effective public health response (Hathaway & Maibach, 2018; Kreslake et al., 2018).

### **Climate Change Communication**

Within the past 15 years, the field of climate change communication has emerged as an interdisciplinary area of study, increasingly focused on how to communicate climate change in ways that motivate engagement and support (Moser, 2016). Literature within the field of climate change communication centres on the themes of knowledge, emotion, and behaviour as a framework for more effective communication (Ballantyne et al., 2016; Lorenzoni et al., 2007). This need for more effective communication has developed in response to the global action deficit (Moser, 2016). Research suggests that while we must communicate the facts of climate change to the general public, including the science, causes, and impacts, in order to stimulate people to engage in climate action and reduce the action deficit, we also need to communicate how it will affect their lives (Kreslake et al., 2016; Moser & Dilling, 2012). The values and beliefs of the public need to be contextualized within a local framework to stimulate community-level action that is relevant and impactful (Leiserowitz, 2006; Weathers et al., 2017).

By framing the rationale for engaging in action against climate change in the context of local attitudes and perceptions, the public can discern the importance of climate action, which in turn can be effectively utilized in targeted engagement to account for variability among communities (Moser, 2014). Literature suggests that climate change communication must be delivered in a message that is more focused on stimulating engagement (Burch, 2010; Moser, 2016). Messages should recognize that climate change is real and human-caused, is already directly and indirectly impacting human health, and requires immediate action, which can be beneficial in improving health (Maibach et al., 2011; PHAC, 2017; Weathers et al., 2017).

Additionally, the individuals and organizations delivering the message must understand that communication is a “two-way street” and that listening is a critical component of communication (Bellette, 2012). Ensuring that the target audience comprehends the message is just one component of communication. Communicators must actively listen to individuals and communities to understand where their priorities lie and what knowledge they already possess

(Cho, 2012). Northern communities have experienced the impacts of a changing climate first hand and to a greater degree than in the South of Ontario, which influences the issues of importance and relevance when it comes to taking action (Furgal & Prowse, 2009).

Communicators must actively listen to the knowledge and goals of communities and work towards action that is engaging, and contextualized within the local culture, history and wishes to ensure effective, sustainable success.

Research has illustrated that framing climate change as a health issue may be effective in terms of not only raising awareness but also motivating engagement and action (Adlong & Dietsch, 2015; Humphreys, 2014; Myers et al., 2012; Roser-Renouf et al., 2014; Myers et al., 2012; Portier et al., 2010). It has been demonstrated that a health focus can elicit an emotional reaction that is consistent with support for climate mitigation action (Myers et al., 2012; Ring, 2015). Historically, promoting actions to improve health and well-being has been effective in educating and communicating with broader audiences, and therefore presents an opportunity as a method to communicate the effects of climate change (Corcoran, 2013; Frumkin et al., 2008).

Health professionals have a “duty to protect and fulfill the right to health” (Sheffield et al., 2014). As trusted community members and sources of information in society, health professionals have an obligation to educate the public and decision makers on the health risks posed by climate change (Haines et al., 2009; Krygsman & Speiser, 2016; Maibach et al., 2011; Roser-Renouf et al., 2014; Xie et al., 2018). As discussed above, public knowledge of health impacts related to climate change is low, highlighting the need for health professionals to communicate the current and potential harm and the need for action.

Whether communicating directly to populations made vulnerable, decision-makers, media outlets, or other health professionals, information needs to be clearly and meaningfully communicated to make it possible for the intended audiences to understand the complex nature of the problem and respond appropriately. Many climate-health organizations, such as The Canadian Association of Physicians for the Environment (CAPE) and the Canadian Health and Environment Education and Research Foundation (CHEER), have produced clear, engaging reports highlighting climate impacts and action with the goal of educating the public and health professionals alike (Abelsohn et al., 2009; CAPE, 2019; CAPE and CHEER, 2017; Portier et al., 2010). Furthermore, many resources currently exist for health professionals that help to inform and guide the way in which they communicate climate change to their clients (Burch, 2010;

CAPE, 2017; Richards & Carruthers Den Hoed, 2018). For example, the *Climate for Health Key Talking Points* (Krygsman & Speiser, 2016) provides health professionals with guidance and information for communicating climate change through a health lens; while the *Climate Change Communication Primer for Public Health Professionals* (Maibach et al., 2011) answers questions around why health professionals should communicate climate change, with whom and how their messages can be most effective. Much of the information summarized within developed resources to aid health professionals in communicating change is included within this literature review. There is, however, a shortage of measures that would serve to directly evaluate the effectiveness of the health professionals' communication efforts, as well as a lack of research identifying the perspectives of health professionals around communicating climate change to their clients, and how easily it is integrated into their work (Buse, 2014; den Boer, 2016).

This shortage is especially evident in the context of this study, as there is limited research in Canada, and none within the Northern Ontario contexts. There is literature that supports the claim that health professionals are seeking educational opportunities to enhance their climate change communication, and to become more comfortable and confident communicating climate change (Bell, 2010; Hess et al., 2012; Maxwell & Blashki, 2016; Shaman & Knowlton, 2018; MSCCH, 2017). Further research is needed to investigate the perspectives of health professionals on climate change communication to fill these knowledge gaps and to inform the development of practical and applicable recommendations to improve climate change communication and identify opportunities for strengthening the role of health professionals in climate change action.

### **Research Methodology**

This qualitative study is guided by a post-positivistic research paradigm, which maintains a set of philosophical assumptions. In taking up this paradigm, the entire research process focused on understanding events and experiences, rather than explaining or predicting outcomes (McGregor & Murnane, 2010). Closely linked to a constructivist world-view, the researcher does not remain objective, with observations being influenced by societal experiences and the interactions between the interpreter and the interpreted (Crotty, 1998; Levers, 2013). This methodology searches for meaning and an understanding of what is happening, constructing knowledge that is not absolute, but rather value-laden and subjective in certain cultural and social contexts (Levers, 2013).

With a focus on authenticity, the post-positivistic paradigm is set in the epistemological assumptions that knowledge is subjective while there are many ways of knowing (Levers, 2013). Social and cultural environments have a large influence on knowledge creation, with ontological assumptions focused on the construction of social reality through the lived experience of individuals and communities. This paradigm, with the focus on understanding experiences authentically, has helped to ensure the results of the study better reflect the experiences of healthcare professionals.

### **Situating Myself as a Researcher**

Reflecting on the influence of my positionality within the study, as well as the entire research process, is important as it allows for greater understanding of where my interpretations are grounded (Mosselson, 2010; Pillow, 2003). My positionality has influenced the direction and focus of the research project, in addition to my understanding and interpretation of the results, and needs to be acknowledged to establish transparency (Creswell & Poth, 2017). Understanding my positionality and the associated influence on my research has provided me with a more honest lens through which to interpret the data and has increased the chance of avoiding inaccurate interpretations.

I spent the majority of my early childhood living in an urban environment in Southern Ontario. Engrossed in the city, my only meaningful experiences with nature came from attending summer camp in Northern Ontario. During my adolescent years, my family moved north as a means to escape the congestion and pollution of urban living. Living in Northern Ontario, albeit the southernmost point, impacted my appreciation for nature, clean air, and outdoor activities. Those values have remained a part of me as I moved further north to Thunder Bay in pursuit of graduate education. This ability to connect with nature is something I value and have found to be a huge influence on my health and well-being. Though my interest in climate change developed with my affinity for the outdoors, my understanding of climate change has increased through my post-secondary education, resulting in an increased awareness of irregularities and greater changes in the climate. However, I recognize that my experiences are limited in comparison to many individuals and communities who are dependent on the land for more than recreational purposes.

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My interest in health was greatly supported by my family's involvement working in the healthcare system. Growing up with this emphasis on health, I have come to understand its importance and its impact on our daily living in such a way that it has shaped my research interests. My experiences with the healthcare system have fostered my belief that those in a position of authority are trusted, and therefore have a responsibility to act and educate in a way that honours the best interest of their clients. This belief has evolved with my education to focus more on climate change. Throughout my previous academic work, I have had the opportunity to conduct research on the effects of climate change on the environment by studying the impacts of climate change on ocean chemistry and circulation. However, I have always been interested in connecting this understanding to the human experience of climate change, specifically how human health is impacted, in Northern Ontario. As I feel a strong connection to the North, both its people and natural beauty, I am driven to create knowledge and practical findings that can have a positive impact in this setting.

During the process of completing this thesis, I began an employment opportunity where I was able to engage in making these real-world connections between climate change and health in Northern Ontario. In August 2019, I accepted a position within the Northern Ontario public health field that could be viewed as a conflict of interest. The role involved leading a collaborative project between the seven Northern Ontario health units to conduct climate change and health vulnerability and adaptation assessments for each region. Data collection for this thesis was completed prior to accepting this position, however data analysis occurred while I was working with the Northern Ontario health units. Through this employment opportunity I developed professional relationships with a variety of health professionals across Northern Ontario, some of which were participants in this thesis. This role has allowed me to come to understand the participants' true perspectives on climate change, which may have differed from my perceptions gained during data collection. I was also able to witness participants' perspectives change during their time involved with the health units' collaborative project. This may have led to an inference of meaning to the interview data during the analysis that was not present during data collection and altered the lens from which I interpreted the data.



### **Impact of Social Location**

My social class is an element of my identity that deeply affected my research. I had the privilege to be raised in a household where I did not need to worry about meeting my basic needs. I always had safe housing, adequate nutrition, and financial security that afforded me many opportunities. One such opportunity was a higher education, which provided me with both the means and understanding to access reliable academic information about climate change. My strong background in academic science has led me to struggle with comprehending how someone can deny the existence of climate change and avoid taking action. I have seen the research that scientifically supports the existence of climate change and have also been a part of various projects studying climate change impacts. My own beliefs support that scientific evidence is valid as fact, and my belief in climate change comes from scientific evidence. However, it was important for me to understand that not all participants' beliefs and ideologies would align with mine, which must be expected and received respectfully.

I believe that my racial identity also impacted how I understood and interpreted the research I conducted. As a white person working in a location that is occupied by many Indigenous populations, I worked to recognise the implied privilege and dominant worldview that I held, understanding that there would be times when I was working through a western understanding and attempting to apply this model to a non-western culture. Northern Ontario is home to a large Indigenous population who historically and presently experience racism through colonialism and assimilation, as well as ongoing experiences of generational trauma. It was important to be aware of this in order to try to avoid the perpetuation of pushing a western understanding as the dominant understanding.

Though it may be less important, my age had an effect on my understanding of the work I conducted. At 27 years old, I am relatively young in my experiences of climate change. While I have witnessed changes in the climate, I have been unable to fully comprehend the large-scale impact of these changes. Climate change is a slow, evolving process, the effects of which can take much longer than 27 years to become apparent. It was important to understand that my limited time experiencing climate change has been much different than that of someone who is older and has had more time to experience the effects. As well, many of the health impacts that are related to climate change have not yet significantly impacted me at a young age. Nevertheless, I recognize that I, and many others in my generation, will inevitably experience the

impacts of climate change and, at the current projections, to a greater extent. I personally resonate with the current youth movement, who are fighting for a future which feels increasingly hopeless with each period of inaction. This has certainly led to a sense of urgency, and a personal desire to complete this research so that it can be utilised to create effective action.

### **Methods**

To investigate health professional's perceptions of climate change communication and action in Northern Ontario, a qualitative design was employed. This design allowed for an enhanced understanding of the research question, providing the necessary breadth and depth on the issue, ensuring trustworthiness of results through a rigorous and methodological process (Caronna, 2010; Nowell et al., 2017).

### **Research setting**

The target area for this study was Northern Ontario, using the common boundaries which extend north from the Southern boundary of the Parry Sound district to the Manitoba border, as seen in Figure 2 (Northern Policy Institute, 2017). This area was chosen for a number of reasons, the first of which is that it is home to many populations that have been made vulnerable to the health impacts of climate change. Social and political constructs have forced many northern populations in remote, rural, and Indigenous communities into disadvantageous circumstances, positioning these populations to experience the impacts of climate change to a greater extent (Harper et al., 2015). This is a result of constructed factors such as forced geographic isolation, a higher dependency on the land, and unjust economic challenges (Ford et al., 2018). In addition, this region has already experienced several important health impacts of climate change, such as increasing rates of morbidity and mortality resulting from extreme weather events, floods, and forest fires, and increased incidence of Lyme disease (Douglas, Richard, & Pearson, 2012; Huff & Thomas, 2014; Public Health Agency of Canada, 2017). Additional contextual details on the research setting are included within the following chapters.

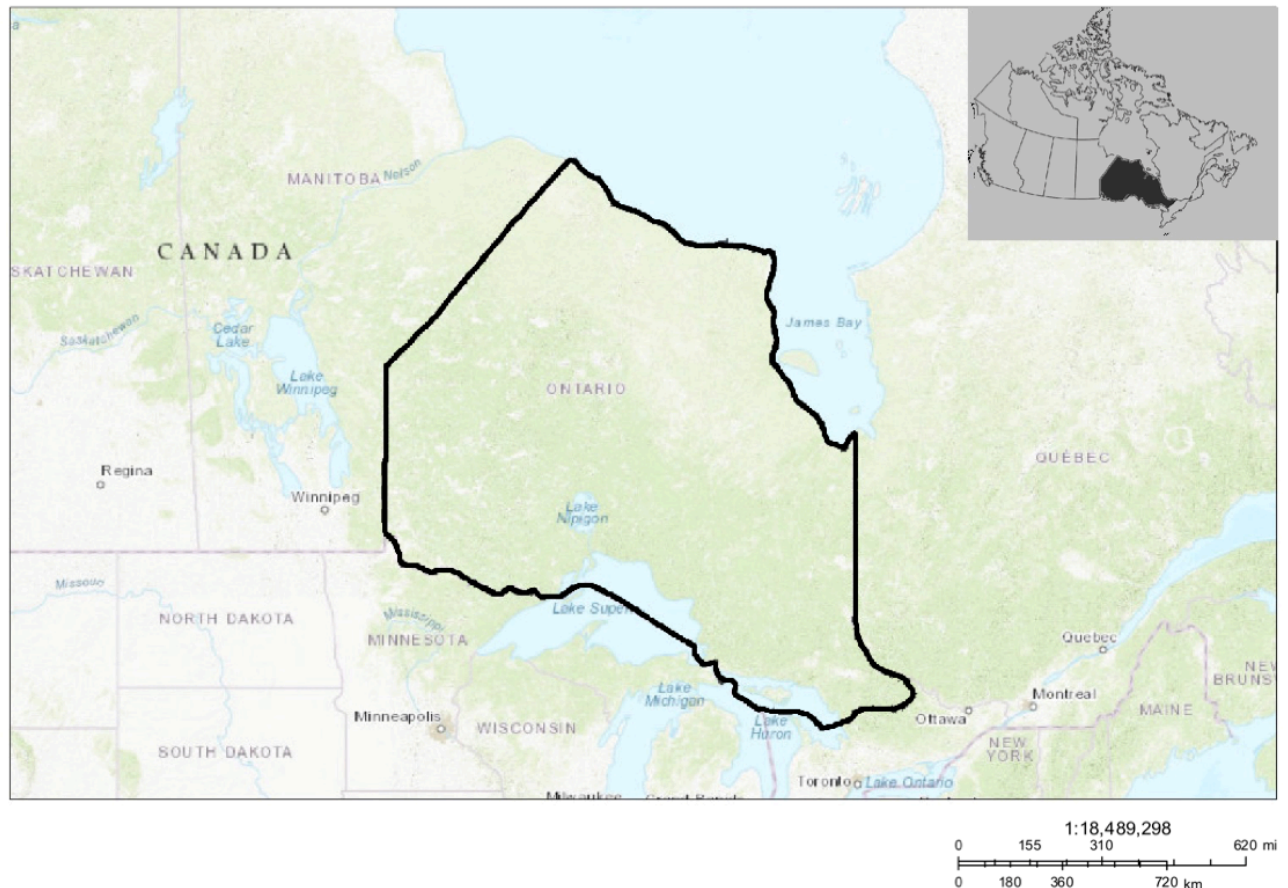
Another reason for choosing this area is that it allowed me to conduct a study from a university that is local to the region. Lakehead University is known as a Northern university, and for its awareness and focus on challenges faced by Northern communities. In addition, this region has important personal significance. I have friends and family living in this region and, at

the time of choosing this study's research objectives, had hoped to work in Northern Ontario. Choosing this region that I am familiar with was beneficial during the participant recruitment stage, because of the previously established relationships I have built with friends, community members and health professionals across different Northern communities. Additionally, having family and friends dispersed across Northern Ontario eased some of the logistical burden when planning travel and accommodation during data collection. Lastly, this region was chosen as it was large enough to gather a diverse range of data suitable for the expectations of a Master's student.

### **Recruitment and Participants**

Two guiding exclusionary criteria were used to ensure participants could speak to the study objectives. First, research participants identified as a health professional, informed by the World Health Organization's (2013) definition, which includes a range of health professionals who study, treat, and prevent illness, as well as those practicing traditional medicine, with experience working in Northern Ontario. Participants were further classified as a regulated or allied health professional, or a public health professional, depending on their occupation. The classification of regulated or allied health professionals used within this study encompassed a broad range of health professionals, distinct from public health, that work to diagnose and treat human illness and injury, providing an acute, immediate focus (Colbert, 2010; Health Force Ontario, 2020; MOHLTC, 2020). Potential occupations of participants within the classification of regulated or allied health professions include nurses, physicians and any profession governed under the Regulated Health Professions Act (Government of Ontario, 1991). Public health professionals were defined within this study as health professionals working in the field of public health who work to study, identify, evaluate and prevent disease. This criterion was chosen as it ensured the participant is accessible and trusted in a role to share information around health outcomes with clients or the general public. Secondly, participants identified as active 'climate change leaders' which, informed by the *Climate for Health* initiative, was defined in this study as those individuals who are engaged and committed to advancing climate change solutions to protect health (Krygsman & Speiser, 2016). This was demonstrated in many ways, such as through practicing medicine in a way that is informed by climate change, involvement in continuing education relevant to climate change, advocating for climate mitigation initiatives, or

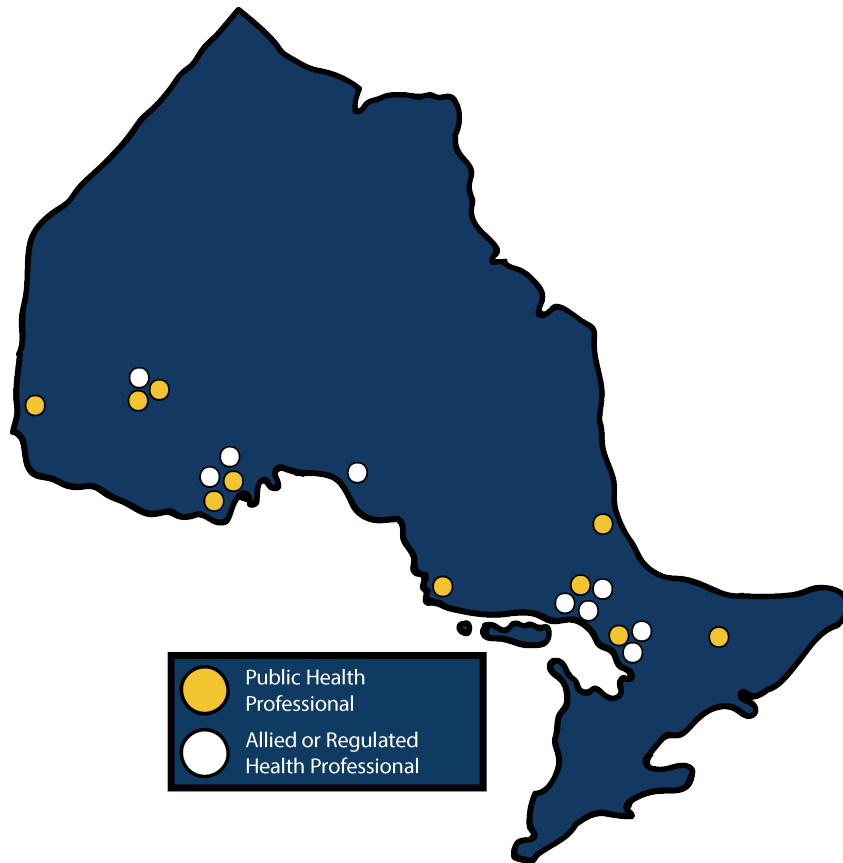
simply leading by example. Whether the participants were educating communities to increase awareness, informing individuals to further understanding, or advocating for policy to support climate solutions, there was a diverse range of ways participants could engage with climate change and therefore self-identify as a climate change leader.



**Figure 2:** Northern Ontario Boundary Map.

Participants were recruited through the use of a purposive sampling strategy, specifically using heterogeneous or maximum variation sampling (Patton, 2015). Heterogeneous sampling incorporates a wide variation of perspectives and experiences from a deliberately selected population to achieve maximum variability among participants when gathering insight into the research questions (Creswell & Poth, 2017; Palinkas et al., 2015). In addition, snowball sampling was utilized to recruit potential participants based on recommendations given by participants at the conclusion of the interview (Ungvarsky, 2017). As from the onset, when recruitment posed a potential challenge, this strategy aided in finding suitable participants who were more likely to

be cooperative and trusting, building off the previously developed rapport with the past participant (Atkinson & Flint, 2001). This study aimed to recruit and interview a total of 20 participants, however the study concluded with a total of 19 participants as visualized in Figure 3.



**Figure 3:** A visualization of participant distribution and classification across Northern Ontario.

As this is an exploratory study to create a foundation for future research, this number of participants provided an adequate picture to build on through further research. To allow for a diversity of experiences and perspectives between health professionals, participants were selected who worked in a wide variety of health occupations, from emergency care providers to public health professionals and a range of allied health professionals. Table 1 highlights the proposed participant recruitment compared to the finalized selection framework. Participants within the same classification worked in different geographic locations and held different

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positions to allow for a variety of experiences that provided a more representative sample and helped to reduce answer bias.

**Table 1:** Participant recruitment framework.

| <b>Health Professional Classification</b> | <b>Occupation</b>                          | <b>Proposed (n)</b> | <b>Actual (n)</b> |
|---|--|---------------------|-------------------|
| Allied or Regulated                       | Primary Care Physician – Family Medicine   | 2                   | 3                 |
|   | Primary Care Physician – Internal Medicine | 2                   | 0                 |
|   | Pediatrician                               | 2                   | 0                 |
|   | Nurse Practitioner                         | 2                   | 0                 |
|   | Registered Nurse                           | 2                   | 1                 |
|   | Other                                      | -                   | -                 |
|   | Physician – Emergency Medicine             | -                   | 3                 |
|   | Physician – General Surgeon                | -                   | 1                 |
|   | Radiation Therapist                        | -                   | 1                 |
| Public Health                             | Public Health Planner                      | 2                   | 4                 |
|   | Medical Officer of Health                  | 2                   | 3                 |
|   | Environmental Health Inspector             | 2                   | 1                 |
|   | Mental Health Clinician                    | 2                   | 0                 |
|   | Dietician                                  | 2                   | 0                 |
|   | Other                                      | -                   | -                 |
|   | Medical Entomologist                       | -                   | 1                 |
|   | Health researcher                          | -                   | 1                 |

Using previously established connections, as well as the examination of recent publications, presentations, and reports, health professionals who are engaged with climate change were identified as potential participants. Contacts within local public health units acted as knowledge sources for connecting with public health professionals. In addition, research institutions that are actively involved in climate change work were contacted to seek external referrals to relevant community health professionals. Publication libraries belonging to organizations such as CAPE and *Canadian Nurses for Health and the Environment (CNHE)* were utilized as an initial recruitment resource for regulated or allied health professionals. Lastly, potential participants were identified during the reception following the launch of the 2018 Canadian specific Lancet Countdown Report. Ten participants met the criteria of a public health

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professional, and the remaining nine were regulated and allied health professionals. Additional participant demographic information is provided in Table 2.

**Table 2:** Demographic data for study participants

|   | <b>Total n (%)</b> |
|---|--------------------|
| Age   |                    |
| 18-39   | 6 (32)             |
| 40-64   | 12 (63)            |
| 65 years and over                                     | 1 (5)              |
| Gender  |                    |
| Male  | 7 (37)             |
| Female  | 12 (63)            |
| Other   | 0 (0)              |
| Region  |                    |
| Northwestern Ont.                                     | 9 (47)             |
| Northeastern Ont.                                     | 10 (53)            |
| Occupation  |                    |
| Regulated and Allied Health Professional <sup>1</sup> | 9 (47)             |
| Public Health Professional <sup>2</sup>               | 10 (53)            |

As previously mentioned, Northern Ontario is comprised of a large Indigenous population, whose experiences with the health impacts of climate change are uniquely amplified by social and environmental factors that impose an increased vulnerability. Therefore, it is imperative to note that throughout this research process, the perspectives of Northern Ontario Indigenous populations are missing among the participants of this study, as none identified with Indigenous groups native to Northern Ontario or as practicing non-western medicine. It is important to note that while one participant did identify as Indigenous (South American) and mixed race, having lived experiences as an Indigenous person, their contextual experiences and understandings are likely different than those of Northern Ontario Indigenous populations, and

<sup>1</sup>Defined within this study as regulated health professionals distinct from public health, who work to diagnose and treat human illness and injury, providing an acute, immediate focus such as primary care physicians and registered nurses.

<sup>2</sup> Defined within this study as professionals working in the field of public health who work to study, identify, evaluate and prevent disease.

cannot be directly equated to, or act as a replacement for the missing perspectives. Several potential participants who practiced non-western medicine were contacted to participate, but either did not respond, or were unable to meet in person and not willing to participate over the phone. The criteria set out for participant recruitment utilised a western medicine lens, and as such may have been discouraging or misaligned to non-western practitioners. For example, the use of the criterion term “health professional” may have discouraged non-western practitioners from participating as this is a western medicine term and one that traditional practitioners may not identify with. Even the categories for classifying participants’ occupation, allied or regulated and public health professional, were non-inclusive to traditional medicine practice, and presented a dilemma for the researcher as to where non-western practicing participants would have been classified. This limitation of an absence of Indigenous perspectives and the implication for this thesis is discussed in greater detail in Chapter 4, but important to acknowledge up-front given the context and goals of this thesis.

### **Data Collection**

Data were collected through the use of key informant interviews. The interviews followed a semi-structured design which allowed for an outline to be followed, while also allowing for flexibility to explore topics brought up by the participants that had not been previously considered. With consent provided through a signed consent form (Appendix III) the interviews were audio recorded to allow for transcription and deeper analysis. The topics and themes of the interview guide resonated with the research question and can be found in Appendix I. Two interview guides were used independently and exclusively, based on the participants’ experiences and ways they engage in climate change. One interview guide was tailored towards health professionals engaged with climate change directly in their profession and daily practice, and the other interview guide was designed for health professionals who do not necessarily engage with climate change in their work, but are advocates and engaged in other ways. Having the flexibility to choose between the two interview guides assisted in ensuring rich data were captured from the different sub-groups of climate change leaders. However, the interview guides share questions that are applicable to both groups to ensure consistency and comparability between interviews. If the participant identified with both categories, Interview Guide A was used. Guided by the literature review and knowledge gaps, the interview guides



were developed and further refined upon review from my thesis committee. The interview guides aided in directing the conversation, and were pre-tested with two medical students and one student in the Master of Health Sciences program at Lakehead University to ensure clarity of questions. Prompts were provided for each question to, if required, help stimulate a more elaborate response from the participant, or to re-focus their response towards the central research question. During the interview, I actively listened and engaged with the participant when appropriate, periodically rephrasing the participants' response back to them in order to ensure that I had an accurate understanding, as well as provide an opportunity for the participant to offer clarification. Notes were recorded throughout the interview, however attention to the participant was the priority allowing for a natural interview without interruptions. The interviews lasted between 35-65 minutes.

The interviews were scheduled to take place in person whenever possible. I travelled to the work location of the participant to better understand the place-based context within which they live and practice. Observations of the setting, participant expressiveness and body language were recorded throughout the interview using the participant sensitizing framework (Appendix V). This sensitizing framework aided in the collection of additional information to support the data and better contextualize the participant, their experiences and their comments, providing a template for consistent observations across participants. Alternatively, when unable to arrange an in-person meeting, interviews were conducted over the telephone. For interviews conducted over the telephone, participant sensitizing notes were made based on tone and expressiveness. Following each interview, I immediately made notes on reoccurring themes and personally reflected on the completed interview, evaluating what went well and what could be improved. These notes were used to improve the conduct of subsequent interviews. Interviews were transcribed verbatim and stored in an encrypted file on a locked computer.

### **Data Analysis**

To analyse the data, Braun and Clarke's (2006) 6-step framework was utilized as it provided a clear and practical guide for performing a thematic analysis, while enhancing rigor and trustworthiness (Nowell et al., 2017). Going beyond summarizing the themes, I sought to interpret and understand the data, to explore semantic themes, the syntax or explicit meaning, in addition to the latent themes, the underlying 'ideas, assumptions and conceptualizations' (Braun

& Clarke, 2006; Maguire & Delahunt, 2017). Upon completion of conducting the semi-structured interviews, recordings and observational notes were transcribed and reviewed for accuracy. If requested (n=5), participants were sent their interview transcript to confirm accuracy and revise comments; any requested changes (n=1) were made to participant transcripts.

Observational notes were not used as primary data, but instead as a tool to provide context and emphasis to participants' perspectives and comments. Each transcript and corresponding set of observational notes were thoroughly reviewed. As I familiarized myself with the data, I added to my notes, made at the conclusion of each interview on early impressions and reoccurring themes, and compiled a summary document of reflective notes for each participant (Appendix XI). These impressions were combined, organized and further developed into preliminary codes. All transcripts were then imported to the qualitative software package *NVivo*. Using *NVivo* and the developed preliminary codes as guiding categories, participant interviews were reviewed, and data was collated into the preliminary codes. Any data which did not classify within the determined preliminary codes was categorized into a new preliminary code. During the subsequent stage of the analysis, I searched for themes, analysing the preliminary codes to identify similarities and patterns between the data. Preliminary codes were refined, grouping similar codes into new or existing headings, and then categorized and collated into sub-themes. Emergent sub-themes were reviewed and revised, until all sub-themes were distinctly and independently defined. Sub-themes were further examined and grouped into larger, broad themes. Upon reflecting on the established larger, broad themes, and through discussion with Dr. Galway, I recognised this data would be best presented using the manuscript approach. The larger, broad themes were critically analysed, reflecting on the study objectives and relationship between generated themes. Themes were divided into two groups, each of which responded to unique research objectives, and used to guide the synthesis and creation of the publishable papers (Appendix XI). Themes which did not directly speak to the study objectives but were still relevant to the findings were classified as overarching themes integrated into both publishable papers. These five steps of familiarization with the data, generation of codes, exploration of themes, revision of, and identification of a larger definition of themes culminated in the sixth and final step of the creation of this thesis.

### Ethical Considerations

Ethical approval by the Lakehead University Research Ethics Board was granted on November 5<sup>th</sup>, 2018, prior to beginning the study. Written consent was obtained from every participant prior to conducting each interview (Appendix III). Participants were given the option of anonymity, or for their name to be associated with their interview, by clearly indicating their preference on their consent form. Of the 19 participants, a little over half (n=10) permitted their name to be associated with their interview, with 70% of those individuals classified as regulated or allied health professionals (Table 3). However, due to the limited scope of health professionals engaging in climate change action within Northern Ontario, in addition to the politicization of climate change as a topic, the decision was made to maintain anonymity of all participants. The potential participant pool for this study contains individuals who are interconnected, both professionally and personally, and whose members could be easily identified with limited information available through meaningful quotes or interview notes. Therefore, data analysis focused on participant occupational classification to develop a more rounded understanding derived from various individual experiences, rather than a comparison of each participants' perspective.

**Table 3:** Participant decision to relinquish anonymity

| Health Professional Classification |      | Total n (%) |
|------------------------------------|------|-------------|
| Total                              | Yes* | 10 (53)     |
|                                    | No   | 9 (47)      |
| Regulated or Allied                | Yes* | 7 (78)      |
|                                    | No   | 2 (22)      |
| Public Health                      | Yes* | 3 (30)      |
|                                    | No   | 7 (70)      |

\* Yes indicates permission of comments to be associated with the participants name in the study results.

Another ethical consideration arose as the interview process began. I found myself as a privileged, academic researcher speaking predominantly with health professionals who themselves hold a privileged position, both through the power inherent in their occupations, as well as their social locations. Though the participants were able to speak to experiences within their role that provided relevant and impactful data for this study, the act of non-Indigenous people in positions of power communicating recommendations and action which they believe to be in the best interest of the Indigenous populations they serve, without consulting or considering the values and perspectives of these populations, may only serve to perpetuate a historical and harmful trend of colonization and assimilation.

### **Thesis Format**

This thesis is composed of four chapters. This first chapter provided an introductory overview of the research goal and objectives, the context and rationale for the research, a review of the current literature, and an outline of the methodological approach. The second chapter, *Perceptions of climate change and climate mitigation among health professionals in Northern Ontario*, is the first of two chapters written in an independently publishable format. This chapter focuses on objective one, “To describe trends and key issues among health professionals, with respect to their perceptions of climate change and climate mitigation in Northern Ontario”, and is formatted according to the submission guidelines of the *Canadian Journal of Public Health*. The third chapter, *Health professional approaches and techniques towards communicating climate change in a predominantly rural setting*, focuses on objective two, “To identify if and how health professionals communicate and engage with the issue of climate change in Northern Ontario”, and is formatted to be adaptable to various submission guidelines. The fourth and concluding chapter focuses on objectives three and four, “To develop practical and applicable recommendations to improve climate change communication in order to inspire and support new health leaders” and “To identify opportunities for strengthening the role of health professionals in climate change action”. This chapter provides a synthesized summary of the findings, a brief discussion of themes that emerged in the analysis, but were indirectly related to the intended research goal, and presents concluding thoughts on the research project, highlighting the need for further research and areas of practical potential.

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**Chapter 2: Perceptions of climate change and climate mitigation among health professionals in Northern Ontario: A qualitative study**

**Abstract**

**Objectives:** Health professionals are being called upon to embrace a stronger role in addressing climate change, yet understanding how health professionals perceive climate change has garnered minimal attention in academic literature. This exploratory paper describes trends and key issues with respect to health professionals' perceptions of climate change and climate mitigation, within the context of Northern Ontario.

**Methods:** Semi-structured interviews were conducted with climate-engaged health professionals (n=19), with experience working in Northern Ontario. Interview transcripts were thematically analysed utilizing an inductive approach that identified, examined and reported themes emerging from the data.

**Results:** Participating health professionals viewed climate change as a profound health problem in Northern Ontario, and felt engagement within their role could be furthered to protect health. Participants held a deep understanding of the complex, interconnected health implications posed by climate change and highlighted the need to contextualize approaches to addressing climate change, calling for collaborative, localized action.

**Conclusion:** Climate change is recognized among health professionals across Northern Ontario as an emerging health threat, however further investigation is needed to understand approaches to integrating climate change awareness and knowledge within their roles. This highlights the need to explore localized approaches to enhancing health professional collaboration and engagement on climate change to protect health.



## Introduction

The climate crisis creates far-reaching, interconnected, and cumulative impacts on human health. Through impacting the social and ecological determinants of health, climate change has amplified, and will continue to amplify, existing health inequities while threatening to reverse significant health achievements made in the last century (PHAC, 2017; Watts et al., 2018). However, despite increasing public acknowledgement of climate change and the evidence documenting impacts on health, significant climate inaction exists, further compounding climate change impacts to health (Akerlof et al., 2010; Health Canada, 2017). Health professionals, as recognized community leaders and health advocates, are well positioned to understand and communicate the implications of climate change and the need to take timely, appropriate action to protect health (CAPE, 2019; CPHA, 2019; Kreslake et al., 2018; Martin & Vold, 2019).

Research exploring the intersection of climate change and health has rapidly expanded in the last several decades with a clear focus on adaptation<sup>3</sup> to protect health (Berry et al., 2018; Ebi et al., 2016; Smith & Woodward, 2014). More recently, the potential health benefits of mitigation<sup>4</sup> has garnered attention, with a notable growth in literature examining the health co-benefits of action aimed at reducing or preventing greenhouse gas emissions (Haines, 2017; Kingsley & EcoHealth Ontario, 2019; Robinson & Breed, 2019). The health co-benefits of climate mitigation are also increasingly recognized as a promising approach for motivating climate engagement (Bain et al., 2016). To date, most of the climate change and health mitigation literature has concentrated on urban settings, leading to a noticeable gap in research focusing on the applicability of a health co-benefits approach in rural and remote contexts, where populations are comparatively more vulnerable to the impacts of climate change (Markandya et al., 2018; Scovronick et al., 2019; Smith & Woodward, 2014).

Climate change vulnerability is defined as the propensity or predisposition to be adversely affected by climate change related health effects (Smith & Woodward, 2014). Vulnerability is moderated by an individual or community's degree of exposure, sensitivity and adaptive capacity, all of which are closely related to social, environmental and economic factors encompassed within the social determinants of health. Populations within Northern Ontario are

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<sup>3</sup> Adaptation - Reducing climate change impacts - The process of adjustment to actual or expected climate and its effects (Smith & Woodward, 2014).

<sup>4</sup> Mitigation - Reducing climate change - Human intervention to reduce the sources or enhance the sinks of greenhouse gases (Smith & Woodward, 2014).

disproportionately and unjustly disadvantaged by systemically constructed social determinants of health, leading to poorer health outcomes and heightened vulnerability to the health impacts of climate change (Berry, 2017; Ford et al., 2018).

Very little research has focused specifically on climate change and health in Northern Ontario, and no research has been published that shares this study's objective of describing trends and key issues with respect to health professionals' perceptions of climate change and climate mitigation in Northern Ontario (Government of Canada, 2018). This paper aims to ameliorate the gap in contextualized climate change and health research in Northern Ontario and create a foundation to better understand current climate inaction.

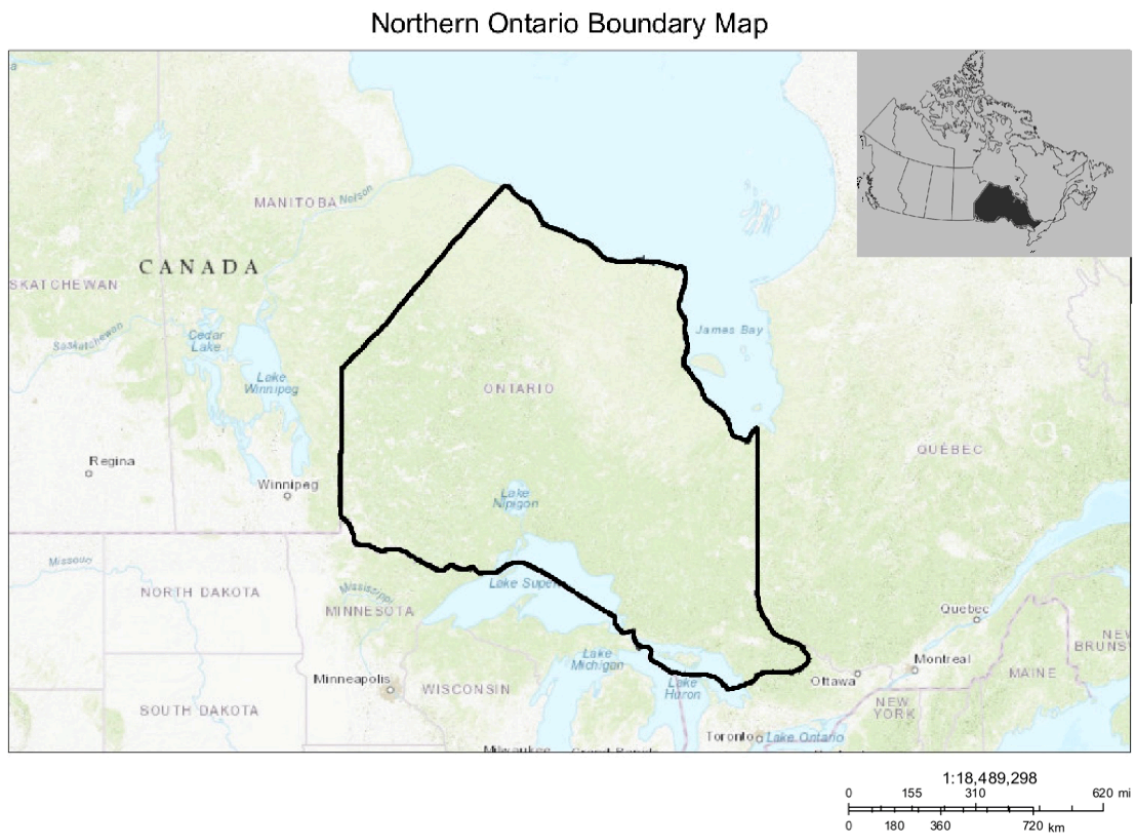
### **Methods**

#### **Research Setting**

This study was conducted in Northern Ontario, Canada (Figure 1), a vast area of approximately 806,000 km<sup>2</sup>, with a dispersed population of over 780,000, giving the region a population density of 0.9/km<sup>2</sup> (*Statistics Canada, 2017*). The recent settler history and economy of Northern Ontario has been driven by the primary sector, predominantly mining and forestry, which continues to shape the changing landscape of Northern Ontario. These industries are resource dependent, and therefore precarious in nature and significantly impacted by climate change, contributing to the existing challenges of labour shortages and service limitations experienced by many small and single-industry dependent communities across Northern Ontario (FedNor, 2018; Pearce et al., 2011). Over half (55.9%) of Northern Ontarians reside in the large urban and medium population centres, that serve as health service hubs for the surrounding and remote communities (*Statistics Canada, 2017*). The remaining 44.1% of the population reside in small population centres and rural areas, which include 105 First Nations (Ministry of Indigenous Relations and Reconciliation, 2017; *Statistics Canada, 2017*). Stark health disparities persist throughout the region with significant challenges comprising elevated rates of chronic illness and food insecurity, premature mortality, and suicide often far above provincial averages and experienced predominantly among Indigenous populations (Health Quality Ontario, 2017). Indigenous peoples across Northern Ontario (First Nations, Metis, and Inuit) “have faced various discriminatory policies ... that created inequities that continue to affect the health of populations,

including forced relocations, residential schools and forced sterilizations” (Health Quality Ontario, 2017).

Communities across Northern Ontario are geographically isolated; many depend on the land for their livelihood and cultural practices, and many face economic and political challenges, that lead to increased vulnerability to climate change impacts (Ford et al., 2018; Harper et al., 2015). Strengths and assets that support resiliency in the face of climate change coexist with challenges (Kipp et al., 2019). Traditional knowledge, close ties with the land, a strong sense of community, and baseline understandings and concerns about climate change are examples of these strengths (Galway et al., 2020).



**Figure 1:** Map illustrating the Northern Ontario boundaries used in this research

## Data Collection

Upon approval from the Lakehead University Research Ethics Board, participants were recruited using purposive and snowball sampling approaches to achieve a diversity of

occupations, experiences, and opinions among health professionals working across the study setting (Kirchherr & Charles, 2018; Palinkas et al., 2015). Potential participants were contacted via email and invited to participate in a semi-structured interview. Participants were provided with an information letter that outlined the study objectives, risks and consent process.

Participants met two inclusion criteria. First, they had experience working in Northern Ontario as a health professional and second, they self-identified as a ‘climate change leader’. The classification of ‘health professional’ followed the World Health Organization (2013) definition, encompassing a range of health professionals who study, treat and prevent illness, as well as those practising traditional medicine. Participants were further classified based on their occupation, allowing for analysis between those working in public health and those working in regulated or allied health professional roles (Health Force Ontario, 2020; MOHLTC, 2020). In this study, we defined ‘climate change leader’ as an individual who is engaged and committed to advancing climate change solutions to protect health, following the designation from *Climate for Health*, a network promoting cross-sector collaboration to protect health and the environment (*Climate Change Leaders For Health*, 2019).

Two different interview guides were used independently and exclusively to better capture the differences in ways participants engaged with climate change. Guide A was developed for participants engaged with climate change directly as part of their profession, such as completing a climate change and health vulnerability assessment as mandated by governing bodies, while guide B was developed for participants engaged in climate change through broader advocacy outside of their assigned role. The majority of questions within the interview guides were identical to maintain consistency, yet differed in regards to questions surrounding the participants’ engagement with climate change (Table 1). Having the flexibility to choose between the two interview guides was important because it ensured rich data were captured from each participant, leading to an enhanced understanding and analysis of the different engagement methods. Interviews were conducted between November 12<sup>th</sup>, 2018 and March 1<sup>st</sup>, 2019. To gain a deeper understanding of participants’ experiences, interviews were scheduled to take place in-person (n=11) at a location convenient to the interviewee. When unable to arrange an in-person meeting, interviews were conducted over the telephone (n=8). The interviews lasted between 35-65 minutes and were, with the consent of the participant, audio-recorded. Auditory and, when in-person, observational notes were recorded, contextualizing the participants’ expressiveness and

body language; this, in addition to subsequent reflective notes made at the conclusion of each interview, aided in informing initial data analysis. The audio-recording and observational notes were transcribed verbatim, read over to confirm accuracy, and transferred into the software package *NVivo* for further analysis (*NVivo 12 Software*, 2019). If indicated on the consent form, participants were provided with a copy of their transcription for verification and confirmation of data, with the option to remove or expand on any responses provided.

**Table 1.** Topics and sample questions from the study interview guides. Refer to Appendix I for full interview guides.

| Discussion Topic                                   | Guide A   |   | Guide B   |  |
|--|---|---|---|--|
|  | Question Examples                                   | Associated Probes   | Question Examples                                   | Associated probes  |
| Climate change engagement as a health professional | How do you integrate climate change into your work? | What settings are you typically sharing your knowledge and views about climate change?<br><br>Can you provide some examples of conversations you have had about climate change? | How do you engage with the issue of climate change? | Do you promote climate change action through your activism?<br><br>Can you provide some examples of action you have taken? |

### Data Analysis

Clarke and Braun's (2013) 6-step framework guided the thematic analysis, utilizing an inductive approach that identified, examined and reported themes within the data. This iterative analysis process allowed for a deeper insight into participant perspectives while providing a deliberately structured and rigorous guide to ensure that the emergent themes were grounded in the data. Table 2 provides a descriptive overview of each step.

**Table 2.** Description of analytical steps.

| <b>Analytical steps suggested by Clarke and Braun (2013)</b> | <b>Analytical steps taken within this study</b>   |
|--|---|
| <b>Familiarizing yourself with the data</b>                  | Interviews were transcribed and subsequently reviewed in conjunction with listening to the audio recording to ensure accuracy of transcription. Observational and auditory notes were re-examined to recall and further contextualize the data.   |
| <b>Generating initial codes</b>                              | Initial codes were constructed utilizing an inductive approach, wherein interesting and meaningful features of the data were identified. Generation of the initial codes followed a systematic approach, thoroughly examining the entire data set to identify all elements of interest and potential relevance, with a narrowed focus on explicit data content. |
| <b>Searching for themes</b>                                  | All initial codes were iteratively categorized and collated into larger sub-themes, which were further conceptualized into overarching themes. Examination of the linkages between initial codes and larger themes provided an opportunity to critically explore the relationship between, and significance of, each theme.                                     |
| <b>Reviewing themes</b>                                      | Themes were critically examined and refined, while reflecting on the study’s objectives to ensure relevance and support of the larger goal of the study. Distinction between themes was improved, while also ensuring data comprised within each theme cohered.   |
| <b>Defining and naming themes</b>                            | The themes were subsequently defined, focusing on understanding and extracting the essence and relationship amongst themes to create a deeper interpretation in connection to the research objectives.  |
| <b>Reporting and synthesizing</b>                            | Co-authors engaged in a review and discussion of the theme classification and integration within the article.   |

## Results

This paper explores knowledge, perceptions, and concerns among 19 health professionals with respect to climate change and climate mitigation action in Northern Ontario. Participant characteristics are summarized in Table 3. Through thematic analysis, and in response to the

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previously highlighted study objective, four main themes emerged surrounding health professionals' understanding of (1) climate change as an emerging and profound health challenge, (2) the interconnectedness of climate related health concerns impacting the North, (3) feelings of uncertainty around engaging in climate action, and (4) adopting mitigation in the North. These findings are described below and supported using quotations, figures, and tables. Participant occupation, age, and location did not impact the key themes identified and comparative analysis was not an objective of this study. Therefore, comparisons between regulated and allied health professionals and public health professionals are only reported when impactful to the study objectives. However, it cannot be ascertained that participant ethnicity did not impact the key themes identified within this study, as a critical perspective was not included. Northern Ontario is home to a large Indigenous population, who are made vulnerable by social and environmental factors and therefore experience amplified health impacts of climate change. While this study endeavoured to include Indigenous and non-western medicine practitioner perspectives, we were unsuccessful and therefore lack the relevant perspectives in the data presented.

**Table 3.** Demographic data for study participants

|            |   | <b>Total n (%)</b> |
|------------|---|--------------------|
| Age        | 18-39                                     | 6 (32)             |
|            | 40-64                                     | 12 (63)            |
|            | 65 years and over                         | 1 (5)              |
| Gender     | Male                                      | 7 (37)             |
|            | Female                                    | 12 (63)            |
|            | Other                                     | 0 (0)              |
| Region     | Northwestern Ont.                         | 9 (47)             |
|            | Northeastern Ont.                         | 10 (53)            |
| Occupation | Regulated and Allied Health Professional* | 9 (47)             |
|            | Public Health Professional**              | 10 (53)            |

\* Defined within this study as health professionals distinct from public health, who work to diagnose and treat human illness and injury, providing an acute, immediate focus such as primary care physicians and registered nurses.

\*\* Defined within this study as professionals working in the field of public health who work to study, identify, evaluate and prevent disease.

**Climate change: An emerging and profound health challenge in the North**

I view it [climate change] as the most profound health problem we will face, we are facing, it is *the* health problem. (Transcript 13, emphasis added from auditory notes)

When asked if they *viewed climate change as a health problem*, participants unanimously agreed that climate change poses a severe threat to human health, with complex health impacts at the individual and population level emerging across multiple scales. All participants had an understanding of climate change beyond a basic comprehension of the causes and impacts, and discussed the interconnectedness and complexity of the impacts on health.

It's really hard to trace the causality in a very clear-cut way... health impacts from climate change they're not often direct... you're usually talking about indirect impacts, cumulative impacts. (Transcript 3)

Although all participants described climate change as an important health issue in the context of Northern Ontario, they varied in describing the severity and immediacy of its impacts on their communities. The majority of participants touched on the urgency of the issue, highlighting the need for further, immediate action to minimize the severity of future impacts. However, many of the same participants saw climate change as an emerging and developing issue that requires further exploration to fully understand the health impacts and necessary action.

I think it [climate change] is absolutely a great challenge to population health both at the local and global scale and we're only really beginning to understand what some of those health impacts look like in concrete terms. (Transcript 10)

Conversely, a small proportion of participants viewed climate change as one of many threats to human health, emphasizing the need to consider threats perceived to be more immediate such as opioid addiction or obesity, in addition to climate change.

I don't think I would have, said right off, 'Oh yeah, one of the major health problems today is climate change.' But having sat here with you, and what you're doing, it's like, 'yeah, climate change is a health problem.' So, if you asked me about 'what are the major health problems right now?' I would think of opioids, cardiovascular disease, that sort of



stuff. However, there are things like poverty and climate change that are really bigger social determinants of health, health problems. (Transcript 11)

### **The interconnectedness of climate amplified health concerns impacting the North**

When asked *what climate change impacts are most concerning as a health professional working in Northern Ontario*, participants described an array of impacts with varying degrees of concern and confidence in causal pathways. A summary of the climate change and health impacts of concern described and discussed by participants is provided in Table 4, in conjunction with illustrative quotes to provide further context. The most frequently discussed climate change and health impacts of concern were increased vector-borne disease, food insecurity, and extreme weather events, particularly forest fires. Almost all participants demonstrated a diverse knowledge of the health impacts of climate change, describing multiple impacts and impact pathways, often expanded upon through accompanying stories of shared experience between the health professional and the clients or populations they serve. Participants' tone generally indicated a strong level of concern, regardless of whether they were discussing an impact to which they had a personal connection or experience, or if they were speculating on a known potential impact to health. There were, however, variations in participants' apparent confidence. Unanimously, participants appeared more confident discussing health impacts that they had a personal experience or connection with, compared to discussions of the speculative impacts.

Many participants took a holistic approach when discussing the impacts of climate change on health, speaking to the interconnectedness and complexity of the impacts with a fluidity that wove together the concept of direct<sup>5</sup> and indirect<sup>6</sup> impacts. For the purpose of clarity, the findings are presented dichotomously. Direct impacts were primarily discussed, with the majority of participants providing examples of seeing and experiencing the impacts of climate change in their health and on the health of their clients. Among the direct impacts, extreme weather events, particularly forest fires, were discussed the most. The negative implications for individuals with pre-existing respiratory conditions such as asthma or chronic

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<sup>5</sup> Direct impacts refer primarily to changes in the frequency and intensity of extreme weather. Instances of flooding, forest fires, heat waves, and other extreme weather events due to climate change have a direct impact on the health of the populations who experience them through increased morbidity and mortality (IPCC, 2014)

<sup>6</sup> Indirect impacts refer to changes mediated through natural and human systems. This includes effects mediated through the environment such as vector-borne disease or air pollution, and effects mediated through human systems such as occupational health impacts, under nutrition and psychosocial impacts. (IPCC, 2014)

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obstructive pulmonary disease were frequently recognized, in addition to the indirect impacts of being displaced from one's home, a loss of access to essential social and health services, and the associated mental health impacts from experiencing and dealing with the consequences of such a traumatic event. Although forest fires were the primary example used when participants discussed instances of extreme weather, flooding events, excessive precipitation, wind and hailstorms were also discussed in the context of extreme weather events.

Indirect impacts of climate change were discussed less frequently and often following prompting. Only three participants explicitly identified the broader theme of climate change impacting conditions that make up the social determinants of health. However, when prompted, several participants provided examples of indirect impacts of climate change seen in their work, such as food insecurity, water quality, and mental health. Food (in)security and (under) nutrition were commonly described as impacts currently experienced, and expected to intensify, among communities across Northern Ontario. Many participants spoke to the dependency which Northern Indigenous communities have on transportation for food access and the precarity a warming climate poses to ice road stability and the decreased availability of safe and nutritious foods. Additionally, impacts of a changing landscape on subsistence hunting, fishing, and foraging were discussed as these practices provide significant nutritional health and cultural value to the community members, and will be challenged with climate change. A few participants elaborated on the challenge of accessing safe and culturally appropriate foods, highlighting the connection to an increase in non-communicable diseases such as type 2 diabetes, nutrient deficiency, obesity and other metabolic health conditions, but also impacting mental wellness. Furthermore, these participants discussed impacts on growing food, with many highlighting the unsuitability and the accompanying challenges of growing food in the northern context.

Northern Ontario soils are thin, acidic and poor for growing, it doesn't matter what the temperature is like. So, food may become an issue because you're going to lose your bread baskets, which had good soil because it's too hot and now you're going to be in areas that have poor soil. Because obviously Sudbury proper has really bad soil because it's all gone due to the mining. The SO<sub>2</sub> killed everything but you go outside of here, in the valleys there is reasonable depth of soil, but in the hills there isn't, and it's all pine, so you've got thin soils and they're acidic. Not great for farming except for maybe blueberries and tomato. So, there is a question on where that trade-off is. (Transcript 19)

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**Table 4:** Localized climate change impacts of concern organized by impact pathway

| Impact Pathway | Impacts of concern          | Quote  |   |
|----------------|-----------------------------|--|---|
| Direct         | Air Quality                 | “I find that [air quality] is one of the things that is hard. It might seem like less of a priority because it’s less visible, but [last year was] one of the first times that the health unit put out an air quality warning.” (Transcript 16)  |   |
|                | Extreme Weather Events      | Forest Fires   | “I think the fire issue is a big one and we’re seeing it now. A) The displacement of people from those zones, B) the impact of the smoke and that on asthma rates and in health in general. And again, we’re hearing, Indigenous people saying their landscapes are changing. So those are some big ones.” (Transcript 5) |
|                |                             | Floods   | “Warming temperatures and very intense precipitation events that again amplifies the effects [of water contamination] and the possibility, or potentiality for people to come in contact with those pathogens.” (Transcript 3)  |
|                |                             | Storms   | “So, we were looking at, extreme storms as well from an extreme precipitation and potential for flood risk, and also included tornadoes because we are sort of in tornado alley for Ontario within our region, so potential for that will also be increased” (Transcript 18)  |
|                | Temperature Extremes        | “The impacts from heat I think are going to be quite large moving forward.... Our climate is shifting dramatically, so when we looked at the actual projections, we saw an increase by 2080 of over five degree centigrade of an annual temperature increase. So that when you put that into perspective of what our communities will look like from a climate perspective, that is similar to Mississippi from in the 1990s. So that’s a major shift in the way our climate is going to react.” (Transcript 18)   |   |
| Indirect       | Food Security and Nutrition | “The impacts on traditional food systems is huge for people, because it’s affecting their health in so many different ways and it also connects to of course the increase in non-communicable diseases like type-2 diabetes, other metabolic health conditions, or diseases like obesity, but it also connects with the impacts of climate change on road stability, or land stability... it is impacting people’s access to safe and nutritious foods and then that affects your mental wellness in different ways, not only your nutritional health.” (Transcript 3) |   |
|                | Mental Health               | So, I recognize in myself, that sense of ecological grief, which is not a mental illness the way that we think of mental illness, but it is a burden of grief that I think I’ve found a language for it, but I’m not sure that my patients have, and I wonder sometimes the extent to which they present... a free flowing anxiety, or an anxiety that they can’t describe. (Transcript 13)  |   |
|                | Socio-Economic              | “My immediate reaction would be that the socio-economic determinants of health are far more relevant and how climate change affects the socio-economic aspects is probably more relevant than the more visible, high profile events related to climate change.” (Transcript 9)   |   |
|                | Vector-Borne Disease        | “[What] I’ve always said is, if you want an indication of climate change locally, then look to the occurrence and distribution of ticks and especially the vector-borne diseases that ticks can carry... the distribution of the vectors is going to increase, the distribution of the insect pests and agriculture is going to increase as well.” (Transcript 7)  |   |

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The last of the notable impacts discussed by participants were the impacts on mental and psychosocial health. Interestingly, several participants recounted personal and observational experiences of clients and colleagues experiencing mental health impacts of climate change. Participants recognized symptoms in their clients and communities that they felt were akin to a diagnosis of anxiety or depression, that related in some way to climate change and/or the impacts of climate change but did not feel confident in diagnosing a causation between mental health and climate change.

So, I recognize in myself, that sense of ecological grief, which is not a mental illness the way that we think of mental illness, but it is a burden of grief that I think I've found a language for it, but I'm not sure that my patients have, and I wonder sometimes the extent to which they present... a free flowing anxiety, or an anxiety that they can't describe. I apologise, I wonder sometimes to the extent that anxiety is related to this sadness, that us as a society haven't put words to them yet. Yeah, and that's something I've started to think about and talk about a bit more with patients. (Transcript 13)

This participant also described seeing cases of Indigenous clients beginning to struggle with their identity, with the loss of the land negatively impacting their clients' connection to the environment, an integral component of Indigenous culture.

I think about 'wow the temperature's warming' and the impact of that on the people who do subsistence hunting, and what's the impact for those people who just feel that it's an important part of the reason why they're [existing]. What does that do to their mental health as those things disappear. (Transcript 13)

Though participants are working to incorporate climate action and communication into their works as health professionals, feelings of hopelessness and loss of meaning reoccurred as participants described the impacts climate change is still having, specifically describing concerns that climate change will undo previous health advancements.

I mean [climate change] is really challenging for me in ways, because sometimes it makes the work that I do in the office day to day feel like rearranging deck chairs on the Titanic. (Transcript 13)

The complexity and interplay between different social systems was a reoccurring theme in the data, which was commonly exemplified through tacitly linking climate change impacts to social determinants of health and vulnerable populations in Northern Ontario.

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I think in the Northern rural and remote communities, both Indigenous and non-Indigenous, are at highest risk in terms of access to food, flooding, evacuation, range of forest fires, electrical grid, basically everything, access to healthcare. (Transcript 8)

All participants acknowledged that populations living in remote, isolated communities are more vulnerable to climate change impacts. Most commonly in reference to remote First Nations communities, many participants emphasized the changes and challenges people living in rural, remote areas would face, as access to food, health and social services will be more precarious with a changing climate. Participants also acknowledged, both explicitly and implicitly, that the increased vulnerability of populations in Northern Ontario, in particular rural, remote, and Indigenous communities, is part of a system of injustices experienced due, in large part, to circumstances of their social determinants of health that have resulted from colonization and settler colonialism. It is important to note that none of the participants self-identified as Indigenous, and therefore none spoke from an Indigenous perspective, or had lived experience as an Indigenous person. In addition, none of the participants practiced predominantly in Indigenous communities, but instead worked out of population centers where Indigenous clients would travel to access their services. These gaps of perspective in the data and their implications will be explored further in the discussion.

### **Feeling uncertain about engaging in climate action: Whose role is it anyway?**

All participants believed that health professionals have a role to play in climate action but felt that there were certain professionals whose role was better suited than others to communicate and integrate climate change advocacy into their work. Regulated and allied health professionals within this study, predominantly represented by acute care physicians and nurses, viewed climate change action as peripheral to their role, and felt that public health professionals were better situated to integrate climate change into their work. Public health professionals shared this perspective on their suitability to integrate climate change into their role, as their governing bodies currently mandate their work addressing climate change, but felt that the health professions, as a collective group, can best address climate change action together. However, two participants highlighted the challenge in viewing health professionals as a collective group, when they are “very heterogenous” (Transcript 10). Many participants were surprised by the lack of a collective voice coming from health professionals, and spoke to the importance of a united

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message advocating for greater action on climate change, that encompassed all health professions.

‘Where is our voice?’ I feel always quite surprised that, there isn’t a stronger public health-physician voice as a whole. (Transcript 12)

Many participants did commend recent position statements from governing bodies such as the Canadian Medical Association and Canadian Public Health Association as positive steps towards promoting the role of health professionals in climate action, yet also questioned how much of an impact these documents would have (CPHA, 2019; Howard et al., 2018).

I was overwhelmed by the idea that the Canadian Medical Association [CMA], at least the president elect of the CMA, has endorsed carbon pricing. Does that mean that doctors as a whole endorse it, I really don’t know; it’s going to be interesting to see what the follow up is from that. (Transcript 4)

When participants were asked specifically about *what role they felt health professionals should and can play when it comes to climate change*, the majority discussed increasing individual and collective education among health professionals to improve understanding of the impacts on health. Participants discussed the importance of taking small-scale, individual action in their homes and workplaces as role models, with the common reiteration of “one person can still make a difference” (Transcript 17). Many participants also highlighted the necessity of partaking in larger scale advocacy, informing communities and governments about the health impacts posed by climate change and the importance of using our vote to effect changes.

We have to educate the entire healthcare team, both in public health and basically in acute healthcare or primary healthcare, we need to have more educational campaigns, education of the public, we need to have more mitigation programs in place for the community, and that we really need to go out and vote in ways that would support the people in policy making who are more key on making the changes that we want. (Transcript 1)

The majority of participants acknowledged the implicit responsibility they felt as trusted leaders in communities to accurately and meaningfully communicate the risks of climate change on health. A few viewed their role as a climate-health advocate as a moral obligation, as the nature of their occupation is to protect and preserve health. Many participants highlighted that their profession is among the most trusted, and that their voice needs to be utilized to communicate

the message to educate the public and call for action. One participant in particular, with a comprehensive background in climate change communication, emphasized the importance of collaboratively communicating one message, on multiple levels, to educate the public and key stakeholders and decision makers.

I think what's important is for health professionals to communicate and work collaboratively. I again I think so many people get their information from so many different means that we need to make sure that we're all speaking the same language. So, if our municipalities are saying one thing, we're also saying that one thing, because I think the more the message is out there and is similar and is saying the same words, then people will believe it more. And if it's being implied or communicated from multiple avenues, the likelihood of the message getting out there is so much stronger. (Transcript 18)

Over half of the participants brought up the politicization of climate change as a barrier to engaging in climate change action as a part of their role. These participants understood their role as having an expectation of being unbiased, and felt that the apparent political nature of climate change could be viewed as “pushing an agenda” (Transcript 11).

If I'm there pushing my agenda on whatever it is, and it's my personal views, I'm not sure in my position that I should be skewing things too much left or right. The same as if I was a climate denier and then got on my soap box every single time a patient came in, or if I had political views and shared them with them, I'm not sure that's totally appropriate. So even though I'm convinced this is the right thing, how do I use that power and influence is a little bit controversial in my mind, because I wouldn't be too happy if someone was pushing an agenda that I don't agree with completely. (Transcript 11)

### **Adopting climate mitigation in the North**

Participants were provided with a basic definition of health co-benefits<sup>7</sup> when asked how they *understand climate change mitigation and the possible health co-benefits associated with mitigation activities*. All participants acknowledged the need for mitigation in response to climate change as well as the potential associated health co-benefits. However, all participants also emphasized challenges of climate mitigation in the context of Northern Ontario. For example, participants unanimously agreed that Northern Ontario is not geographically favorable

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<sup>7</sup> Health co-benefits are often defined as additional benefits to health when engaging in climate mitigation action (Hosking et al., 2011). As an example, engaging in active transportation as a way to lower personal emissions and reliance on fossil fuels, will improve air quality, cardiovascular health and lower the long-term risk of developing chronic disease

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or currently structured in a way that empowers individuals or organizations to engage in mitigation leading to health co-benefits.

I see it as valuable that any sort of mitigation strategy has health benefits, but I think any of those types of changes I feel like are going to impact cities more, like bigger centers, more than rural areas. (Transcript 15)

Active transportation, primarily cycling, was most commonly identified as an example of climate mitigation offering co-benefits for physical and mental health. For example:

Active transportation is a particular interest of mine and there are certainly health co-benefits, with respect to physical activity, and perhaps even beyond physical wellbeing, mental health and wellbeing, when it comes to increasing physical activity. (Transcript 10)

However, many of these same participants also emphasized the challenges of active transportation in Northern Ontario communities due to the expansive geography of the North, weather, limited infrastructure to support active transportation, and a dominant ‘car culture’ shaping major infrastructure and community design decisions. In addition, extreme cold and heavy snow limited the ability to produce and utilize green energy year-round.

I think there are a couple of particular challenges for our rural communities. One is community design; they haven’t been designed to be green communities, and our community is fortunate, it has sidewalks; some communities in Northern Ontario don’t and they’ve been laid out in a way that has accepted the fact that land is available, so it can be a little bit more spread out than might have otherwise been the case if people were designing a very walkable community, so I think that’s a challenge. (Transcript 13)

One participant held the perspective that mitigation action, using the example of removing jobs in communities that are dependent on resource extraction or heavy CO<sub>2</sub> producing industries, could also negatively impact a populations’ social determinants of health. They explained that, from their perspective, people who lose their jobs were likely to then engage in poor, unhealthy lifestyles, leading to a greater dependence and strain on health resources.

### **Discussion**

This study explored trends and key issues with respect to health professionals’ perceptions of climate change and climate action in Northern Ontario. Through the process of



conducting key-informant interviews with purposefully sampled health professionals, all of whom self-identified as climate leaders, the findings yielded insight into four themes: perspectives surrounding the health challenge of climate change; the climate change impacts of concern; the role of health professionals in addressing climate change; and the challenges for climate mitigation in Northern Ontario. As perspectives were compiled from a small subset of health professionals working across Northern Ontario, the results are not representative of the entire region. Nevertheless, these findings yield important insight into the perspectives of those who self-identified as climate change leaders among the Northern Ontario health professional community. It is important to note that, although all participants identify climate change as a threat to human health, most participants feel uncomfortable and uncertain about engaging in climate action within their role as a health professional working in Northern Ontario. This section explores this discomfort and uncertainty through weaving results with existing literature and personal reflective commentary to discuss the value health professionals place on climate change, their understanding of the complex nexus of climate and health, and the perception of climate action as a health professional working in the North. These three categories – value, complexity, and action – provide a framework for this discussion and we propose an avenue to understand the perspectives of climate engaged, health professionals in Northern Ontario.

### **Inherently complex and difficult to engage with**

Within the existing literature, the impacts of climate change on health are predominantly presented through a siloed framework, which views climate amplified impacts exclusively affecting one area of health, without these impacts rippling to other dimensions of health (Smith & Woodward, 2014; Watts et al., 2015). However, this differs from the holistic perception of interconnected experiences that health professionals within this study portrayed. While participants acknowledged that the impacts on health are complex in nature, they showed a strong understanding of the ways in which this complexity intersects with the health of their clients, seeming to recognize that a single health impact of climate change will resonate through the physical, mental, and psychosocial health of an individual.

Both allied and regulated providers and public health professionals shared examples of grief, trauma, and overwhelming sadness among the clients they serve as well as colleagues and themselves, that they believed could be directly linked to climate change. Whether or not a client

believed in climate change, participants noted patterns in increased symptoms similar or related to negative mental health, though participants did note they were not always labeled as such. One participant became quite emotional when discussing their experience of clients feeling a tremendous sadness, but not being able to name it or understand where it is coming from. Our study is consistent with the emerging literature which highlights that the mental health implications of climate change is a growing area of concern that is only beginning to be adequately understood and addressed (Hayes et al., 2019; Ingle & Mikulewicz, 2020; Obradovich et al., 2018; Palinkas & Wong, 2020; Wiley, 2019).

Participants also noted that climate change was having an impact on the psychosocial wellbeing of their clients, particularly those in the far North. For many Northern populations, culture and identity are tied very heavily to the land (Tobias & Richmond, 2014). One participant in particular noted that they were beginning to see their clients struggling with their identity, as their connection to the land was being negatively impacted by climate change. The current literature supports this perspective, highlighting the additional psychosocial and cultural impacts being experienced by Northern Canadians (Harper et al., 2015; Hayes et al., 2019; PHAC, 2017). As we move forward in the field of climate change health and continue efforts to address the many climate-amplified impacts to health, it is important to acknowledge that additional socio-cultural, economic and geographic factors are impacting the mental health of populations in the North (Kipp et al., 2019).

The health impacts of climate change become more complex when we acknowledge that not every individual or population experiences them to the same degree. Socially and structurally maintained vulnerabilities exist, particularly in rural, remote, and Indigenous communities of Northern Ontario; this complicates every aspect of engaging with climate change (Ford et al., 2010; Christopher Furgal & Seguin, 2006). These vulnerabilities create and maintain a unique lived experience for those in the community, and any engagement approach utilised, including with respect to health professionals, must take every precaution to recognize and reflect the unique context of these populations. This task is not inherent in many current approaches, and requires purposeful reflection be done prior to and throughout the engagement process (Ebi et al., 2016).

Climate change communication and engagement is inherently complex, and in an attempt to address this complexity, participants expressed a desire for greater education and knowledge,

so that they may feel confident in labeling climate change as a health problem. This aligns with previous literature, which has identified steps that could be taken to improve health professionals' confidence in labeling climate change as a health problem, including increased education, both in academic settings, through news and media outreach, as well as greater public engagement and knowledge of the health impacts and health co-benefits of climate mitigation (Adlong & Dietsch, 2015; Weathers et al., 2017; Kreslake et al., 2018). Health professionals are advocating for increased emphasis on the education of climate and health impacts through various forms of continuing education and curriculum modification (Hackett et al., 2020; Hathaway & Maibach, 2018; Watts et al., 2018). Recent research has illustrated that health professionals demonstrate a desire to learn and manage the associated health risks of climate change to provide the most appropriate care and effective public health response (Hathaway & Maibach, 2018; Kreslake et al., 2018). Participants in this study who sought out further education around climate change and its impacts on health appeared to be more confident in viewing and labeling climate change as a health problem, which supports the previous literature.

### **Values drive behavioural change**

Irrespective of their role as a public health, regulated or allied health professional, participants unanimously perceived climate change as an important health problem in Northern Ontario. This is not surprising given that the study recruited health professionals who self-identified as climate leaders, and given the increasing recognition and focus on climate change as a health issue among medical and public health organizations (*CANE*, 2019; CAPE, 2019; CPHA, 2019; Doyle, 2019; Paterson et al., 2012). There was, however, a differing sense of urgency in addressing the health impacts related to climate change among participants, which may be indicative of individual value (Corner et al., 2014). This offers a possible explanation for the current action deficit among health professionals, as literature shows that value is a key motivator to behaviour change, in that we are more likely to make a behaviour change if it aligns with our values (Corner et al., 2014; Leiserowitz, 2006; O'Brien & Wolf, 2010). Similarly, climate change communication literature indicates that audiences are more receptive to messaging that targets their values, and more likely to engage in the desired behaviour (Moser, 2016; Moser & Dilling, 2012). When we consider the need for collective behavioural change towards climate change action, however, we are led to speculate on whether it is reasonable to

expect people who do not equally value the importance of action to address climate change to engage in collective behavioural change.

For example, over 50% of Northern Ontarians who responded to a National Climate Opinion Survey claimed that they feel climate change will harm them “a little” or “not at all” (Mildenberger et al., 2016). If we assume they will engage in climate change action proportionally to the value they place on its risk, which appears to be very little to none at all, what does this mean for the collective action towards addressing climate change? And how can we address this mismatch between personal value to personal action needed? It can be assumed that if we create messaging for health professionals to deliver that utilises a value laden perspective, those who appear to place a low value on climate change action may feel more connected to this issue, increasing their value and therefore making them more likely to engage in climate action (Marshall, 2014).

### **Potential for action within the health professional role**

While all participants agreed that climate mitigation was needed, and that health professionals had a role in advocating for, promoting, and supporting action, discrepancies arose when deciding which health professionals would fill these roles. Regulated and allied health professionals felt it was the responsibility of public health to take on this role, and while professionals working in public health expressed willingness to take on some of the burden, they felt that it was the responsibility of all health professionals to step up and engage. It seems, though, that this hesitancy to take on a daunting role is justified. We are asking individuals in a profession whose workload is already overburdened to take on an unprecedented and challenging task. Nevertheless, this work is important and needs to begin. That being the case, we need more than simple calls to action. We need those in power and with authority within governing bodies to mandate climate change action within the roles of health professionals. But does this align with the objectives of those in power? The public health system is also overburdened, working to address an expansive list of current threats to human health, and those in positions of power within the system must make choices on where resources are directed and focused. We know that those in power are not those who are experiencing the health impacts of climate change to a greater extent, and therefore may be less personally invested in seeing a movement towards mandating climate change action within the role of health professionals.

Climate change was also described as a politicized issue. The findings suggest that some health professionals, who are taught to use treatments and approaches in their practice that are heavily based in scientific evidence that illustrates strong causal relationships and strict regulation, and therefore rely on evidence to determine what to communicate to their patients, still view climate change impacting health as a politicized, opinion-based concept, despite the evidence supporting it as fact. Due to the fact that several participants still viewed climate change as a politicized issue, they understood it to be viewed and shared through a personalized lens. One participant explained that because the issue is politicalized, particularly in the study context where economies and livelihoods are highly connected with resource extractive activities, climate change communication can be perceived by audiences as pushing a specific political agenda. The view of climate change as a politicized issue is supported in previous literature, which cites political leaders, in addition to health professionals, as those who are best suited to address the issue of climate change due to their perceived expertise in addressing and working with polarizing issues (Mirsaiedi et al., 2017; Moser, 2016; Richards & Carruthers Den Hoed, 2018). This raises the question of whether or not it is realistic to ever view climate change engagement as apolitical. Perhaps instead, to support our collective efforts towards addressing the current climate action deficit, we must recognize that climate change will always be a politicized topic and shift the narrative to one of climate change communication being an opportunity for health professionals to find courage and speak out against this politicized issue to spark transformative change.

### **Limitations**

We know through the literature that there is a uniquely heightened vulnerability to climate change specific to rural, remote, and Indigenous communities in Northern Ontario (Christopher Furgal & Seguin, 2006). However, as mentioned in the results, none of the participants identified as Indigenous, and could therefore speak to this unique vulnerability firsthand. Instead, participants held a privileged position, both through the power inherent in their occupations, as well as their social locations, and did not feel comfortable speaking for Indigenous populations, but rather spoke to witnessing the vulnerability of the Indigenous populations they work with and the vulnerability that is socially and geographically constructed. The paternalistic approach of speaking to what is best for populations made vulnerable without

consulting or considering the values and perspectives of these populations, may have only served to perpetuate a historical and harmful trend of oppression. This, however, leaves a gap in the data that reflects an important aspect of the broad experiences of Northern Ontario, Indigenous peoples' lived experience with climate change. Not being able to include the lived experience of Indigenous peoples omits the perspectives of a population that have been made uniquely vulnerable to firsthand experiences of the impacts of climate change on health.

The data also show a gap in that all of the participants practiced medicine from a Western model, and therefore could not speak to the engagement of climate change communication in a traditional Indigenous medicine framework. The literature tells us that Indigenous populations draw a strong connection to the Earth and environment as part of their understanding of overall health and wellbeing (Tobias & Richmond, 2014). The sacred medicines used in many ceremonies come from the land, highlighting the reliance on a healthy environment that Western medicine does not share (OHRC, 2015). That being the case, those utilizing traditional medicine may feel the impacts of climate change affecting their health and practice more deeply than those practicing Western medicine. Future research should strive to incorporate the missing perspective of health care providers who practice traditional medicine to help deepen the understanding of the experience of the impacts of climate change on health in Northern Ontario.

Similarly, none of the participants practiced medicine primarily in remote communities in the far north of the province. While the majority of study participants had some experience working with Indigenous populations and remote communities, they practiced predominantly in regional centres (i.e. Thunder Bay, Sudbury, Sault Ste Marie, Kenora, and Parry Sound ) whose infrastructure supported more complex health services. The data did represent some of the unique perspectives and experiences associated with the study setting when compared with larger, more dense urban population centres, and as such represented some of the vulnerabilities that are not represented in the previous literature. However, a full understanding that would be achieved by having the perspectives of health professionals working predominantly in the most remote, most vulnerable communities is still lacking. This consideration may help guide related future studies.

### **Conclusion**

Understanding the key trends and issues among health professionals with respect to their knowledge, perceptions, and concerns in relation to climate change and climate mitigation highlighted participants' collective view of climate change as a threat to health with many current and projected implications. However, further research beyond understanding perspectives is needed in order to appropriately spark engagement and support action that will protect health. If health professionals working within the context of Northern Ontario are to develop and strengthen their role in mitigating climate change and protecting health, we recommend a renewed focus to enhanced cross-sector collaboration among all health professionals.

Within this broad recommendation, engaging in climate change action must be an explicit part of every health professional role to eliminate feelings of uncertainty surrounding appropriateness of climate engagement, while mandating designated time to allocate and help balance demanding workloads. Further collaboration among health professionals, climate scientists, and local experts will prevent knowledge and engagement silos, while reducing perceptions of isolation through establishing a network of engaged health professionals across Northern Ontario. Enhanced collaboration will help to increase and diversify education around climate science and engagement among health professionals, so they themselves can understand and integrate new information to create deliverables for their clients.

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**Chapter 3: Health professional approaches and techniques towards communicating climate change in a predominantly rural setting**

### **Abstract**

Health professionals are being called upon to embrace a stronger role in addressing climate inaction, utilizing their knowledge of health to raise awareness and empower action on the foreboding impacts of climate change on human health. However, it is not clear if and how health professionals communicate and engage with the issue of climate change. This paper aims to explore how health professionals can be most effective in their role to bridge the climate action deficit and stimulate engagement. The two primary objectives of the paper are to identify if and how health professionals communicate and engage with the issue of climate change; and, to develop recommendations to improve climate change communication in order to inspire and support new climate health leaders. Using a qualitative approach, health professionals who had experience working in Northern Ontario, the study setting, and self-identified as climate change leaders were purposefully recruited to participate in a semi-structured interview. Responses were thematically analysed to identify emergent themes. The themes that emerged from the data focused on the barriers and limitations that are currently experienced by health professionals when engaging with climate change, as many participants were not communicating climate change within their role. Participants did, however, speculate on utilising their current skills to communicate the health impacts of climate change if the experienced barriers were to be removed. In addition to changes in the mandated role of the health professional, increased education was the most frequently suggested approach to increasing health professional knowledge and capacity to communicate climate change health impacts to their clients. Much like the issue of climate change itself, the ways in which health professionals are engaging with climate change are complex. While health professionals have identified capacity within the scope of their role to communicate climate impacts and action, all feel limited by systemic barriers and their own perceived lack of knowledge. As such, they are calling on decision makers and policy developers to help alter the scope of their role to incorporate climate change communication.



## **Introduction**

Climate action has fallen short of climate science. Despite an ever-increasing public understanding of climate change, an ‘action deficit’ persists, wherein present action directed at adapting to and mitigating climate change is wildly insufficient to address the current and projected impacts to the ecosystems, economy, and human health (Field et al., 2014; Hornsey & Fielding, 2019; Ricke et al., 2018; Watts et al., 2019). Despite the numerous impacts of climate change, the impacts on human health present an important avenue to inspire engagement and action. Climate change impacts are often interconnected and complex, such as increased extreme weather events leading to greater rates of injury and death, but also creating lasting negative mental health impacts such as anxiety and post-traumatic stress disorder (Clayton et al., 2017; Hayes & Poland, 2018). Despite this complexity, the literature shows that framing climate change as a challenge to human health can be an effective way to provide personal relevance needed to enhance public engagement (Myers et al., 2012). Health professionals and their governing bodies, who have been identified as having a critical role in climate change prevention and preparedness, have publicly recognized the imminent risk climate change poses to human health, and the need for urgent action to avoid further health crises. However, it is not clear if and how health professionals communicate and engage with the issue of climate change. With their trusted position and knowledge of health, health professionals can have an important role in communicating the health impacts of climate change, and the action needed to mitigate these impacts.

This paper explores how health professionals who identify as climate change leaders communicate and engage with the issue of climate change in Northern Ontario. Recognizing that climate change impacts are seen and experienced at a local level, and that localized communication approaches are required to address local impacts, this research explores opportunities to improve climate change communication and engagement within the context of Northern Ontario (Greschke & Tischler, 2015; Hess et al., 2008; Moser, 2016). The overarching goal is to examine how health professionals can be most effective in their role to bridge the climate action deficit and empower engagement. There were two primary objectives of this study: (1) To identify if and how health professionals communicate and engage with the issue of climate change; and, (2) To develop recommendations to improve climate change communication in order to inspire and support new health leaders. A background is provided to

contextualize existing climate change communication and the potential role of health professionals in addressing climate change.

### **Background**

#### **Climate change communication and engagement**

Academic literature illustrates climate change as a wicked problem characterized by complexity and uncertainty, perpetuated by a lack of engagement, and requiring urgent individual, institutional, and systemic action (Ballantyne et al., 2016; Hulme, 2009; Wolf & Moser, 2011). Previous efforts directed at increasing engagement, through enhanced promotion of climate change awareness and information sharing, have been largely perceived as ineffective and arguably counterproductive, attributing feelings of confusion and skepticism surrounding climate science or disengagement from a distantly perceived threat to information overload (Lorenzoni et al., 2007; Moser, 2016; Moser & Dilling, 2012). This ineffective climate change communication has been identified as a critical factor in perpetuating a climate action deficit, leading to an expanse of research directed towards enhancing climate change communication to promote action (Asmi et al., 2019; Corner et al., 2018; Moser, 2014; Wibeck, 2014).

In Moser and Dilling's (2012) publication *Communicating Climate Change: Closing the Science-Action Gap*, the necessity of effective climate change communication is highlighted as an essential means of fostering public engagement. Climate change engagement, as defined by Lonenzoni et al. (2007), is an individual's state of involvement in climate change, encompassing three elements: the cognitive, a comprehension and reflection on the issue; the affective, an emotional response or connection to the issue; and the behavioural, an active response or change in behaviour. Building off Lonenzoni et al.'s definition, Moser and Dilling (2012) posit that systemic change can be achieved when an abundance of community members adopt climate change engagement as a personal value and convey these values to decision-makers. However, this is reliant on effective messaging that reflects the audiences' current values and presents the challenge of climate change as congruent with their values. This position underlies the objectives of this paper and stresses communicating beyond simply a distribution of facts, towards meaningful discussion to address the climate action deficit.

Scholarly literature focused on climate change communication research and practice has expanded over the last decade, centering on principles and approaches to empower engagement

(Kelsey, 2020; Moser, 2016; Polk, 2018; Richards & Carruthers Den Hoed, 2018). Strategies for effective climate change communication and engagement include understanding of one's audience, localizing and personalizing the issue, which can be done using storytelling and visuals, and suggesting actionable solutions that register on an affective level in targeting an audiences' values (Ballantyne et al., 2016; Cunsolo Willox et al., 2013; Moezzi et al., 2017; Moser, 2016; Scannell & Gifford, 2013). Communicating climate change must register as a dialogue, where the audience is understanding, conceptualizing, and relating to the message based on their own values and experiences (Ballantyne et al., 2016). Research suggests that climate change communication must start from a localized understanding to convey how a changing climate will affect the audiences' lives emotionally and behaviourally, moving beyond a "one size fits all" approach (Kreslake et al., 2016; Moser & Dilling, 2012).

The values and beliefs of the public need to be addressed within a local framework to stimulate community-level action that is understood as relevant, and thus impactful at ultimately addressing the climate action deficit (Leiserowitz, 2006; Weathers et al., 2017). However, despite the growing research, there remains several gaps in knowledge that impede a comprehensive understanding of how to effectively communicate climate change in ways that promote engagement, specifically the utilisation of health impacts and the health co-benefits of climate mitigation as an engagement tool. Recognizing and utilising the impact of emotion to affect behaviour, communicating in politicized or resource dependent settings, and most relevant to this paper, understanding the role of different messengers, are all factors in effective communication that still require additional knowledge and exploration (Moser, 2016; Polk, 2018; Salama & Aboukoura, 2018; Schweizer et al., 2013).

### **Health professionals as effective climate change communicators**

Beyond the message, the messenger plays a critical role in effective climate change communication (Corner et al., 2018; Moser, 2014). Perceptions of credibility and trust are "particularly important in the context of a problem like climate change that is invisible, uncertain, seemingly remote in time and space, scientifically and morally complex" (Moser & Dilling, 2012) and requiring often uncomfortable behavioral change. Recent studies focused on identifying potentially effective communicators have recognized health professionals as role models, who have the potential to educate and empower clients and communities, bridging the

gap between health and climate change (Krygsman & Speiser, 2016; A. M. Moser et al., 2017; Roser-Renouf et al., 2014). As trusted members of society, health professionals have the ability to leverage their leadership and reach to educate their clients and the public about climate change and the associated health implications (Haines et al., 2009; Xie et al., 2018). Utilizing a standpoint of social accountability to improve the health of individuals and populations, health professionals have historically launched campaigns informing and combating various threats to health including smoking, nuclear weapons and gun control (Cassel & Jameton, 1982; Pinto, 2008). These campaigns have yielded effective means of communicating the specific health threat to reduce the impact using the trusted health professional voice to communicate effectively and effect transformative change. Health professionals present great potential to act as messengers, communicating health impacts to wide, diverse populations who do not all share the same social determinants such as class, culture, and socio-economic status or geography, and therefore experience the impacts of climate change in different ways and to differing degrees (Abelsohn et al., 2008; *Canada's Changing Climate Report*, 2019; Field et al., 2014; Sibbald, 2013).

The health community has an important role to play in this improved communication. While the general public lacks specific knowledge on the health impacts of climate change, there is a strong consensus among health professionals that climate change is already negatively impacting health (Hathaway & Maibach, 2018; Paterson et al., 2012). However, many health professionals lack experience and confidence in communicating climate change and the linkages to health (Krygsman & Speiser, 2016). As previously mentioned, research has illustrated that framing climate change as a health issue may be effective in terms of not only raising awareness but also motivating engagement and action (Adlong & Dietsch, 2015; Humphreys, 2014; Myers et al., 2012; Roser-Renouf et al., 2014; Myers et al., 2012; Portier et al., 2010). It has been demonstrated that a health focus can elicit an emotional reaction that is consistent with support for climate action (Myers et al., 2012). Historically, promoting actions to improve health and well-being has been effective in educating and communicating with broader audiences, and therefore presents an opportunity as a method of communicating the effects of climate change (Corcoran, 2013; Frumkin et al., 2008). Key knowledge gaps exist, including how health professionals can help to effectively communicate the immediate and long-term health threats posed by climate change, how they can work toward addressing the current, and increasingly

concerning, action deficit, and how a mitigation and health co-benefits approach can be used in communication to stimulate engagement (Hathaway & Maibach, 2018).

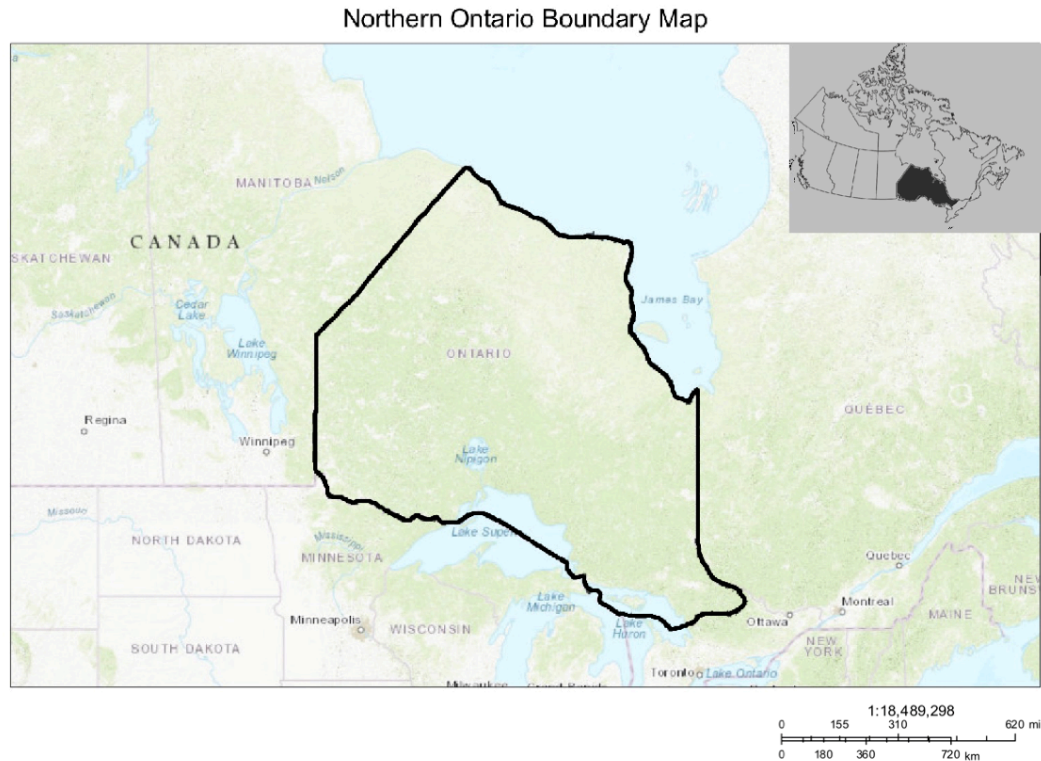
### **Methods**

#### **Research Setting**

The research setting chosen for the study was Northern Ontario, where a dispersed, diverse population and dependence on the primary sector continue to shape its ever changing landscape (*Canadian 2016 Census Data Profile*, 2017). Primary sector industries in Northern Ontario, predominantly mining and forestry, are resource dependent, and therefore precarious in nature and significantly impacted by climate change. This contributes to the existing challenges of labour precarity and service limitations experienced by many small and single-industry dependent communities across Northern Ontario (FedNor, 2018; Pearce et al., 2011). Over half (55.9%) of Northern Ontarians reside in the large urban and medium population centres, which serve as regional hubs for health and social services (*Statistics Canada*, 2017). The remaining 44.1% of the population reside in small population centres and rural areas, which include 105 First Nations, often with limited available health and social services (Ministry of Indigenous Relations and Reconciliation, 2017; *Statistics Canada*, 2017). Many Northern and Indigenous communities in Northern Ontario are exposed to higher health risks in comparison to Southern Ontario, as environmental and socially constructed conditions cause these communities to disproportionately experience the impacts of climate change, which compounds existing health challenges (Abelsohn et al., 2008; Chris Furgal & Prowse, 2009; Christopher Furgal & Seguin, 2006; Smith & Woodward, 2014; Watts et al., 2015). Indigenous peoples across Northern Ontario “have faced various discriminatory policies ... that created inequities that continue to affect the health of populations, including forced relocations, residential schools and forced sterilizations” (Health Quality Ontario, 2017).

Communities in Northern Ontario are characterized by being rural and remote, having high rates of poverty and unemployment, a strong dependency on the land for food, health and wellbeing, and political marginalization, all of which contribute to a heightened vulnerability to climate change impacts (Ford et al., 2010; Furgal & Seguin, 2006; Lemmen & Warren, 2004; Prowse et al., 2009). Strengths and assets that support resiliency in the face of climate change coexist with challenges (Kipp et al., 2019). Traditional knowledge, close ties with the land, a

strong sense of community, and baseline understandings and concerns about climate change are examples of these strengths (Galway et al., 2020).



**Figure 1.** Map illustrating the Northern Ontario boundaries used in this research

## Data Collection

Upon approval from the Lakehead University Research Ethics Board, participants were recruited using purposive and snowball sampling to participate in semi-structured interviews (Kirchherr & Charles, 2018; Palinkas et al., 2015). Participants met two inclusion criteria. First, they had experience working in Northern Ontario as a health professional and second, they self-identified as a ‘climate change leader’. The classification of ‘health professional’ followed the World Health Organization (2013) definition, encompassing a range of health professionals who study, treat and prevent illness, as well as those practising traditional medicine. Participants were further classified based on their occupation, allowing for potential analysis between those working in public health and those working in regulated or allied health professional roles (Health Force Ontario, 2020; MOHLTC, 2020). In this study, we defined ‘climate change leader’ as an individual who is engaged and committed to advancing climate change solutions to protect

health, following the designation from *Climate for Health*, a network promoting cross-sector collaboration to protect health and the environment (*Climate Change Leaders For Health*, 2019).

Two different interview guides were used independently and exclusively to better capture the differences in ways participants engaged with climate change. Guide A was developed for participants engaged with climate change directly as part of their profession, such as completing a climate change and health vulnerability assessment as mandated by governing bodies, while guide B was developed for participants engaged in climate change through broader advocacy outside of their assigned role. The majority of questions within the interview guides were identical to maintain consistency, yet differed in regards to questions surrounding the participants' method of engagement. Having the flexibility to choose between the two interview guides was important because it ensured rich data were captured from each participant, leading to an enhanced understanding and analysis of the different engagement methods. Auditory and, when in-person, observational notes were recorded, contextualizing the participants' expressiveness and body language; this, in addition to subsequent reflective notes made at the conclusion of each interview, aided in informing initial data analysis. The audio-recording and observational notes were transcribed verbatim, read over to confirm accuracy, and transferred into the software package *NVivo* for further analysis (*NVivo 12 Software*, 2019).

### **Data Analysis**

Braun and Clarke's (2006) 6-step framework was used as a guide to thematically analyse the data (see Appendix A for a more detailed summary). With an overarching aim of holistically exploring participant experiences, the analysis strove to investigate explicit meaning, in addition to underlying 'ideas, assumptions and conceptualizations' of participant perceptions (Braun & Clarke, 2006; Maguire & Delahunt, 2017). Following transcription, codes were constructed utilizing an inductive approach, where noted themes and observations within the data were used to develop and derive a coding framework (Braun & Clarke, 2006). All initial codes were iteratively categorized and collated into sub-themes and themes, distinguishing any overlap while ensuring the data supported each emergent theme. The themes were subsequently defined, focusing on understanding and extracting the essence and relationship amongst themes to create a larger elucidation in connection to the research objectives (Clarke & Braun, 2013). This

iterative analysis process allowed for a deeper insight into participant perspectives while providing a deliberately structured and rigorous guide to follow.

### Results and Discussion

This project explored perspectives and experiences among 19 health professionals in Northern Ontario in relation to their engagement with and communication of climate change and related health impacts. Participant characteristics are summarized in Table 1. In response to the study objectives, thematic analysis was used to derive five main themes from the data, illustrated in Figure 2. The themes are presented and discussed in the following sections, supported using quotations and tables. Although comparison between allied, regulated and public health professionals was not the goal of the study or analysis, differences emerged in relation to key themes that are worth noting, as they add additional richness and deepen understanding of the results. An explicit indication will be given when these comparisons are being made.

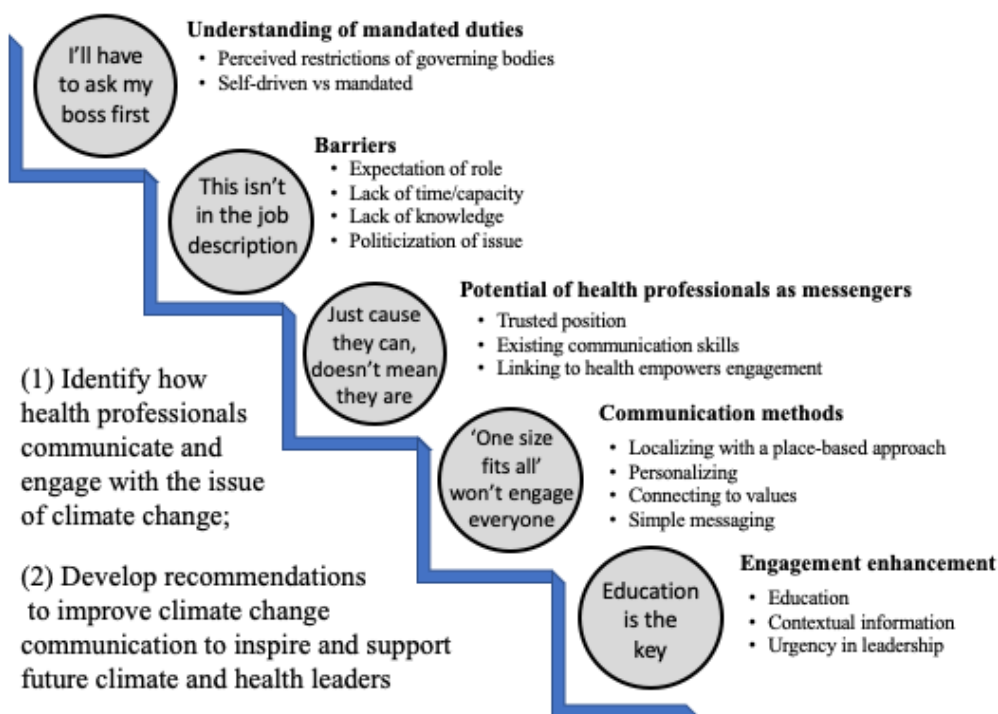
**Table 1.** Demographic data for study participants

|            |  | <b>Total n (%)</b> |
|------------|--|--------------------|
| Age        | 18-39                                    | 6 (32)             |
|            | 40-64                                    | 12 (63)            |
|            | 65 years and over                        | 1 (5)              |
| Gender     | Male                                     | 7 (37)             |
|            | Female                                   | 12 (63)            |
|            | Other                                    | 0 (0)              |
| Region     | Northwestern Ont.                        | 9 (47)             |
|            | Northeastern Ont.                        | 10 (53)            |
| Occupation | Regulated and Allied Health Professional | 9 (47)             |
|            | Public Health Professional               | 10 (53)            |



## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

Recalling the first objective of this paper, the interview process set out to understand how health professionals communicate and engage with the issue of climate change and its impacts on health. However, when participants were specifically asked how they were communicating, almost all responded that they were not communicating about climate change within their role and were therefore unable to even begin to discuss the “how”. Participants instead began to speak extensively to the barriers and structural limitations within their role that inhibited them from communicating about climate change. These barriers were experienced and shared consistently among all participants. Despite being unable to speak about how they were communicating, when asked about methods of communicating if their experienced barriers were removed, participants spoke extensively to the “how” they would communicate. This demonstrates that participants do understand how to communicate the health impacts of climate change, they are however unable to begin or engage in this work. That being the case, the themes that emerged from the data, discussed below, focus on the barriers and limitations that are currently experienced by health professionals; the objective of “how health professionals are communicating” is discussed, most often, theoretically; as themes focusing on how health professionals would communicate if the barriers to this communication were removed.



**Figure 2.** Visualisation of themes and sub-themes

**Communicate and engage with climate change? I'll have to ask my boss first**

When participants were asked about how they communicated and engaged with climate change within their professional role, a common response, and as such the first emerging theme, was given. Unless participants were mandated through their role to communicate and engage with climate change, any climate advocacy was predominantly done outside of their work. Many participants described feeling restricted by their employers in terms of what was explicitly required within their role and what was not, indicating that engaging in climate communication or advocacy, unless mandated, felt like something that required justifying action to their superiors. Several participants who were personally driven to engage with climate change outside of their role acknowledged that they were not utilizing their position as a health professional to their full potential. This highlights the current need to better utilize the trusted positions of health professionals to communicate the health impacts of climate change, a point that is further echoed in the current literature (Graham et al., 2019; Kreslake et al., 2018; A. M. Moser et al., 2017; Sibbald, 2013).

I don't think that we're hearing [climate change discussions] right now from health professionals and I think it's maybe a bit of a scapegoat thing, but I don't feel like it's my role, or that would be my expected role from my manager or the staff or hospital.  
(Transcript 2)

All of the participants working in roles with mandated climate change related work were among those classified as working in public health. As such, though this research is not a comparative analysis between public health and regulated allied health professionals, there were some differing experiences, and therefore perspectives, between these groups that should be highlighted. It is of interest to note that of the participants who engaged with climate change within their role, whether mandated or not, all except one were public health professionals, and did so through work surrounding climate change and health vulnerability and adaptation assessments, which have not yet reached the stage of directly communicating to and engaging with community members. Participants who were regulated and allied health professionals spoke to engaging in professional development, advocacy, and organizational involvement, such as engaging in climate change professional groups. Though several participants were able to engage in these activities within their roles, it was self-motivated, driven by a personal interest in

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engagement rather than an explicit expectation of their role. Other participants who engaged in these activities did so outside of their role. A more comprehensive visualization of engagement action among health professionals is provided in Appendix B. All participants acknowledged some personal action, which was expected, as the criteria for this study involved participants self-identifying as climate change leaders, and as such, would have some level of personal engagement.

Participants who did not engage with climate change within their health professional role were primarily allied and regulated health professionals and shared examples of engagement and advocacy done outside of their role. One participant reflected that, even when they are outside their place of practice, they are still seen by their clients as a health professional. And, as such, although they are not engaging with climate change as part of their practice as a health professional, their clients may still view them as a health professional engaging with climate change. This introduces questions for reflection and exploration in future research, such as how viewing a health professional engaging with climate change outside of their professional role may impact the thoughts and actions of a community member and whether this could be considered communication? We can reflect on how seeing your doctor at a climate protest would impact you, compared to seeing your doctor smoking a cigarette. Both instances would convey a message of how your doctor perceives the consequences of these actions impacting their health, and how it aligns with the way in which they are addressing your own health.

### **Climate change communication isn't in the job description**

When asked to expand upon the barriers to communicating or engaging with climate change within their role as a health professional, participants described several factors inhibiting them from engagement. It is useful to note the consistency in barriers faced by health professionals who work in a variety of roles. Almost all regulated and allied health professionals shared the common perspective that communicating about and participating in climate action is not expected in their health professional role. Consequently, many participants felt that they did not have the time or capacity to incorporate climate change communication into their already overwhelming duties.

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We should be involved more, it's just we're busy and it takes someone with the practical bent, that can actually take concrete steps, or organize people. (Transcript 9)

Many participants said they felt insecure about their own level of knowledge and understanding of the particular health impacts relevant to their clients and the Northern Ontario setting.

Recognizing their trusted position as sources of information, they lacked confidence to explicitly draw connections between climate change and the health impacts being experienced by their clients, and expressed hesitancy at making strong causal statements:

Climate science has been pretty cautious to attribute any specific event to climate change. And so, say someone does have an illness that was associated with a flood, given that even climate scientists would be hesitant to link that flood with climate change, certainly I think health care providers probably wouldn't go down that road. (Transcript 8)

I have a certain segment in my practice who are chronically mentally ill. . . . They are very vulnerable in every respect, they're fragile. So, I'm giving them some false reassurance that things will be fine, that they will be looked after, but I don't really know that. (Transcript 6)

In addition, many health professionals felt they do not have the technical expertise or background in environmental and climate sciences to accurately and confidently discuss the topic. Participants expressed worry about not being able to correctly explain climate processes, and the relation to health believing that “those are really the realm of questions for researchers” (Transcript 10). It is important to note that the aforementioned barriers were identified across participant groups, both the public health group as well as the regulated and allied groups, who are governed by their own organizations. This speaks to a problem across the health system, not just within any one area of health.

Another barrier, stated by several participants, was the challenge that climate change is a complex issue that can be easily politicized. These participants felt that, because climate change advocacy is not yet commonly viewed by the public as part of a health professional's role, it could be interpreted as pushing an agenda, and damage existing relationships between health professionals and their clients. Participants built on the added challenges through acknowledgment of the Northern Ontario economy and labour market and the heavy dependence on resource extraction, and how this dependence shapes the communities' perspectives on climate change.

Health is political and I think climate change absolutely is because it involves policy, it involves broad public sector, private industry decision making, it involves having some tools of influence that unfortunately aren't going to be popular until enough people say, I'm afraid enough that I'm willing to pay a price for this. (Transcript 13)

If I'm there pushing my agenda on whatever it is, and it's my personal views, I'm not sure in my position that I should be skewing things too, too much left or right. The same as if I was a climate denier and then got on my soap box every single time a patient came in, or if I had political views and shared them with them, I'm not sure that's totally appropriate. So even though I'm convinced this is the right thing, how do I use that power and influence is a little bit controversial in my mind, because I wouldn't be too happy if someone was pushing an agenda that I don't agree with completely. (Transcript 11)

There was an expressed fear among participants that they would be seen as doing wrong by engaging in advocacy, when in reality neglecting to inform clients or populations of the detrimental health impacts of climate change may be causing greater harm. This perspective sheds some light on a barrier that was unexpected, which is a personal ethical dilemma for the health professional. Many health professionals enter the field because of some desire to improve the health of the communities and populations they serve. However, what is being asked of them within their role and what is best for their clients' health may not always be the same, creating an internal dilemma of obeying their governing bodies and regulations, or ensuring that the least harm comes to their clients. Climate change unjustly impacts marginalized and vulnerable populations and with current policy having little effect on addressing these health concerns, health professionals must recognize the opportunity and ethical obligation to act. Widespread acts of civil disobedience occurring with the intention of changing policy have become commonplace in society, however, these radical displays of rebellion should not be needed (Bennett et al., 2019; Mahase, 2019). Instead, Bennett et al. (2019) suggest that health professionals contemplate and grapple with a spectrum of possible, and more effective advocacy actions within each context-specific case to reduce this ethical dilemma.

### **Just because they can, doesn't mean they are**

The third theme within the results emerged when, despite the many barriers identified, all 19 participants shared the perspective that health professionals could and should be effective climate change communicators. Participants agreed that health professionals have the potential to

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be effective messengers given their trusted role in society while also emphasizing the suitability of the health professional role to incorporate climate change communication.

I think absolutely there is that potential, in general physicians and other healthcare professionals and as a group they carry a high degree of legitimacy and public trust. So, I think the challenge really is to find that sweet spot of where they do have that role. (Transcript 10)

I think the public definitely takes to heart what health professionals say to them. So that's one area where it may be important for us to engage with our primary care physicians because, if people are talking to their family doctor who they have had for numerous years, they tend to trust those individuals and what they're saying. And so, I think they are a great vehicle to be able to address some of these health issues or communicate some of these concerns to them. (Transcript 18)

This belief that health professionals are well positioned in a trusted, leadership capacity to communicate climate impacts and action aligns with previous studies investigating physician knowledge, beliefs and attitudes with respect to climate change engagement and health (Bolsen et al., 2019; Sarfaty et al., 2014; Sarfaty, Kreslake, Casale, et al., 2016; Sarfaty, Kreslake, Ewart, et al., 2016). However, it is important to recognize trust as a reciprocal relationship, and the perception of trustworthiness must be perceived by both the messenger and the recipient, which may not always be the case (Brennan et al., 2013; Imber, 2017; Smylie, 2001; Williams, 2017). The perception of health professionals as having a trusted position can be complicated within the remote, Northern communities. Oftentimes, health professionals are outsiders to the community, working within communities for a short period of time in response to a lack of permanent health care providers, and are therefore unable to engage in consistent contact to build trustworthy relationships with the communities they care for (Goertzen, 2005; Minore et al., 2004). “[T]rustworthiness and [an ability] to work in a culturally appropriate way with other Indigenous communities is essential” (Transcript 17) as knowledge and information is often effectively passed on by those within the community who hold a trusted position, commonly someone who has been present in the community for a long time (McGuire & Kishebakabaykwe, 2010; Ostapchuk et al., 2015; Smylie et al., 2014). That being the case, having an unreliable presence in these communities may alter the legitimacy of the trusted position health professionals feel they have within specific communities, and therefore negatively impact the perspective the

community has of health professionals as effective climate messengers. Additionally, health professionals must recognize and reflect on the fact that historically, the relationship between Indigenous populations and the health professionals who serve them were fundamentally associated with distrust and oppressive intentions (Burnett et al., 2020). When health professionals are working to understand their role and position as a trusted messenger, they need to recognize that simply being in the role of a health professional will not guarantee trust in every community they work with, and health professionals must always be striving to build and maintain trust (Levac et al., 2018).

Interestingly, many participants were hesitant to label themselves as an effective potential climate change communicator. Nevertheless, perspectives of our sample of participants still echoed existing literature emphasizing that health professionals are eager to play more of a role in climate change but need further education on climate change science and communication (Hathaway & Maibach, 2018; Macpherson & Hill, 2017; Sarfaty, Kreslake, Casale, et al., 2016). Health professionals within this study agree to the role of climate change communicator being added to their responsibilities, despite feeling ill-equipped for it. While emerging literature indicates that adding climate change communication to the role of health professionals is possible, it would require a carefully considered change at the systems level (Fox et al., 2019; Kreslake et al., 2018; Weathers et al., 2017; Yang et al., 2019). However, this interest among health professionals in Northern Ontario of adding to their role speaks to the urgency being felt to engage their clients in a way that is effective and impactful, and could be useful for further engagement among health professionals to become climate messengers.

### **‘One size fits all’ won’t engage everyone**

When participants reflected on climate change communication strategies and approaches that could be effective if they were able to engage within their role, the most reoccurring theme was that the messaging cannot follow a ‘one size fits all’ model, aligning with the emerging literature in the climate change communication field (Ballantyne et al., 2016). All participants who spoke to this shared that when communicating the health impacts of climate change, using a mass produced, blanket message or approach is likely to be ineffective.

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You know, some people might be very concerned about the health implications. Some other person might be much more concerned about the fact that some creature, they grew up with in the woods is going to be extinct or something. So, I mean, it all depends what moves people's hearts. (Transcript 4)

Instead, participants felt that an effective message containing relevant content framed in a localized context would be better received by clients, and more likely to incite action.

When asked to expand on what this messaging would look like, participants shared that it should be applicable to the individual or community, not too broad, and focus on issues and experiences that exist within the client's personal context. This frequently involved making linkages to health impacts specific to the clients or communities they were serving. While participants felt that communicating the health co-benefits of climate action to health were important, they did not feel that commonly proposed co-benefits would be well received within the context of Northern Ontario. This approach of localizing climate messaging is increasingly linked and supported by current climate communication literature (Moser, 2016; Polk, 2018)

Several participants shared their perspective of the unique context of Northern Ontario, and how any communication approaches developed for health professionals practicing in the North will require unique, targeted messaging.

A lot of people think about climate change from a more policy science way and how they tend to conceive it within their own experiential or cultural domains. So, I saw that right away as a very important piece to create a bridge between those so I started framing things in slightly different way, or adapting the questions, and it became much more generative when that happened. (Transcript 3)

It will not be enough to simply shift messaging that is being used in denser, more urban population centres to be used in Northern Ontario. Health professionals will need to be able to connect their messaging to the values and local experiences of the communities they are serving. Clients in the North may not feel compelled to act when hearing about the health impacts of big city air pollution, but will resonate with messaging that is contextualized to impacts felt more directly in the North, like ice road melt, and forest fire harm and displacement. This aligns with the current place-based climate change literature, which tells us that climate change communication will be best received by audiences when it is situated in values that are meaningful to the audience (Schweizer et al., 2013). However, contextualizing climate change communication to audience values is still challenging in Northern Ontario, as there is a dearth of



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research examining the values of populations in Northern Ontario that is needed to inform communication.

Several participants raised the idea of having a quick, clear message they could integrate into client interactions, expressing that having a simplified message and engagement approach could increase client uptake.

I think having the conversations more in parallel. You know, ‘lets talk about how you might get a bit more exercise in your day, have you thought about riding your bike?’, because that’s good for you and bonus, it’s good for the environment. (Transcript 13)

This alludes to a feeling of hesitancy to identify climate change as a standalone issue, but also a willingness to integrate climate change communication into more concrete discussions.

However, while participants in this study were not hesitant in identifying climate change impacting health as a standalone problem, they were invited to participate due in part to their self-identified climate engagement. Therefore, we cannot presume whether health professionals as a larger collective are still hesitant to label it as such. Nevertheless, participants were able to share what they perceived to be effective communication techniques in theory. Many of the suggested climate change communication techniques are strongly supported within the background. But the question of why health professionals are still not communicating with their clients remains.

Despite all participants acknowledging engaging with climate change, either within or outside of their role as a health professional, none were able to share experiences of communicating climate change directly with their clients. When engaging within their role, it was done in a capacity that did not involve any direct client interaction. However, most participants were still able to share communication techniques they currently use in their role when interacting directly with clients that they believed had the potential to be effective when communicating the impacts of climate change on health, as shown in Table 2. Knowing that health professionals already perceive themselves as having some of the skills and techniques required to effectively communicate important information to their clients will be beneficial in implementing further climate change engagement within the health professional’s role. If health professionals feel confident in their ability and skills to communicate with clients, utilizing those

same skills to communicate a different message should not be as daunting. This is an encouraging development.

Many participants discussed previous experiences of using a strength-based approach and providing actionable treatment recommendations, finding this approach to be more effective and sustainable in motivating and supporting behaviour changes to improve health. The use of actionable approaches to foster sustainable change has also been shown throughout the existing health literature (Banerjee et al., 2015; Ybarra et al., 2014). Health professionals can tailor these actionable items to the strengths of individual clients or communities to provide the best opportunity for success when communicating the health impacts and action to address climate change (Koh, 2016).

Health professionals working in Northern Ontario may also have a better understanding of the health history and context of their communities, as well as individual clients, and would be able to spot ways their health might relate to impacts of climate change, such as noticing patients with asthma or allergies experiencing more intense symptoms correlating with general warming. They may also often have the rapport needed to successfully engage in climate change communication and have the message be well received, as well as having real, locally based stories of health impacts to strengthen and contextualize their message (Cunsolo Willox et al., 2013; Nicolosi & Corbett, 2018; Scannell & Gifford, 2013). However, despite the current levels of engagement, and optimistic prospects for improved communication, participants still did not view climate change as a topic that can be easily incorporated into their work or their interactions with clients without larger systems-level change (Fox et al., 2019; Watts et al., 2019). Participants in this study, as well as the existing literature, support the idea of using a health lens to better engage in climate change communication in a way that draws on their strengths and knowledge, and allows them to better incorporate climate change communication into their current roles (Swartz, 2019; E. J. Topol & G. McCarthy, 2019). There still remains, however, several barriers, both external and internal, which are inhibiting health professionals from communicating and engaging with the issue of climate change.

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**Table 2:** Perceptions of viable climate change communication techniques and messages among Northern Ontario Health Professionals

| <b>What To Say</b>      | <b>Description</b>   | <b>Illustrative Quotation</b>   |
|-------------------------|--|---|
| Health-centered         | Messages focused on leveraging health professionals' established knowledge of health to create personal connections to climate change. | I'm trying more and more to highlight health perspectives. If I get called upon to speak, [climate change is] usually the theme of what I'm supposed to speak about. I think it's probably as a physician, the particular strength and voice that I can bring to the topic that maybe others couldn't do as effectively without the medical training or maybe they wouldn't have as much credibility because they lacked that training. (Transcript 4)  |
| Actionable              | Messages with clear, immediate action clients can take easily or individually.   | Having concrete action, for individuals to engage with, whether that's writing to their MP or voting a particular way on an issue, or having them achieve a greater understanding on a particular issue. I think those are small ways that we can help provide concrete action for folks who, even though they think it's a giant problem, really don't see meaningful solutions that they can individually implement. (Transcript 10)  |
| Contextualized          | Messaging that localizes the issue, highlighting the impacts seen and experienced by clients in their home or community                | I tend to say from a climate change perspective is that, climate change is happening now and we are seeing impacts within communities, already... So I try to use those tangible pieces to explain what climate change is and how we're seeing it locally, because I think climate change can be viewed as such a global issue that it's hard to see that is hard to see the tangible local impacts that it's having. (Transcript 18)   |
| Audience-focused        | Messaging targeting clients' values, interests and health  | I don't see or deal with patients with allergies but patients with environmental allergies, I think that that would be a really effective place to talk about climate change and potentially see if their symptoms are worsening. (Transcript 8)  |
| <b>How To Say It</b>    | <b>Description</b>   | <b>Illustrative Quotation</b>   |
| Narrative, storytelling | Messages told through stories of lived experience  | I think storytelling is probably one of, in general, the most effective way [to communicate a message], people just really tend to connect with. So whenever I present, I always try to combine stories plus the data, plus what do we do next, and especially when people are talking about their personal experiences and how it's impacted their life, their family, their communities 'cause I think in the end, people know the data around climate change, generally they know something really bad is happening, but unless it's you or someone you know or love is impacted it's not as relevant. (Transcript 12) |
| Inspirational, positive | Messages framed optimistically, highlighting positive impacts from climate action  | I think the biggest thing, and even for me is to talk about the... to speak about the necessity of it and urgency of it, but also not to frame it in such a negative, scary way, because really that's what works best for me. It is a bit of an impending doom for me but I hate looking at it that way and I think a lot of changes that we could make that would impact climate change in a positive way can be exciting and fun and interesting and ingenuitive. (Transcript 2)   |
| Resiliency lens         | Messages constructed using a strength-based approach, emphasising opportunity to build upon existing capacity                          | I try to take quite a resilience lens to my work on climate change adaptation... it's really important, especially when looking at the existing strengths, capacities or resources within communities or health systems, to be able to not just cope with the impacts of climate change but to actually adapt and maybe even transform things to be able to create opportunities out of them. (Transcript 3)  |

### **Education is the key to inspiring and supporting new health leaders**

When participants were asked how we can generate interest and sustain engagement for climate change communication among health professionals, increased education for health professionals was the most frequently suggested solution.

I definitely think a lot more educating needs to happen. A lot of times people talk about increasing climate literacy for communities, for individuals, but I think a lot of climate change literacy needs to happen amongst health care professionals and providers for sure, or even administrators of whatever facet of the health systems. (Transcript 3)

In alignment with recent literature, participants emphasized that enhanced and improved training was needed in earlier stages of medical education, as well as through professional development, to develop a deeper understanding of process and connections between climate change and health (Hackett et al., 2020; Lavey, 2019).

While participants reported seeing evidence of some impacts of climate change on health, they expressed a desire for the educational background that will increase their confidence in making direct links between health and climate change, and communicating them to their clients. However, hesitations were voiced around the practicality of adding climate change education, particularly in medical school, as the current curriculum is already content heavy and contains a multitude of complex information and terminology.

I think that's absolutely invaluable, I think it would be very important, but I'm not too sure other than those little snapshots if having a full course dedicated to the environment is something at this point that would be pushed as a NOSM agenda or a medical school agenda, although depending on the impacts down the road, it may be more and more important? (Transcript 11)

There was additional concern from a couple participants around grand rounds as a method of education, as these events are often optional and attended by those already engaged in climate change advocacy and communication. There is a risk that this may not be effective in reaching new audiences who had not previously been involved with climate change. Instead of preaching to the choir, participants felt that education needed to engage those who were previously unengaged or indifferent.

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Participants also shared the need to find the proper time and place within their already busy workload to incorporate climate change communication. Many participants recognized that health professionals are already handling a heavy workload, and adding something else to their burden without proper consideration could be poorly received.

So, it's finding that sweet spot of where and what areas does health have a mandate to speak out, when it comes to the health impacts of climate change. And where can we be truly confident based on the evidence that these are real significant risks to health, real impacts and then even more challenging is to say, what is it that we're calling for specifically, locally, that can be actioned upon. (Transcript 10)

Participants expressed the need for increased contextual information and evidence to inform messaging.

Building off the need for messaging to be localized and context specific, participants felt that their current knowledge of local experiences and impacts did not allow for the messaging to be authentic, in particular identifying their unfamiliarity and recognition that “they can’t speak for far Northern communities” (Transcript 13). It is important to acknowledge that none of the participants self-identified as Indigenous, and did not feel comfortable speaking to the lived experiences of the Indigenous populations they serve. As well, many participants identified that they lived with additional socio-economic privileges that would allow them to experience greater resilience to the impacts of climate change. Recognizing the social location from which participants are practicing, it is unrealistic to expect genuine, empathic understanding of Indigenous populations experiences from the more privileged health professionals. Instead, decision makers must purposefully make space for the voices of populations made vulnerable to share their knowledge and experiences, and create greater collaboration within and more importantly, outside of the health sector. In doing so, those in public health will gain contextual knowledge at the broader population level, while those working in acute care can work to understand personal stories through interactions with individual clients.

### **Recommendations for improving health professional climate change communication**

In pursuit of improving our understanding of what is needed to develop practical and applicable recommendations to improve climate change communication and to inspire and support new climate health leaders, participants were asked for their perspective on how climate

change communication could be strengthened. Many began by acknowledging the unique context and experiences of their clients in northern communities, and the fact that while effective climate health engagement is happening in more populous, urban cities, the methods used are not transferable to the North. Given the constructed social and geographical vulnerabilities experienced by northern communities, participants provided perspective for strengthening climate change communication in the North.

The first opportunity for strengthening communication was through education, which would increase climate literacy among health professionals. Health professionals rely on their own knowledge to understand and decide on the information they are communicating to their clients. By having improved climate literacy, health professionals will better understand the climate science surrounding the health impacts of climate change, and may feel more confident communicating this information to their clients. This resonates with the rapid growth in literature and calls to action for increased climate education opportunities in post-secondary and professional education (Adlong & Dietsch, 2015; Lavey, 2019; McDermott-Levy et al., 2019; Xie et al., 2019). The second method was being more conscious of the audience, and making the message personal. Again, in acknowledging the unique context of those living in the North, climate health messaging needs to be tailored to their specific needs and experiences. The third method was making the messaging practical for the health professionals communicating it. Participants talked about their struggle with only having so much time to spend with each client, particularly in the North where they are working within a large geographical area. Climate change communication needs to consider the value of what little time health care professionals have to communicate with their client, and should deliver a message that is clear and concise (Richards & Carruthers Den Hoed, 2018).

Finally, participants spoke to the benefit of having a tool, such as a guide, to help them craft their message and engage in effective climate change communication. This is something that is quite feasible, as we already know the techniques and methods for communicating the health impacts of climate change that are most effective. Drawing from the participants' recommendations for strengthening climate change communication, it appears that what has been missing was the consideration and recognition of the unique Northern Ontario context. Therefore, utilizing these recommendations, the perspective of local experts, and current climate science, we will use our knowledge to develop a guide to be used as a tool for health

professionals looking to engage, or strengthen, their communication of the health impacts of climate change within the unique context of Northern Ontario (Appendix XII).

### **Conclusion**

Much like the issue of climate change itself, the ways in which health professionals are engaging with climate change are complex. While health professionals have identified capacity within the scope of their role to communicate climate impacts and action, all feel limited by systemic barriers and their own perceived lack of knowledge. Health professionals are ready to take up this call to action, but share feelings of fear that they could be reprimanded for stepping outside of their expected role. Therefore, health professionals are calling on leaders within the health system to continue to enact changes that will allow health professionals to engage in effective communication, such as clear expectations of climate change communication within their role, increased education surrounding climate science, and support in developing context specific, targeted messaging. It is clear from this study that there are health professionals who are engaged and ready to incorporate climate change communication within their role, they are simply waiting on the health system to be ready as well.

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**Appendix A – Data Analysis Summary****Description of analytical steps used in data analysis**

| <b>Analytical steps suggested by Clarke and Braun (2013)</b> | <b>Analytical steps taken within this study</b>   |
|--|---|
| <b>Familiarizing yourself with the data</b>                  | Interviews were transcribed and subsequently reviewed in conjunction with listening to the audio recording to ensure accuracy of transcription. Observational and auditory notes were re-examined to recall and further contextualize the data.   |
| <b>Generating initial codes</b>                              | Initial codes were constructed utilizing an inductive approach, wherein interesting and meaningful features of the data were identified. Generation of the initial codes followed a systematic approach, thoroughly examining the entire data set to identify all elements of interest and potential relevance, with a narrowed focus on explicit data content. |
| <b>Searching for themes</b>                                  | All initial codes were iteratively categorized and collated into larger units, which were further conceptualized into overarching themes. Examination of the linkages between initial codes and larger themes, provided an opportunity to critically explore the relationship between, and significance of each theme.  |
| <b>Reviewing themes</b>                                      | Themes were critically examined and refined, while reflecting on the study's objectives to ensure relevance and support of the larger goal of the study. Distinction between themes was improved, while also ensuring data comprised within each theme cohered.   |
| <b>Defining and naming themes</b>                            | The themes were subsequently defined, focusing on understanding and extracting the essence and relationship amongst themes to create a deeper interpretation in connection to the research objectives.  |
| <b>Reporting and synthesizing</b>                            | Co-authors engaged in a review and discussion of the theme classification and integration within the article.   |

HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

Appendix B – Engagement Overview

Climate change engagement action among health professionals

| Climate change and health engagement         |  | Illustrative Quotation   |
|--|--|--|
| Classification                               | Specific Action  |  |
| <u>Public Health Professionals</u>           |  |  |
| Mandated action                              | - Climate change vulnerability and adaptation assessments  | Carrying out a climate change vulnerability assessment and working with partners on adaptation and mitigation strategies, emergency preparedness, that type of work has only very recently been part of the mandate of public health. So as . . . a local health agency, it’s on the one hand fantastic that this is now considered broadly to be a part of our domain, whereas previously it may have just been something that we relegate to researchers.(Transcript 10)   |
| <u>Regulated Allied Health Professionals</u> |  |  |
| Professional development                     | - Grand rounds and information sessions on climate change impacts on health  | Even though I did say . . . we should put it on a grand rounds . . . two years ago. It takes a lot of work, so again, but I'm kind of a fragmented person and I'm kind of a back room person, which doesn't make good and my excuse is I've been very busy. (Transcript 6)   |
| Advocacy                                     | - Organization / participation in petitions<br>- Climate strikes<br>- Letters to politicians<br>- Letters to governing health bodies | So probably the biggest thing I do for CCL is I write a heck of a lot of letters to the editor and many of them do get published actually. I also have done a bit of speaking . . . I gave a talk to my paediatric department last spring, there are six of us all told and I think by definition doctors are probably reasonably smart people. They have some science education, they are trained in evaluating evidence, especially the younger ones and they ought to be able to look at science and policy, I think and evaluate it for its evidence. But what I discovered in giving that presentation are things like, at least one of my colleagues, the one who admitted it, had never heard of the IPCC and it could be that more of them had not either and just didn’t admit it, I don't know. One of them said when I pointed out how much warming had already taken place, she asked, “well, is that global, because I haven't really noticed any change in the weather”, you know, and things like that, that just to me reveal such a lack of basic knowledge, such a lack of scientific sophistication. (Transcript 4) |
| Organizational involvement                   | - Participation in professional associations   | The Canadian Nursing Association was actually looking at having some kind of advocacy group related to environmental health and I volunteered to be on that original group and it became the Canadian Nurses for Health and the Environment (Transcript 17)  |
| <u>Both</u>                                  |  |  |
| Personal action                              | - Waste reduction<br>- Divestment<br>- Active transport<br>- Self educating<br>- Informal conversations                              | I’ve tried to make a conscious decision to do is to have a conversation, with everyone I speak to, just to bring climate change into the conversation as an item, as an issue, as either a fun thing, a punitive, like they're all sorts of different ways, but just to make mention of it within every conversation a little bit. (Transcript 10)   |
|  |  | I look at my actions and try to minimize my use of fossil fuels as much as possible and that means electricity as well. (Transcript 7)   |

**Chapter 4: Conclusions**

## **Summary and Synthesis**

The overarching goal of this exploratory study was to examine how health professionals, who identify as climate change leaders, perceive and communicate climate impacts and action in Northern Ontario. The findings from this study revealed that a concerned and passionate subset of Northern Ontario health professionals exists, who understand and recognize the serious health implications presented by climate change. These health professionals viewed the impacts of climate change as extending beyond physical health, impacting mental health and social wellbeing, in addition to driving further health inequities based on social determinants of health. However, the identified awareness and concern has not led to an emergence of foundational action such as communicating climate change to individuals and populations they serve. The current expectations of the health professionals' role, feeling a lack of capacity and available time, and the politicization and fear of damaging the trusted relationship between clients, community and the health professional were all identified as the predominant barriers to communicating climate change. Despite these barriers, participants saw potential for their role to include the communication of climate change health impacts, and offered a valuable perspective on how this could be achieved.

Participants recognised that Northern Ontario would need its own unique approach to communication, with respect to health impacts and climate action, which will require a deeper, contextual understanding of the North and the experiences of the populations who reside there. Participants acknowledged that the North is a tricky sociopolitical landscape to navigate, and that simply replicating current approaches to communication used in larger urban centres, such as Southern Ontario, would not be appropriate. In particular, participants described challenges in utilising the health co-benefits approach to mitigation in Northern Ontario. Although this approach is increasingly used and called for in climate communication research to inspire greater support for climate action, and although some participants in this study explicitly recognized the potential value of a co-benefits approach, most cautioned that this approach must be adapted for the context of the North (Gould & Rudolph, 2015).

While participants acknowledged a lack of confidence in their capacity and current knowledge that would enable them to accurately and effectively draw links between climate change and health, they felt that further education and training in regards to climate change health communication could significantly improve their capacity to incorporate the

communication into their role. Participants also identified a desire for additional resources to support the development of context specific messaging they could use in their daily practice. Building off of the foundational communication techniques already developed and used within the health professional roles, participants could incorporate these context relevant climate change communication techniques and messages into their practice to ensure the messaging is most effective.

**Table 5:** Communication techniques and messages previously known and illuminated by this paper.

| What is already known   | What this paper adds   |
|---|--|
| <ul style="list-style-type: none"> <li>• Actionable messaging is most effective utilizing clear, achievable directives (Polk, 2018)</li> <li>• Audience-focused messaging targeting values is critical for engagement (Moser &amp; Dilling, 2012)</li> <li>• The importance of co-creation of knowledge and storytelling to generate connection (Ballantyne et al., 2016; Kreslake, 2018)</li> <li>• Inspirational messages generate increased and sustained climate action (Maibach et al., 2011)</li> </ul> | <ul style="list-style-type: none"> <li>• An enhanced understanding of the potential health-centered messages have, in combination with a leveraged health professional voice to inspire engagement</li> <li>• Practical messages and approaches to communicating climate change within the context of Northern Ontario</li> <li>• Insight into strength-based approaches to enhancing engagement through utilization of resiliency lens</li> </ul> |

### Privilege and Politics

This exploratory study aimed to respond to several specific research objectives surrounding the perceptions and experiences of health professionals with regards to their communication and engagement with climate change action and health impacts. Due to the semi-structured nature of the interviews, participants often shared a more rounded telling of their experiences, rather than a brief answer to specific interview questions, which resulted in a predominantly inferred theme that did not directly correlate with this study's objectives. While this research did not set out to address this additional theme through the research questions, it is nevertheless relevant to the greater understanding of the perspectives and experiences of health

professionals in regards to climate change, as it provides additional context to the information shared.

As participants engaged with the interview questions, the theme of privilege was often inferred throughout their responses. Within this study, privilege is understood as any advantage that occurs when a person's social location places them in a position to benefit from advantages and afford ignorances that someone in a non-dominant social location could not. As mentioned, there are several elements that make up a person's privilege, and varying degrees of privilege, but in regard to this study, I am particularly interested in those elements that enable privilege when it comes to experiencing the health impacts of climate change. That is to say, someone whose social location allows them to effectively adapt to or engage in mitigation action against the health impacts of climate change.

Many participants spoke to their self-identified social location as a barrier in relating to and understanding the experiences of the vulnerable populations they work with. The privilege of participants' identities allowed them to be better equipped than the populations they serve, whether it be socially, economically, or physically, to adapt to the health threats posed by climate change, whether it be having the resources and education to understand best mitigation practices, or the means to engage in mitigation behaviours. The privileged lens from which participants may be communicating and engaging with the health impacts of climate change is important to consider, as it may influence the effectiveness of their messaging. Effective communication operates as a two-way street and involves both giving and receiving messages. Health professionals who are working to engage in effective communication with their clients must be sure to also listen to the lived experiences of their clients in order to identify their values and contextual understandings. If health professionals are advocating for mitigation action that is based on their experiences with climate change, they may be advocating for action that is inaccessible to populations made vulnerable who experience lesser privilege.

As we know from previous literature, effective climate change communication must align with an audience's values and perspectives, and the advocacy from a privileged person to an underprivileged person may result in a detrimental misalignment (Moser, 2016). This leaves us to speculate, are health professionals inherently the best communicators for this role? While their positionality and social privilege may indicate the contrary, participants from this study, as well as the current literature, show promise in their ability to adapt their current communication skills



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and expand their understanding to become effective messengers (Koh, 2016; Kreslake et al., 2018). At the very least, the role of a health professional is well suited to observe the health impacts experienced by the populations they serve, and share this information with those engaging in action.

Another instance of the emergence of privilege as an underlying theme occurred when participants discussed the politicization of climate change. While participants shared that they had no problem speaking to individual clients about changes required to improve health that had co-benefits to climate change mitigation, such as recommending a client cycle more to improve cardiovascular health, they were quick to point out that it became a politicized topic if these recommendations were linked to, or described as, climate action. As previously mentioned, participants felt that this was a potentially divisive area, and that their employers were discouraging against engaging in potentially political discussions. However, we have seen in the past that health professionals have taken a stand against politicized issues, such as nuclear weapons, proving that they are able to effectively speak against a politicized topic without professional repercussions (Cassel & Jameton, 1982).

Therefore, it stands to reason that the true politicization of climate change impacting health may not arise out of concern for clients feeling an agenda is being pushed upon them, but rather as a means of protecting a system that benefits those in privilege to the detriment of vulnerable populations. Participants shared an experience of feeling unable to address the broader, systemic changes required to allow for effective communication within their role as a health professional, which further posits that the health system has created a culture of non-political talk, which becomes engrained in the professional perspectives of health professionals, and perpetuates the institutional classism, racism and others -isms experienced by populations made vulnerable within the healthcare system.

As a person of privilege currently operating in a system that is populated by those in positions of privilege, academics, I have often grappled with this idea of dismantling systems that perpetuate inequity and injustice. While I know that this is necessary work to generate transformative change towards a just society, my personal reward in enacting this change is far less than my risk in taking a stand. The system as it is today benefits, and even rewards, those in privilege, which ensures those in privilege sustain the systems as they are. The system does not reward those whose aim is to “do right” and ensure all are treated equitably, but rather those who

operate within the constraints of the systems and perpetuate their existence (Chomsky, 2002). However, this is a cycle that must be broken if we are to truly work towards dismantling our current social systems and rebuilding them for a just, sustainable future.

Current climate change research focuses heavily on the idea of vulnerability and people made vulnerable as a means of understanding and communicating the severity of climate change impacts, and the necessity of action. This term becomes problematic, however, as it undermines and discredits the capacity of individuals and populations to respond to the impacts of climate change on their own, inferring that vulnerability is a trait of a population, rather than a state enforced by social and political systems (Katz et al., 2019; Kipp et al., 2019). Rather, we know these populations are made vulnerable, but in spite of this, remain resilient in character. Understanding that the populations residing in Northern Ontario have been and continue to be resilient to systems of oppression is important in developing effective communication approaches, as the literature currently shows that using a strengths-based approach is an effective method of fostering engagement (Drolet & Sampson, 2017; Ford et al., 2018; Tobias & Richmond, 2014). Drawing on the resiliency of northern populations as a means of encouraging action offers a unique approach to climate change communication in Northern Ontario, and further highlights the need for additional novel research examining its unique context.

### **Strengths and Limitations**

Reflecting on the theme of privilege provides a valuable context as we acknowledge the initial limitation identified within this study, which was the absence of participants who self-identified with populations who due to politics and structural violence are more likely to experience the health impacts of climate change. The identity, and accompanying privilege, of the participants meant that there was no perspective or experience shared from a health professional who has not only professionally, but personally experienced the health impacts of climate change to the same degree as the populations they serve. Current literature regarding climate change communication tells us that a locally contextualized message will not only be better received by audiences, but also be more effective at stimulating engagement (Moser, 2016). By lacking perspectives from participants who have personally experienced the greater vulnerability to the health impacts, and might therefore potentially have a deeper understanding of the context to frame their messaging from, this study was limited in its ability to further align

with the current literature. Additionally, all participants within the study live and work predominantly in regional centres (i.e., Thunder Bay, Sudbury, Sault Ste Marie, Kenora, and Parry Sound). They would see northern residents when the northern residents travelled to regional centers to access health care or when they themselves would very occasionally travel to remote northern communities to provide care on-site. As Northern Ontario was chosen as the setting for this study due in large part to the unique experiences of populations made vulnerable within its remote communities, that the voices of those who have local experience are missing is a distinct limitation. A final limitation related to the identity of participants was the fact that seven of the nine participants categorized as allied or regulated health professionals were physicians. This may have impacted the data provided, both in narrowing the scope of perspectives and experiences shared by the physicians, as well as in the barriers faced within their roles. It is likely that this group of physicians face similar barriers in their work to address the health impacts of climate change, and not having the perspectives of additional allied or regulated health professionals in different roles may have limited the data provided, and skewed the results of this work.

Another potential limitation of the study was the use of self-identification to determine whether participants met the criteria of a climate health leader. As there was no specific threshold for the type or extent of climate action or advocacy a participant had to be engaged with, there was no way to know prior to the interview whether a participant met the study's expectation of a climate health leader. Someone who had signed one climate change petition could just as easily be included as someone who consistently lobbies for changes in policy to address the impacts of climate change. Resultingly, the perspectives shared within the interviews could reflect a variety of health professional engagement with climate change that did not meet the true aim for the research goals of this study. Along the same lines, the use of snowball sampling may have also been a limiting factor of the study. This type of sampling may have led to participants suggesting colleagues for the study who engage in similar levels of advocacy, creating a snowball of participants with comparatively low levels of engagement recommending additional participants with equally low levels of engagement who, again, may lack a true understanding or perspective of the impacts of climate change on health. Snowball sampling may have also caused participants who engage in comparatively low levels of engagement, but who were recommended by a colleague with a comparatively high level of engagement, to feel an

obligation of professional courtesy to participate, despite the fact that they may not truly identify as a climate health leader. There was no way to quantifiably measure engagement to ensure participants met the intended criteria of the study.

The last limitations, which may have impacted my analysis, were the potential biases I held as a researcher. The first potential for bias occurred as a result of my recent employment coordinating a collaborative project between the seven Northern Ontario public health units conducting climate change and health vulnerability and adaptation assessments. During this time, I have come to develop working relationships with several of the participants who were interviewed during this study, and as a result, my interpretation and analysis of their responses and engagement in this study may have been impacted. The second potential for bias occurred throughout the process of presenting the data, from analysis to the discussion. As an inherent component of qualitative research, interpretation was required on the part of the researcher. While the interpretations presented in the findings are based on the data collected, both transcripts as well as observational notes, and therefore well supported, it is important to consider that the data presented within this thesis may only be that which supports and confirms both my professional hypothesis and personal expectations of how health professionals might be perceiving and experiencing the health impacts of climate change. In addition, my presence as the researcher during the interview process may have led participants to modify their responses to align with that they perceived as my expectations for the research. While I strove to minimise bias and maintain rigour within this work, I feel it is important to acknowledge the possibility of some bias.

While the decision to select Northern Ontario for the study context may present as a limitation, as there was a smaller participant pool to draw from and therefore a likelihood of generating less rich data, this was a purposeful choice. This study aimed to focus on context, rather than depth of experience, in order to contribute to establishing a greater context knowledge within Northern Ontario. Based on my literature search results (Appendix VI), this study is the first to examine perceptions of health professionals around communicating and engaging with climate change in Northern Ontario. This allowed the opportunity to design and implement a study that would set the groundwork for future research in this area. We could design an interview guide and format that future studies examining the perceptions and engagement around climate change in rural and remote communities could model. Being the first

study to examine this specific topic in an unexamined setting offered a freedom to tailor research questions and methods that would prove most valuable to the emerging field of climate change communication. Another strength of this study was its aim to approach a variety of health professional roles in the data collection process. While the actual roles of participants varied from the proposed participant recruitment framework, this study was still able to utilise a variety of health professionals to create a broader spectrum of experiences and understanding. The last strength identified within this study is the practical recommendations and outputs, in addition to contributions to the field of climate change communication, that can be used by the participants and populations they serve.

### **Contributions and Future Research**

This study contributed to the growing field of climate change communication by adding to the knowledge gap around communicating with a health lens as a means of encouraging public support and engagement. As this was an exploratory study, our objective was to gain a greater understanding of the current perceptions and experiences of communicating the health impacts and mitigation of climate change, rather than to identify a solution to solve the climate action deficit. The findings from this study may be used to develop strategies to improve the ways in which climate change is communicated in a remote, rural context, which will in turn increase client understanding of the health impacts related to climate change and optimistically, spark action.

I intend to condense my project, in alignment with participant recommendations, into a comprehensible, brief report that will be distributed openly to participants and made accessible to any interested parties. This report will be a synthesis of all findings from my project, including current perceptions of climate-health leaders, communication lessons and engagement recommendations, a draft of which is available in Appendix XII. I believe that the synthesis and mobilization of this report will be impactful and beneficial to the practice of any health professional, self-identified climate change leader or not, as the information will serve to improve communication about the health impacts of climate change. This report can be used as a tool for educational institutions to reflect upon when creating curriculum involving climate change communication. As well, the report can be used to show the healthcare community the influence they can have when they integrate climate change and the health impacts of climate

change into their practice, and the effect it can have on communities. At this time, I have had the opportunity to share the preliminary results of this study at several instances, including:

- Lakehead University's *3 Minute Thesis* event, Thunder Bay ON, Oral Presentation (Mar. 2019)
- Lakehead University's Office of Sustainability Climate Disruption Event, Thunder Bay ON, Panel Presentation (Mar. 2019)
- Public Health 2019 - Canadian Public Health Association's Annual Conference, Ottawa ON, Poster Presentation (May. 2019)
- The Northern Health Research Conference, Little Current ON, Oral Presentation (Sept. 2019)
- Climate Change and Health Forum – Ontario Public Health Association's Annual Forum, Toronto ON, Poster Presentation (Nov. 2019)

I will also seek out opportunities to present my completed work to interested audiences, with specific attention made to share with communities and individuals who are directly impacted by my project, in addition to submitting chapters two and three for publication consideration.

### **Conclusion**

The current global circumstances have made it apparent that climate action is urgently needed. While the health impacts of climate change are well documented, particularly among populations who are made vulnerable by social and politically generated forces, current global events have further perpetuated inequities and health disparities, worsening the impacts of climate change. As we continue to remain idle in our climate action, global events such as the current Coronavirus pandemic will create further health disparities, and compound the health impacts of climate change. Since the beginning of this research process, health professionals have shown increasing engagement in regard to climate change, including public calls for greater action and the integration of climate change into curriculum, and most recently advocating for a just, green recovery (de Paula & Mar, 2020; Howard, 2020). Climate engaged health professionals are identifying and engaging in roles that will allow for a larger platform to

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empower climate action, such as Dr. Courtney Howard, a pioneer of climate change communication among health professionals, running for leadership of the Green Party.

Following this momentum, health professionals in Northern Ontario are looking for opportunities to empower engagement among the populations they serve, but feel inhibited by various systemic barriers, and a lack of capacity to effectively communicate the impacts in order to stimulate action. The intention of this research was to explore if and how health professionals communicate the health impacts of climate change, aspiring to develop practical and applicable recommendations to engage health professionals in climate change communication. Though the shared perspectives of health professionals currently engaged as climate change leaders in Northern Ontario has provided a foundational understanding of the current experience working to integrate climate change communication into their role, there is still more to understand in order to effectively instill the capacity and courage within health professionals to tackle the current greatest threat to human health.

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**Appendices**  
**Appendix I - Sample Interview Guide**

- Obtained consent to preform interview
- Clarify and confirm confidentiality
- Obtained consent to record interview

**Preamble to participant**

Thank you for agreeing to participate in this research project. I will be using a semi-structured approach, meaning that I have a number of questions that have been developed by my research team and myself, and approved by our ethics board, that will guide the interview, however our discussion may deviate in different directions depending on your expertise and experiences. As a refresher to my previous email, we are conducting this research in hopes of gaining a greater understanding of how health professionals perceive and communicate the health impacts of climate change and the health co-benefits of climate mitigation. To help prevent any misinterpretations of terms, I am going to clarify some definitions for this study. In this study, climate change is defined as human action altering the global climate predominantly through the burning of fossil fuels. Mitigation is action that works to reduce the rate and magnitude of long-term climate change impacts. Health co-benefits will be defined as additional benefits to health when engaging in climate mitigation action.

Health professionals are being called upon as trusted leaders and advocates for health to influence policy and educate individuals and communities to take action. By understanding of how health professionals are communicating climate change impacts we hope to aid in identifying opportunities to improve climate change communication and engagement, and identify opportunities for strengthening the role of health professionals in climate action. Throughout this interview we will discuss your role as a health professional and the concerns you have with respect to climate change impacts, your engagement in climate action, climate change communication among health professionals, and finally the potential opportunities for strengthening the role of health professionals in climate change mitigation action. Discussing climate change can be a polarizing and often politically charged topic, so to reiterate, all participants are offered confidentiality, unless waived in the consent form, to protect them from injury to reputation or reprimand from employers and colleagues. Are there any questions you have for me before we get started?

**Interview Guide A – Health Professionals engaged in climate change in their day-to-day work**

1. Tell me about the path that led you to work as a health professional?
  - a. How did you become interested in health?
  - b. Describe the work that you do?
  - c. What led you to work in Northern Ontario?
  
2. How did your interest in climate change originate?
  - a. Why are you interested in climate change?
  - b. What do you see as some of the causes of climate change?

## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

3. Do you view climate change as a health problem?
  - a. How do you describe the relationship between the impacts of climate change and health?
4. What are the impacts of climate change that are most concerning to you as a health professional working in Northern Ontario?
  - a. What do you see as important health impacts of climate change in the community(ies) where you live and/or work?
  - b. In your view, are there populations that are more vulnerable to impacts of climate change than others?
    - i. Can you provide examples of the ways these populations are impacted by climate change?
5. Health co-benefits are often defined as additional benefits to health when engaging in climate mitigation action (Hosking et al., 2011). How do you understand climate change mitigation and the possible health co-benefits associated with mitigation activities?
  - a. Can you describe specific health co-benefits you anticipate from climate change mitigation?
  - b. What kinds of mitigation activities are most achievable and relevant to the community(ies) where you live and/or work? ?
    - i. What about thinking specifically in the context of Northern Ontario?
6. How do you engage with the issue of climate change?
  - a. Do you talk about climate change?
    - i. Are you raising awareness?
    - ii. What settings are you typically sharing your knowledge and views about climate change?
    - iii. Can you provide some examples of conversations you have had about climate change?
  - b. Are you taking action?
    - i. If so, what kind of action?
    - ii. Can you provide some examples of action you have taken?
7. How do you integrate climate change into your work?
  - a. Do you talk about climate change in your work? Or is it separate?
    - i. Who or what groups do you talk to specifically?
  - b. Do you promote climate change action through your work?
    - i. What types of action do you promote?
      1. Can you provide examples?
    - ii. Why do you promote this type of action? Is it related to your field of interest?
8. Are your clients bringing the topic of climate change to you in your practice?
  - a. How do they introduce the topic?
  - b. What are they saying or asking about?
  - c. Do your clients express concern about climate change?

## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

- d. If so, can you provide examples?
9. If one of your clients asked you about the health impacts of climate change, what would you say/what would you tell them about?
10. Does your awareness and understanding of climate change influence decisions that you make in your professional work?
  - a. Can you provide any examples?
  - b. Do you adapt your work to emerging information around climate change?
    - i. Are there barriers that prevent you from doing so?
    - ii. If so, can you tell me more about these barriers?
      1. At the public level?
      2. At the Institutional level?
      3. At the governmental level?
11. In your opinion, are other health professionals in your community aware of the ways in which climate change impacts health?
  - a. Where does that awareness or lack of awareness come from?
  - b. Is there a level of concern?
12. Do you notice other health professionals taking climate action (whether that is talking about climate change to their clients or the public, advocating for change, or changing their personal behaviors)?
  - a. Can you provide any examples?
  - b. If not, why not?
13. What barriers exist that prevent you, or other health professionals, from taking action and talking about the health impacts of climate change in your work?
  - a. Is it a structural problem with the healthcare system?
    - i. Is there a restrictiveness of regulating bodies?
    - ii. Does it fit within our medical model?
  - b. Can you provide examples of other barriers?
    - i. Time?
    - ii. Lack of resources?
    - iii. Uncertainty how to communicate?
    - iv. Unreceptiveness of patients?
14. When you talk about impacts of climate change, are there specific strategies or approaches that you have found to be effective?
  - a. Do you adopt a health perspective in your communication?
  - b. Do you highlight any health impacts in particular?
  - c. Do you focus on the health of the individual versus the health of the environment?
  - d. Do you use visuals or storytelling to convey your messages?
  - e. Is there specific terms or words that you use or avoid when communication about climate change?

## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

15. Do you feel that health professionals are effective messengers when it comes to climate change communication?
  - a. Why or why not?
16. What role do you think health professionals should and can play when it comes to climate change?
  - a. Do you feel the role of the health professional needs to be emphasized more strongly in climate action and communication?
17. What are some ways to increase awareness and improve communication of climate change health impacts among current and future health professionals?
  - a. Should health professionals be provided more opportunities for professional development relevant to environmental health and climate change throughout their career?
  - b. Should there be a larger focus on environmental health and climate change within curriculum during university education for students?
    - i. During interprofessional education for professionals?
  - c. Are there voices that are missing that would be beneficial towards progress on climate mitigation and strengthening the role of health care professionals?
18. Are there other ways health professionals could be engaging with this issue of climate change that they currently are not?
  - a. What can be done immediately?
  - b. What can be done differently?
  - c. What can be improved upon?

### **Recruitment – other potential interviewees**

19. Are there other colleagues or organizations you can think of that may be interested in participating in this research?

### **Demographic Information**

20. Can you give me an approximate range of your age?
21. What is your race or ethnicity?
22. How do you define your gender?
23. What is your job title?
24. What organization do you work for?

**Interview Guide B – Health Professionals engaged in climate change predominantly outside of their practice**

1. Tell me about the path that led you to work as a health professional?
  - a. How did you become interested in health?
  - b. Describe the work that you do?
  - c. What led you to work in Northern Ontario?
2. How did your interest in climate change originate?
  - a. Why are you interested in climate change?
  - b. What do you see as some of the causes of climate change?
3. Do you view climate change as a health problem?
  - a. How do you describe the relationship between the impacts of climate change and health?
4. What are the impacts of climate change that are most concerning to you as a health professional working in Northern Ontario?
  - a. What do you see as important health impacts of climate change in the community(ies) where you live and/or work?
  - b. In your view, are there populations that are more vulnerable to impacts of climate change than others?
    - i. Can you provide examples of the ways these populations are impacted by climate change?
5. Health co-benefits are often defined as additional benefits to health when engaging in climate mitigation action (Hosking et al., 2011). How do you understand climate change mitigation and the possible health co-benefits associated with mitigation activities?
  - a. Can you describe specific health co-benefits you anticipate from climate change mitigation?
  - b. What kinds of mitigation activities are most achievable and relevant to the community(ies) where you live and/or work? ?
    - i. What about thinking specifically in the context of Northern Ontario?
6. How do you engage with the issue of climate change?
  - a. Do you talk about climate change?
    - i. Are you raising awareness?
    - ii. What settings are you typically sharing your knowledge and views about climate change?
    - iii. Can you provide some examples of the conversations you have had about climate change?
  - b. Are you taking action?
    - i. If so, what kind of action?
    - ii. Can you provide some examples of action you have taken?
7. How do you integrate climate change into your activism?

## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

- a. Do you talk about climate change in your activism? Or is it separate?
    - i. Who or what groups do you talk to specifically?
  - b. Do you promote climate change action through your activism?
    - i. What types of action do you promote?
      1. Can you provide examples?
    - ii. Why do you promote this type of action? Is it related to your field of interest?
8. Communication is a two way street, and with activism, can occur between many different groups (eg. Community members, government, policy makers, etc.). How do people respond to your activism, and how do people begin conversations around climate change with you?
- i. How do they introduce the topic?
  - ii. What are they saying or asking about?
  - iii. Do they express concern about climate change?
    1. Why are they concerned?
    2. If so, can you provide examples?
9. If a concerned citizen asked you about the health impacts of climate change, what would you say/what would you tell them about?
10. Are there barriers that prevent you from advocating for climate action?
- a. Does activism fit into our current medical model of practice?
  - b. How do you overcome barriers to effectively communicate your message?
    - i. What are some examples of barriers you've had to overcome, and how you overcame them?
11. As a health professional, you are governed by regulating bodies that influence the way you practice. Do you feel these regulations influence affect your ability to engage in climate change or advocacy?
- a. Is it simply more effective to get the message across outside the health profession practice setting?
  - b. Is there fear of repercussion from regulating bodies for speaking about an issue that is so often politicized?
    - i. Does this fear come from actual experiences of health professionals facing consequences, or more of a culture that has been fostered to not discuss politicized issues within the profession?
12. Do you notice other health professionals taking climate action (whether that is talking about climate change to their clients or the public, advocating for change, or changing their personal behaviors)?
- a. Can you provide any examples?
  - b. If not, why not?
13. When you talk about climate change, are there specific strategies or approaches that you have found to be effective?
- a. Do you adopt a health perspective in your communication?

## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

- b. Do you highlight any health impacts in particular?
  - c. Do you focus on the health of the individual versus the health of the environment?
  - d. Do you use visuals or storytelling to convey your messages?
  - e. Is there specific terms or words that you use or avoid when communication about climate change?
14. Do you feel that health professionals are effective messengers when it comes to climate change communication?
- a. Why or why not?
15. What role do you think health professionals should and can play when it comes to climate change?
- a. Do you feel the role of the health professional needs to be emphasized more strongly in climate action and communication?
16. What are some ways to increase awareness and improve communication of climate change health impacts among current and future health professionals?
- a. Should health professionals be provided more opportunities for professional development relevant to environmental health and climate change throughout their career?
  - b. Should there be a larger focus on environmental health and climate change within curriculum during university education for students?
    - i. During interprofessional education for professionals?
  - c. Are there voices that are missing that would be beneficial towards progress on climate mitigation and strengthening the role of health care professionals?
17. Are there other ways health professionals could be engaging with these issues of climate change that they currently are not?
- a. What can be done immediately?
  - b. What can be done differently?
  - c. What can be improved upon?

### **Recruitment – other potential interviewees**

18. Are there other colleagues or organizations you can think of that may be interested in participating in this research?

### **Demographic Information**

19. Can you give me an approximate range of your age?
20. What is your race or ethnicity?
21. How do you define your gender?



## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

22. What is your job title?

23. What organization do you work for?

**Appendix II - Research Ethics Board Information letter**

Health professionals and climate change communication:  
An exploratory study in Northern Ontario

**Project Lead:** Robert Sanderson  
Lakehead University - Department of Health Sciences

Dear Potential Participant,

You are invited to participate in a research project entitled “**Health professionals and climate change communication: An exploratory study in Northern Ontario**”. The aim of this study is to explore how health professionals communicate the health impacts of climate change and health co-benefits of mitigation action in Northern Ontario. The study aims to interview a diverse group of health professionals working in a variety of roles, who possess a range of experiences in relation to communicating impacts of climate change on health.

You are being requested to participate in this study because you have experience working in Northern Ontario as a health professional and a climate-health leader. We believe that your experiences will help us learn more about climate change communication and engagement, and the way health professionals can engage with the issue of climate change.

**Why is this research important?**

Appropriate, immediate action is imperative to address the problem of climate change, however significant climate inaction still exists despite our ever-increasing understanding and knowledge of climate change. Research aimed at understanding the cause of this inaction or ‘action deficit’, has identified inadequate climate change communication as an important contributing factor. Previous research has demonstrated that the perceived credibility, trustworthiness, and knowledge of the individual delivering the message may impact how the climate change information is interpreted and utilized. Recent studies have focused on health professionals as a reliable, trusted source of knowledge to convey messages around climate change. Findings from this research will be used to further understanding of how health professionals engage with the issue of climate change and as a foundation for future studies on strengthen the of role health professionals in addressing the issue of climate change.

**What is involved in the study?**

If you agree to voluntarily participate in this research, this will involve one interview on the topic of climate change, with a focus on climate change communication and climate change impacts on health. The interview will be approximately 45-60 minutes in length and conducted over the telephone or face-to-face. With your permission, the interview will be audio-recorded.

**Are there any risks to participating in this study?**

There are risks and potential harm that may result from participating in this study, however actions have been taken to minimize the potential risks. Climate change may often be perceived as a politicized topic, with various opinions and ideas held by various groups. Discussing climate change may go against employee regulations to avoid discussing potentially controversial topics. All participants will be offered confidentiality to prevent potential harm to their person or their reputation in instances of potential differing views between participants and their employers or colleagues. All recordings will be given a participant identification code to preserve confidentiality. Participation is voluntary, and all participants have the ability to withdraw from the study up until data submission. Participation in the study will require an approximate 45 to 60 minute time commitment, which may cause an interruption or inconvenience to the participant. There are no costs for participants. Finally, the topic of climate change may be upsetting to participants and may elicit negative emotions.

## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

### **Are there any benefits of participating?**

There are no direct benefits to participating in the study, although you may enjoy sharing your views and experiences on the topic, and feel fulfillment from contributing to the study. Indirectly, the research will add to existing literature on the topic of climate change communication and hopefully positively impact communities in Northern Ontario through a greater understanding of the challenges this region faces with regards to climate change. Additionally, this research will provide a greater understanding of climate change communication surrounding health impacts and co-benefits and aid in identifying opportunities to improve climate change communication and engagement, and identify opportunities for strengthening the role of health professionals in climate action.

### **Who will know what I said or did in the study?**

Should you agree to participate in this study, you will be participating confidentially. We will not use your name or any potentially identifying information in any study materials or reports. You will be assigned a unique study number as a participant in this study. Only this number will be used on any research-related information so that your identity (i.e., your name or any other information that could identify you) will be kept confidential. No one but the primary research investigator will know whether you were in the study and what you said during the interviews. If you choose to, you will have the opportunity to review the transcript of your interview.

Data collected during this study will be kept on a password-protected computer in a locked and secure office space in Lakehead University's Department of Health Sciences. De-identified data will be stored on a secure online environment, accessible only by the primary research investigator and the supervising committee. Data will be stored for 5 years after the completion of the study at which time it will be destroyed by removing computer files from the hard drive and shredding hard copies of data.

### **Informed consent and rights**

Your participation in this study is voluntary and you have the right to refuse to participate. If you decide to participate, you may still choose to withdraw from the study for whatever up until the data has been published. There are no consequences to withdrawing from the study. In cases of withdrawal, any data you provided will be destroyed. You may also decline to answer any questions.

### **How do I find out what was learned in this study?**

The study results are expected to be available in August 2019. The project will be condensed into a summary report that will be distributed openly to all interested individuals. You will not be identified along with the information. A summary report of the final results will be sent to the email you provide in the consent form.

### **Who can you contact if you have questions about the study?**

If you have questions or need more information about the study itself, please contact the principal Investigator, Robert Sanderson at: [rfsander@lakeheadu.ca](mailto:rfsander@lakeheadu.ca) **OR (705) 774 - 4791**

This study has been approved by the Lakehead University Research Ethics Board. If you have any questions or concerns related to the ethics of the research and would like to speak to someone outside of the research team please contact Sue Wright at the Lakehead University Research Ethics Board (email: [research@lakeheadu.ca](mailto:research@lakeheadu.ca) or tel: 807-343-8283)

**THANK YOU** for your participation and your time.

|   |   |
|---|---|
| <b>Robert Sanderson</b><br>MHS. Candidate<br>Department of Health<br>Sciences, Lakehead<br>University | <b>Dr. Lindsay Galway</b><br>Assistant Professor,<br>Department of Health<br>Sciences, Lakehead<br>University |
| <a href="mailto:rfsander@lakeheadu.ca">rfsander@lakeheadu.ca</a><br>705-774-4791                      | <a href="mailto:lgalway@lakeheadu.ca">lgalway@lakeheadu.ca</a><br>807-766-7280                                |

**Appendix III - Research Ethics Board Consent Form**

**Title of the study:** Health professionals and climate change communication: An exploratory study in Northern Ontario

**Study team:**

|  |   |
|--|---|
| <b>Robert Sanderson</b><br>MHS. Candidate<br>Department of Health<br>Sciences, Lakehead<br>University<br><br>rfsander@lakeheadu.ca<br>705-774-4791 | <b>Dr. Lindsay Galway</b><br>Assistant Professor,<br>Department of Health<br>Sciences, Lakehead<br>University<br><br>lgalway@lakeheadu.ca<br>807-766-7280 |
|--|---|

Taking part in this study is entirely up to you. You have the right to refuse to participate in this study. If you decide to take part, you may choose to withdraw from the study at any time up until the date the data are published without giving a reason and without any negative consequence to you. Your signature below indicates that you have received a copy of this consent form for your own records and that you consent to participate in this study.

- You have read and understood the information letter.
- You freely consent to participate.
- You are older than 18 years of age.
- You have had the opportunity to ask questions and have received satisfactory responses.
- You understand that participation in this study is voluntary and that you are free to refuse to participate or to withdraw from this study without negative consequences.
- You understand that all potential identifying information will be kept confidential.
- You understand that information that you provide during this study may be used in a report and/or publication but you will not be identified.
- You have received a copy of this form for your own records.
- You understand that the data you provide will be securely stored at Lakehead University for a minimum of 5 years following completion of this study.

You agree that the interview session can be audio-recorded.  Yes  No  
Would you like to receive a summary of the study results?  Yes  No  
Would you like to review a transcript of your interview?  Yes  No

Please send study results and/or interview transcript to me at this email or mailing address:

Email: \_\_\_\_\_

I agree to be identified by name as a participant in this study and understand that by initialing, I am waiving my right to confidentiality. I allow for my comments to be associated with my name in the study results, and in future publications and presentations (Initial): \_\_\_\_\_

\_\_\_\_\_  
Participant Name (Printed)

\_\_\_\_\_  
Participant Signature

\_\_\_\_\_  
Date

*If you have any questions or concerns about this study, please contact Robert Sanderson (705-774-4791, or rfsander@lakeheadu.ca). If you have questions about your rights as a research participant in general, please contact Sue Wright at the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.*

**Appendix IV – Participant Recruitment Email**

**Email subject line:** Volunteers needed for research study on health professionals and climate change communication

**Email text:**

Dear potential participant,

**Are you a health professional and interested in sharing your thoughts about climate change communication?**

**We want to hear from you!**

We invite you to participate in a research project entitled “**Health professionals and climate change communication: An exploratory study in Northern Ontario**”. An objective of this study is to learn how and why health professionals engage with the issue of climate change. We hope to describe key trends and issues among health professionals working in Northern Ontario with respect to their knowledge, concern and communication about climate change. Results from the study will add to the nearly non-existent literature on climate change communication in Northern Ontario and be used to strengthen the role of health professionals in addressing the complex issue of climate change.

**Your participation will involve:**

- Participating in an interview approximately 45-60 minutes in length (over the telephone or face-to-face as appropriate)

If you are interested in participating in this study, please send an email to the research team at **rfsander@lakeheadu.ca** or call Robert Sanderson at **705-774-4791** to learn more about the study and to set up an interview time should you choose to participate. Interviews will be conducted by Robert Sanderson. Participation is entirely voluntary and confidential.

Thank you for considering participation in this research.

Sincerely,

**Robert Sanderson**  
MHS. Candidate  
Department of Health  
Sciences, Lakehead  
University

**Dr. Lindsay Galway**  
Assistant Professor,  
Department of Health  
Sciences, Lakehead  
University

rfsander@lakeheadu.ca  
705-774-4791

lgalway@lakeheadu.ca  
807-766-7280

**Appendix V – Participant Sensitizing Template**

Time (Start): (End):

Date:

Location:

Observer:

Participant ID:

Interview conducted:

In-person

via telephone

via video chat

Other : \_\_\_\_\_

| Time | Descriptive Notes | Reflective Notes |
|------|-------------------|------------------|
|      |                   |                  |

Observational Notes:

Observational Notes:

- What setting is the interview being conducted in?
  - o Is there evidence of climate-health activism?
    - Posters? Flyers?
  - o Is there evidence of involvement in the community?
  
- In the interview...
  - Does their tone reflect the theme of the discussion?
  - Are they elaborating in their responses or giving short answers?
  - Are they keeping the conversation moving?
  - Do they appear confident in their knowledge and abilities?
  - What is their body language? Alert? Laid-back?
    - Does it change throughout the interview? If so, when?
    - Do they maintain eye contact?
    - Do they use hand gestures?
  - Are they focused on the conversation?

# HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

## Example of observational notes

**Appendix V – Participant Sensitizing Template**

Time (Start): 11:15 (End): 1:00  
 Date: Dec 3<sup>rd</sup>, 2018  
 Location: Sudbury  
 Observer: Rob Sanderson  
 Participant ID: Participant 5

Interview conducted:  
 In-person  
 via telephone  
 via video chat  
 Other: \_\_\_\_\_

Type of Action

organized →

- Petition (across N. ont)
- climate strikes
- Individual action
- Grand rounds
- Individual conversation (outside of work)

| Time  | Descriptive Notes   | Reflective Notes   |
|-------|---|--|
| 11:15 | low-impact house<br>↳ EV<br>↳ solar panel<br>↳ Veg garden.  | strong examples of personal action                                       |
| 11:42 | visibly concerned<br>↳ seriousness<br>↳ passionate.   | strong personal connections  |
| 11:46 | Frustration in tone<br>re: lack of larger action (high level)<br>↳ Dejection (somber) in regards to Northern Pop. concern & leadership priorities | climate change politicization complicates issues leads to hopelessness   |
| 12:20 | Action = optimism<br>↳ talking about action shifted tone and energy in conversation   | Passion & care<br>key traits<br>↳ needed to push action & create channel |

## Appendix VI – Literature Search Summary

| Database | Search Details   | Results |
|----------|--|---------|
| PubMed   | climate change communication   | 892     |
|          | ("climate change") AND communication   | 641     |
|          | ((("climate change") AND communication)) AND health impacts                              | 52      |
|          | (((((("climate change") AND communication)) AND health impacts)) AND health[MeSH Terms]) | 23      |

| Database | Search Details   | Results |
|----------|--|---------|
| PubMed   | (climate change[MeSH Terms])   | 14,235  |
|          | (climate change[MeSH Terms]) AND health  | 2,544   |
|          | ((climate change[MeSH Terms]) AND health)) AND impacts                                 | 641     |
|          | (((((climate change[MeSH Terms]) AND health)) AND impacts)) AND health professionals   | 42      |
|          | (((((climate change[MeSH Terms]) AND health)) AND impacts)) AND "health professionals" | 17      |

| Database | Search Details  | Results |
|----------|---|---------|
| PubMed   | climate change[MeSH Terms]  | 14,235  |
|          | (climate change[MeSH Terms]) AND knowledge, attitudes, practice[MeSH Terms]                       | 55      |
|          | ((climate change[MeSH Terms]) AND knowledge, attitudes, practice[MeSH Terms])) AND health impacts | 13      |

| Database       | Search Details   | Results |
|----------------|--|---------|
| Science Direct | climate change   | 510,750 |
|                | "climate change" "climate change communication"                  | 189     |
|                | "climate change" "climate change communication" "impacts"        | 176     |
|                | "climate change" "climate change communication" "health impacts" | 20      |

| Database               | Search Details   | Results |
|------------------------|--|---------|
| EBSCO Searching CINAHL | Climate change   | 2,036   |
|                        | Climate change AND health  | 1,079   |
|                        | Climate change AND health AND impacts and effects                          | 137     |
|                        | Climate change AND health AND impacts and effects AND health professionals | 6       |

| Database       | Search Details   | Results |
|----------------|--|---------|
| Web of Science | Climate change   | 262,289 |
|                | Climate change AND Health impacts                          | 6,376   |
|                | Climate change AND Health impacts AND Health professionals | 187     |



HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

|  |  |    |
|--|--|----|
|  | Climate change AND Health impacts AND Health professionals AND communication | 22 |
|--|--|----|

**Appendix VII – Research Ethics Board Researcher’s Agreement Form**

**Research Ethics Board Researcher's Agreement Form**

**Project Info.**

**File No:** Ref No : 5404

**Project Title:** Health professionals and climate change communication: An exploratory study in Northern Ontario

**Principal Investigator:** Mr. Robert Sanderson (Health and Behavioural Sciences\Health Sciences)

**Start Date:**

**End Date:**

**Keywords:** climate change, communication, healthcare professionals

**Project Team Info.**

**Principal Investigator**

**Prefix:** Mr.

**Last Name:** Sanderson

**First Name:** Robert

**Affiliation:** Health and Behavioural Sciences\Health Sciences

**Rank:** STU

**Email:** rfsander@lakeheadu.ca

**Phone1:** 7057744791

**Phone2:**

**Fax:**

**Primary Address:** 315 Dawson Street, Thunder Bay Ontario, P7A 3T9

**Institution:** Lakehead University

**Country:** Canada

**Comments:**

**Other Project Team Members**

| Prefix | Last Name | First Name | Affiliation | Role In Project | Email |
|--------|-----------|------------|-------------|-----------------|-------|
|--------|-----------|------------|-------------|-----------------|-------|

## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

|     |         |         |   |                  |  |
|-----|---------|---------|---|------------------|--|
| Dr. | Levkoe  | Charles | Health and Behavioural Sciences\Health Sciences | Co- Investigator | <a href="mailto:clevkoe@lakeheadu.ca">clevkoe@lakeheadu.ca</a>   |
| Dr. | Berger  | R. Paul | Education\Education                             | Co- Investigator | <a href="mailto:rpberger@lakeheadu.ca">rpberger@lakeheadu.ca</a> |
| Dr. | Galway  | Lindsay | Health and Behavioural Sciences\Health Sciences | Co- Investigator | <a href="mailto:lgalway@lakeheadu.ca">lgalway@lakeheadu.ca</a>   |
| Dr. | Moeller | Helle   | Health and Behavioural Sciences\Health Sciences | Co- Investigator | <a href="mailto:hmoeller@lakeheadu.ca">hmoeller@lakeheadu.ca</a> |

### Common Questions

#### 1. General Information

| #   | Question   | Answer                      |
|-----|--|-----------------------------|
| 1.1 | Type of Participants:  | Adults                      |
| 1.2 | Estimated Enrollment (#):  | 20                          |
| 1.3 | Where will the research be conducted?  | Local (outside of campuses) |
| 1.4 | Have you received approval, or are you seeking approval from any other ethics committee? | No                          |
| 1.5 | If "Yes", which Ethics Committee(s)?   |                             |
| 1.6 | Is this project's funding administered through Lakehead University?                      | No                          |
| 1.7 | Is this project's funding administered outside of Lakehead University?                   | No                          |
| 1.8 | If funded, Name of Granting Agency:  |                             |

#### 2. Preliminary Checklist

HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

| #    | Question  | Answer |
|------|---|--------|
| 2.1  | Will your study involve more than minimal physical risk to your participants? (For a definition of minimal risk, see TCPS2, Chapter 2, Section B.)  | No     |
| 2.2  | Will your study involve the use of high-risk test instruments, i.e. surveys that may reveal that the participant intends to participate in dangerous activities such as self harm or harm to others?  | No     |
| 2.3  | Will your study involve more than minimal psychological risk to your participants?  | No     |
| 2.4  | Will your study likely lead to the discovery of your participants' involvement in illegal activities?   | No     |
| 2.5  | Will your study involve participants who are members of vulnerable populations?   | No     |
| 2.6  | If "Yes" to any of the above, please elaborate briefly:   |        |
| 2.7  | Will your study involve clinical research? (Click blue (i) for a definition of clinical trial.)   | No     |
| 2.8  | If "Yes", please elaborate briefly:   |        |
| 2.9  | Will your study involve First Nation, Metis and/or Inuit (FNMI) peoples as a "scheduled" representative group in the research? (Click blue (i) for a definition of "scheduled".)  | No     |
| 2.10 | If "Yes", describe your collaboration or community engagement plan for guiding and monitoring the research with appropriate Aboriginal (FNMI) groups, including how the community has been engaged and plans for future engagement. For FNMI people residing outside of First Nations communities (ie. in urban centres), a similar plan of |        |

## HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

|      |  |     |
|------|--|-----|
|      | engagement with a representative FNMI group is required.   |     |
| 2.11 | Will your study involve, effect or impact Aboriginal (FNMI) peoples as an "incidental" representative group in research? (Click on blue (i) for a definition of "incidental".)   | No  |
| 2.12 | If "Yes", please refer to TCPS 2, Article 9.2 and indicate your awareness of how your study may involve or impact FNMI peoples, in the short or long term. Demonstrate awareness by describing how your study will involve, effect or impact FNMI peoples. For example, is there a benefit of FNMI peoples in the longer-term research outcomes? |     |
| 2.13 | I confirm that if I become aware that my participant pool contains a sizeable proportion of FNMI participants, I will advise the REB of my new research situation by submitting an amendment/addition through the Romeo Research Portal.   | Yes |

### 3. Research Ethics Review Criteria

| #   | Question  | Answer   |
|-----|---|--|
| 3.1 | LAY DESCRIPTION:<br>Provide a brief lay-word summary of the proposed project (40 words or less, similar to the statement you would prepare for a granting agency for public dissemination). | This project will explore, through the use of semi-structured interviews, how health professionals, working in Northern Ontario, communicate the health impacts of climate change and health co-benefits of climate mitigation action.                   |
| 3.2 | SUMMARY OF PURPOSE OF RESEARCH: Be sure to include sufficient   | The overarching goal of this research is to examine how health professionals perceive and communicate the health impacts of climate change and the health co-benefits of climate change mitigation. The study will aim to achieve the following specific |

HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

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|------------|---|--|
|            | <p>detail, described in terms that do not require extensive field-specific knowledge. Include your research question(s).</p>              | <p>objectives: 1. To describe trends and key issues among health professionals with respect to their knowledge, perceptions, and concerns, in relation to climate change. 2. To identify how and why health professionals communicate and engage with the issue of climate change. 3. To develop practical and applicable recommendations to improve climate change communication in order to inspire and support new health leaders. 4. To identify opportunities for strengthening the role of health professionals in climate change mitigation activities.</p>   |
| <p>3.3</p> | <p><b>RESEARCH PARTICIPANTS:</b><br/>Describe required characteristics and number of participants. (See (i) for further information).</p> | <p>This study will aim to recruit and interview a total of 20 participants. Research participants must identify as a health professional or allied health professional with experience working in Northern Ontario (WHO, 2010). This includes, but is not limited to, primary care providers such as physicians, nurses, and nurse practitioners, in addition to other allied health professionals such as dietitians, environmental health inspectors, and public health practitioners. This criterion was chosen as it ensures the participant is accessible and trusted in a role to share information around health outcomes with clients or the general public. In addition, participants must be active ‘climate change leaders’ which, informed by the Climate for Health Initiative, I define as those individuals who are engaged and committed to advancing climate change solutions to protect health (Krygsman &amp; Speiser, 2016). This could be demonstrated in many ways, such as through practicing medicine in a way that is informed by climate change, involvement in continuing education relevant to climate change, advocating for climate mitigation initiatives, or even simply leading by example. Whether the participants are educating communities to increase awareness, informing individuals to further understanding, or advocating for policy to support climate solutions, there is a diverse range of ways participants could engage with climate change and therefore be defined as an active climate change leader. World Health Organization (2010). Classifying health workers: Mapping occupations to the international standard classification. Retrieved from <a href="http://www.who.int/hrh/statistics/Health_workers_classification.pdf">http://www.who.int/hrh/statistics/Health_workers_classification.pdf</a> Krygsman, K., &amp; Speiser, M. (2016). Let’s Talk Health and Climate: Communication Guidance for Health Professionals. Washington DC: Climate for Health. Retrieved from <a href="http://climateforhealth.org/lets-talk">http://climateforhealth.org/lets-talk</a></p> |
| <p>3.4</p> | <p><b>DATA COLLECTION:</b><br/>Explain the method of data collection</p>  | <p>Interviews will last approximately 45 to 60 minutes and with consent, be recorded to allow for transcription upon interview completion. The interview guides will direct the conversation and</p>   |

HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

|     |  |   |
|-----|--|---|
|     | <p>and analysis. Explain exactly what will be expected of participants (length of time commitment, etc.) All questionnaires and research instruments must be included as appendices. (See (i) for further information).</p>  | <p>will be pre-tested with one medical student and one student in the Master of Health Sciences program at Lakehead University to ensure clarity of questions and appropriate length of time commitment. I will have the ability to take notes throughout the interview, however attention to the participant will be a priority allowing for a natural interview, without interruptions. Interviews will be scheduled to take place in person whenever possible. I will travel to the work location of the participant to better understand the place-based context which they live and practice in. Observations of the setting and participant body language will be recorded throughout the interview, using the participant sensitizing framework as a template. Alternatively, if unable to arrange an in person meeting, interviews will be conducted over the telephone. Following each interview, I will immediately make notes on reoccurring themes and personally reflect on the completed interview, evaluating what went well and what could be improved. These notes will be used to improve delivery of subsequent interviews. Upon completion, the interview recordings and notes will be imported to the qualitative software package NVivo. Data analysis will be conducted using a thematic analysis approach. Patterns and themes consistently identified within the interviews will be connected to build a foundation for the research question. The analysis will focus on understanding and extracting the meaning of participants' thoughts, experiences, and actions, rather than simply explaining the syntax. Participant observations will be used to establish context for individual participants and analysed separately from the interview recording.</p> |
| 3.5 | <p><b>SECONDARY DATA:</b><br/>For research involving the use of secondary data (data which has been previously collected for a purpose other than the research project itself), REB review is not required if the data is anonymized so long as the process of data linkage or recording or dissemination of</p> |   |

HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

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|            | <p>results does not generate identifiable information (see TCPS 2, Chapter 2, Article 2.4). For secondary data that is identifiable, please see TCPS 2, Chapter 5, Section D.</p> |  |
| <p>3.6</p> | <p><b>RECRUITMENT PROCEDURES:</b><br/>Describe how potential participants will be selected and contacted. Include a copy of any advertisements used to recruit participants.</p>  | <p>Participants will be recruited through the use of a purposive sampling strategy, specifically using a technique called heterogeneous sampling (Patton, 2015). To allow for a diversity of experiences and perspectives between health professionals, participants selected will work in a wide variety of health occupations, including those who provide more of an acute care focus as well as those who work with preventative goals. Snowball sampling will then be conducted once preliminary interviews are completed, where participants will be asked if they have any recommendations for potential participants, who will then be contacted via email (Ungvarsky, 2017). The term allied health professionals will be used which, by definition, encompasses a broad range of health professionals, distinct from medicine and nursing, that work to identify, evaluate and prevent disease (Colbert, 2010). Professions contained within the classification of allied health include dietitians, environmental health officers, public health practitioners, epidemiologists, health educators and many more. Ten participants will meet the criteria of an allied health professional, and the remaining ten will be health professionals such as doctors and nurses. Participants within the same category of classification (i.e. allied health professional, dietitian) will work in different geographic locations, and hold different positions to allow for a variety of experiences that will provide a more representative sample and reduce answer bias. Using previously established connections, as well as the examination of recent publications, presentations, and reports, health professionals who are engaged with climate change will be identified as potential participants and contacted via email. In addition, I will contact research institutions via email that are actively involved in climate change, seeking external referrals to relevant community health professionals. Contacts within local public health units will act as a knowledge source for connecting with allied health professionals. All potential participants will be contacted using the recruitment email, and sent the information</p> |



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|     |  |   |
|-----|--|---|
|     |  | <p>letter and consent form, informing them of the goals and importance of the project. Colbert, J. (2010). Allied Health Professionals. ASAHP - The Association of Schools of Allied Health Professionals. Patton, M. (2015). Qualitative Research &amp; Evaluation Methods (4th ed.). Retrieved from <a href="https://us.sagepub.com/en-us/nam/qualitative-research-evaluation-methods/book232962">https://us.sagepub.com/en-us/nam/qualitative-research-evaluation-methods/book232962</a></p> <p>Ungvarsky, J. (2017). Snowball sampling. Salem Press Encyclopedia.</p>   |
| 3.7 | <p>HARM and/or POTENTIAL RISKS to PARTICIPANTS: (a) State clearly any potential harm or risks - physical, psychological, injury to reputation or privacy, and breach of any relevant law - for participants or for third parties (those affected by the research but who are not active research subjects); (b) If there is any apparent or potential harm or risk, clearly explain all steps that are being taken to reduce this.</p> | <p>The foreseeable risks and potential harm from participating in this study have been minimized. All recordings will be given a participant identification code to preserve confidentiality. Participant's names will not be used or any potentially identifying information in any study results, reports or presentations, unless specifically waived on the consent form. Climate change is often closely linked to political controversy and discussing climate change may violate employee regulations or contracts. The confidentiality of all participants will be ensured to prevent injury to reputation in instances of potential differing views between participants and their employers or colleagues. Participation is voluntary, and all participants have the ability to withdraw from the study up until data submission. During all publications and presentations of the research, participants will remain anonymous, referring only to their participant identification code, unless otherwise specified in the consent form. Participation in the study will require an approximate 45 to 60 minute time commitment, which may cause an interruption or inconvenience to the participant. There are no costs for participants. Finally, the topic of climate change may be upsetting to participants and may elicit negative emotions. Participants may choose not to answer any question and will be clearly informed of this right to reduce the risk of upsetting the participant and making them feel uncomfortable.</p> |
| 3.8 | <p>DECEPTION: If deception is part of the research program, the researcher must: (a) State clearly why no alternative methodology, which does not involve deception, can fruitfully be used to answer the research question; (b) Provide</p>   | <p>There is no deception as part of the research project.</p>   |

HEALTH PROFESSIONAL CLIMATE CHANGE COMMUNICATION

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|------|---|---|
|      | evidence that the participant is not put at risk by the deception. If appropriate, provide a debriefing letter to participants disclosing the deception.  |   |
| 3.9  | <b>BENEFITS to PARTICIPANTS and/or SOCIETY:</b><br>Describe in detail the potential benefits of the research for both participants and to general knowledge.  | There are no direct benefits to participating in the study, although you may enjoy sharing your views and experiences on the topic, and feel fulfillment from contributing to the study. Indirectly, The research will add to existing literature on the topic of climate change communication and hopefully positively impact communities in Northern Ontario through a greater understanding of the challenges this region faces with regards to climate change. Additionally, this research will provide a greater understanding of climate change communication surrounding health impacts and co-benefits and aid in identifying opportunities to improve climate change communication and engagement, and identify opportunities for strengthening the role of health professionals in climate action.  |
| 3.10 | <b>INFORMED CONSENT:</b> Clearly outline the measures that will be used to ensure the informed consent of all research participants. Cover letters and consent forms must be attached as appendices on Lakehead University (or NOSM if appropriate) letterhead. | Participation in the study is voluntary and participants have the right to refuse to participate. Consent will be obtained prior to conducting each interview, through the signing of the consent form acknowledging that they understand the information letter and they agree to the interview being recorded. Participants will receive their interview recording and completed transcript to review by email from the PI through the email they provided on the consent form. Participant identity will remain confidential throughout the report, however participants will be given the option to waive their right to confidentiality by providing a specified signature clearly indicated on the consent form. Up until final submission of my thesis, participants will have the ability to exclude their comments and participation in the study. There are no consequences to the participant for withdrawing from the study and all data provided will be destroyed. However, once the final thesis is submitted, all comments are final. |
| 3.11 | <b>CAPACITY TO CONSENT:</b> Capacity refers to the ability of prospective or  | Yes   |

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|                  |   |   |
|------------------|---|---|
|                  | <p>actual participants to understand relevant information presented about a research project, and to appreciate the potential consequences of their decision to participate or not participate (TCPS 2, Chapter 3, Section C). Will the research participants sufficiently understand the nature of the research project, and the risks, consequences, and potential benefits associated with it?</p> |   |
| <p>3.1<br/>2</p> | <p>If "No", please state why this vulnerable group is necessary to the study, and elaborate on the consent process (i.e. parental consent, caregiver consent).</p>  |   |
| <p>3.1<br/>3</p> | <p>RIGHT TO WITHDRAW: The researcher must illustrate that participants will be informed of their right to withdraw from the study at any time without penalty of any kind, and that they may choose not to answer any question</p>  | <p>Yes, but only up until the point of submission of data</p> |

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|                  |   |  |
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|                  | <p>asked as part of the research. For participants submitting information anonymously, the participants must be informed that withdrawal post-submission is not possible due to the anonymous nature of their data. Will the participants have the right to withdraw?</p>   |  |
| <p>3.1<br/>4</p> | <p>If "No", please elaborate:</p>   |  |
| <p>3.1<br/>5</p> | <p><b>ANONYMITY and/or CONFIDENTIALITY:</b><br/>The researcher must outline the procedures that will be used to guarantee confidentiality and/or anonymity for participants. Participants who wish to be named and to waive their right to privacy and confidentiality must provide written evidence. (Click blue (i) for definitions.)</p> | <p>Participants will be given a participant identification number, which they will be referred to as to preserve confidentiality throughout the project. The cypher to the code will be kept on a locked computer on an encrypted file, only accessible by the PI. Only the participant identification number will be used on any research-related information so that the participant identity (i.e., their name or any other information that could identify them) will be kept confidential. During the transcription of the recorded interview, all identifying information will be removed or switched, such as changing the name of the participant to their participant identification code. Participants who express a desire to waive their right to privacy and confidentiality will provide written evidence on the consent form.</p> |
| <p>3.1<br/>6</p> | <p><b>STORAGE of DATA:</b><br/>Detail how the data will be securely stored for a minimum of 5 years following completion</p>  | <p>Data collected during this study will be kept on a password-protected computer in a locked and secure office space in Lakehead University's Department of Health Sciences. De-identified data will be stored on a secure online environment (Sync secure cloud storage), accessible only by the primary research investigator and the supervising committee. Data will be stored for 5 years after</p>  |

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|                  |   |   |
|------------------|---|---|
|                  | <p>of the research, at Lakehead University, as per Lakehead University policy.</p>  | <p>the completion of the study at which time it will be destroyed by removing computer files from the hard drive and shredding hard copies of data.</p>   |
| <p>3.1<br/>7</p> | <p>PEER REVIEW: State the intention, or non-intention to have the proposal peer reviewed by an external granting agency or thesis committee, if appropriate. If the REB determines the project to be of more than minimal risk, peer review may be required by the addition of ad-hoc members to the REB, even if the granting agency for the project does not require this, or if the project is not funded.</p> | <p>The proposal will be peer reviewed by my thesis committee.</p>   |
| <p>3.1<br/>8</p> | <p>RESEARCH PARTNERS and STUDENTS: Clearly state whether or not the research will involve student researchers or if the research will involve researchers at another university/institution . TCPS2 Tutorial Certificates for all research partners and students must be attached.</p>  | <p>This project is being completed as a partial requirement of my Master of Health Science degree, and therefore will involve myself as a student researcher. No other students will be involved in the project as research partners. The project will not involve researchers from other universities or institutions.</p> |

|                  |  |  |
|------------------|--|--|
| <p>3.1<br/>9</p> | <p>MULTI-JURISDICTION RESEARCH: If you are involved in multi-jurisdictional research, provide evidence that ethical approval is also being sought at any other institution where direct research with human participants will be undertaken. Ethical approval from another institution, while essential in a multi-jurisdiction project, is not itself sufficient for the commencement of research with human participants at Lakehead University.</p> |  |
| <p>3.2<br/>0</p> | <p>CONFLICT of INTEREST: Disclose any real, perceived or potential conflicts of interest (professional, personal or financial) to the Research Ethics Board. NOTE: It is preferable to avoid or prevent being in a conflict of interest, when possible. When it is not possible to avoid a conflict of interest, then it should be disclosed to the appropriate people and steps taken to</p>  | <p>This research project is being completed in partial fulfillment of my Master of Health Science degree and could be viewed as a conflict of interest. Although I am genuinely interested in this project and topic area, I must complete this project to graduate, which presents another interest for conducting this research.</p> |

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|          |  |  |
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|          | minimize or manage the conflict.   |  |
| 3.2<br>1 | DISSEMINATION of RESEARCH RESULTS:<br>Clearly state the means by which the research will be disseminated and by which research participants may be made aware of the findings of the study.  | In addition to my thesis, I intend to condense my project into a report that will be distributed openly by email to all participants. I will seek out opportunities to present my work at conferences and poster presentations with specific attention made to share with communities who are directly involved or affected by my project. |
| 3.2<br>2 | I have completed the TCPS 2 Tutorial: Course on Research Ethics (CORE) and have attached a copy of my completion certificate to this application. *Please note that all investigators listed on this application must submit their certificates.                                   | Yes  |
| 3.2<br>3 | I am familiar with the Agreement on the Administration of Agency Grants and Awards by Research Institutions, and the Tri-Council Policy Statement 2: Ethical Conduct for Research Involving Humans and I agree to comply with these guidelines, and the procedures approved by the | Yes  |

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|          | REB, in carrying out this proposed research.  |     |
| 3.2<br>4 | I attest that all information submitted to the REB is complete and truthful. I understand the consequences, for myself and for the institution, of failure to comply with the above regulations.  | Yes |
| 3.2<br>5 | Researchers are required to report to the REB any changes in research design, procedures, sample characteristics, and so forth that are contemplated after REB approval has been granted. Changes may not be implemented until approved by the REB. If any unforeseen incident occurs during the course of research that may indicate risk to participants, I will immediately cease research and inform the REB. | Yes |
| 3.2<br>6 | I understand that my protocol will be subject to random review for compliance by the  | Yes |



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|          | Office of Research Services.  |     |
| 3.2<br>7 | I will inform the REB when the research is complete by completing the Final Report Form (see New Event Forms in the Romeo Research Portal). | Yes |

**4. Informed Consent Checklist (to assist Applicants)**

| #   | Question   | Answer |
|-----|--|--------|
| 4.1 | General  |        |
| 4.2 | The Cover Letter/Introductory Information (including electronic letters and consent forms) should include: |        |
| 4.3 | The Consent Form must state each individual's agreement that:  |        |
| 4.4 | Other Consent Information  |        |

**Attachments**

| Doc / Agreement            | Version Date | File Name  | Description                 |
|----------------------------|--------------|--|-----------------------------|
| Supporting Documents (REB) |              | Researcher's Agreement Form - Health professionals and climate change communication - Robert Sanderson.pdf | Researcher's Agreement Form |
| Supporting Documents (REB) |              | Consent Form - Health professionals and climate change communication - Robert Sanderson.docx               | Consent Form                |

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|                            |  |   |   |
|----------------------------|--|---|---|
| Supporting Documents (REB) |  | Participant Recruitment Email - Health professionals and climate change communication - Robert Sanderson.docx     | Participant Recruitment E-mail                        |
| Supporting Documents (REB) |  | Participant Information Letter- Health professionals and climate change communication - Robert Sanderson.docx     | Information Letter                                    |
| Supporting Documents (REB) |  | Interview Guide - Health professionals and climate change communication - Robert Sanderson.docx                   | Interview Guide                                       |
| Supporting Documents (REB) |  | Participant Sensitizing Framework - Health professionals and climate change communication - Robert Sanderson.docx | Participant Sensitizing Framework (Observation Guide) |
| TCPS Certificate           |  | tcps2_core_certificate.pdf  | TCPS 2 Certificate of Completion - Robert Sanderson   |
| TCPS Certificate           |  | Helle Møller TCPS2.pdf  | TCPS 2 Certificate of Completion - Dr. Helle Møller   |
| TCPS Certificate           |  | Levkoe TCPS Certificate.pdf   | TCPS 2 Certificate of Completion - Dr. Charles Levkoe |
| TCPS Certificate           |  | tcps2_core_certificate_2016_LPG.pdf   | TCPS 2 Certificate of Completion - Lindsay Galway     |

**Appendix VIII – Research Ethics Board Approval**



Research Ethics Board  
t: (807) 343-8283  
research@lakeheadu.ca

November 5, 2018

**Principal Investigator:** Dr. Lindsay Galway  
**Co-Investigator:** Robert Sanderson  
Health and Behavioural Sciences\Health Sciences  
Lakehead University  
955 Oliver Road  
Thunder Bay, ON P7B 5E1

Dear Dr. Galway and Mr. Sanderson:

**Re: Romeo File No: 1466678**  
**Granting Agency: N/A**  
**Agency Reference #: N/A**

On behalf of the Research Ethics Board, I am pleased to grant ethical approval to your research project titled, "Health professionals and climate change communication: An exploratory study in Northern Ontario".

Ethics approval is valid until November 5, 2019. Please submit a Request for Renewal to the Office of Research Services via the Romeo Research Portal by October 5, 2019 if your research involving human participants will continue for longer than one year. A Final Report must be submitted promptly upon completion of the project. Access the Romeo Research Portal by logging into myInfo at:

<https://erpwp.lakeheadu.ca/>

During the course of the study, any modifications to the protocol or forms must not be initiated without prior written approval from the REB. You must promptly notify the REB of any adverse events that may occur.

Best wishes for a successful research project.

Sincerely,

A handwritten signature in cursive script, appearing to read "L. Chambers".

Dr. Lori Chambers  
Chair, Research Ethics Board

/sw

**Appendix IX – Research Ethics Board Renewal**

**Date:** November 05, 2019

**To:** Dr. Lindsay Galway, Primary Investigator

**From:** Dr. Kristin Burnett, Chair, Research Ethics Board

**Subject:** Renewal of REB Romeo #1466678

---

On behalf of the Research Ethics Board, I am pleased to grant *renewal of ethical approval* to your research project titled, "Health professionals and climate change communication: An exploratory study in Northern Ontario".

Ethics approval is valid for one year. A Request for Renewal can be applied for through the Romeo Research Portal. A Final Report must be submitted promptly upon completion of the project, also available through the Romeo Research Portal.

During the course of the study, any modifications to the protocol or forms must not be initiated without prior approval from the REB. You must also promptly notify the REB of any adverse events that may occur.

If you have any questions, please contact Sue Wright, Research Ethics & Administrative Officer.

Best wishes for continued success with your research project.

/sm

**Appendix X – Data Analysis Summary**

Description of analytical steps guided by Clarke and Braun (2006)

| <b>Analytical steps suggested by Clarke and Braun (2006)</b> | <b>Analytical steps taken within this study</b>   |
|--|---|
| <b>Familiarizing yourself with the data</b>                  | Interviews were transcribed and subsequently reviewed in conjunction with listening to the audio recording to ensure accuracy of transcription. Observational and auditory notes were re-examined to recall and further contextualize the data.   |
| <b>Generating initial codes</b>                              | Initial codes were constructed utilizing an inductive approach, wherein interesting and meaningful features of the data were identified. Generation of the initial codes followed a systematic approach, thoroughly examining the entire data set to identify all elements of interest and potential relevance, with a narrowed focus on explicit data content. |
| <b>Searching for themes</b>                                  | All initial codes were iteratively categorized and collated into larger units, which were further conceptualized into overarching themes. Examination of the linkages between initial codes and larger themes, provided an opportunity to critically explore the relationship between, and significance of each theme.  |
| <b>Reviewing themes</b>                                      | Themes were critically examined and refined, while reflecting on the study's objectives to ensure relevance and support of the larger goal of the study. Distinction between themes was improved, while also ensuring data comprised within each theme cohered.   |
| <b>Defining and naming themes</b>                            | The themes were subsequently defined, focusing on understanding and extracting the essence and relationship amongst themes to create a deeper interpretation in connection to the research objectives.  |
| <b>Reporting and synthesizing</b>                            | Co-authors engaged in a review and discussion of the theme classification and integration within the article.   |

**Appendix XI – Interview Reflective Notes**

An example of compiled reflective notes taken immediately after and while listening to recording of a completed interview. Reflective notes were handwritten, however to ensure legibility for this example, notes are presented typed below.

| Interpretation/Understandings/Take-away Messages from Interview   |
|---|
| Participant: 13   |
| <ul style="list-style-type: none"> <li>→ Compassion fatigue/vicarious trauma impacting health professionals in the fight against climate change</li> <li>→ Health professionals being pushed to push many agendas/ideas/products/treatments</li> <li>→ Administration viewing it as pushing an agenda, which may be too left or too right             <ul style="list-style-type: none"> <li>- Interesting that Doctors (often evidence based) still understand climate change as a political/politicised issue</li> </ul> </li> <li>→ Still many perceived barriers to climate change being incorporated into their work             <ul style="list-style-type: none"> <li>- Answering questions to their practice with personal examples</li> <li>- Change is possible, but larger, impactful change will require collective buy-in</li> </ul> </li> <li>→ Physicians using their trusted position outside of their practice, but need to integrate within practice</li> <li>→ Communication approaches should link people’s perceptions/knowledge/experiences to the ways in which they are involved             <ul style="list-style-type: none"> <li>- based on feeling of value</li> </ul> </li> <li>→ Hard for people to motivate to act towards long term prevention, which climate change used to be, but now it is becoming an immediate issue.             <ul style="list-style-type: none"> <li>- Must connect to local impacts / challenges and local opportunity for health and economic improvement</li> </ul> </li> <li>→ Northern Community design is not meant to be adapted for health co-benefits.</li> <li>→ Collective communication is needed             <ul style="list-style-type: none"> <li>- Upstream and downstream need to improve communication</li> <li>- More collaboration and knowledge sharing amongst health stakeholders</li> </ul> </li> </ul> |

## Appendix XI – Data Analysis Codebooks

## Paper #1 (Chapter 2)

| <b>Main Theme</b>                | <b>Sub-theme</b>                          | <b>Participants n (%)</b> |
|----------------------------------|---|---------------------------|
| <b>HP Awareness</b>              | Connection to health                      | 19 (100)                  |
|                                  | Complexity, interconnectedness            | 19 (100)                  |
|                                  | Level of concern, severity                | 13 (68.4)                 |
|                                  | Perception of other's awareness           | 3 (15.8)                  |
| <b>Health Impacts of Concern</b> | Direct Impacts                            |                           |
|                                  | Extreme weather                           | 16 (84.2)                 |
|                                  | Mental health                             | 6 (31.6)                  |
|                                  | Air quality                               | 5 (26.3)                  |
|                                  | Temp. extremes                            | 4 (21.1)                  |
|                                  | Indirect Impacts                          |                           |
|                                  | Disease, vector-borne                     | 11 (57.9)                 |
|                                  | Food, farming, hunting & nutrition        | 10 (52.6)                 |
|                                  | SDoH                                      | 3 (15.8)                  |
| Water safety                     | 2 (10.5)                                  |                           |
| <b>Perceived Role</b>            | Occupational scope                        | 17 (89.5)                 |
|                                  | Advocacy                                  | 12 (63.2)                 |
|                                  | Responsibility, protection of health      | 11 (57.9)                 |
| <b>Co-benefits</b>               | Perceived benefit , connections to health | 14 (73.6)                 |
|                                  | Northern context, Applicability           | 12 (63.2)                 |
|                                  | Current utilization, opportunity          | 4 (21.1)                  |

## Paper #2 (Chapter 3)

| <b>Main Theme</b>  | <b>Sub-theme</b>              | <b>Participants n (%)</b> |
|--|-------------------------------|---------------------------|
| <b>Understanding of mandated duties</b> (engaging in CC, i'll have to ask my boss first) | Climate action                | 12(63)                    |
|  | Implementation Strategy       | 11(58)                    |
|  | Outside of Occupation         | 11(58)                    |
|  | Within Occupation             | 14(74)                    |
| <b>Barriers</b> (This isn't in the job description)                                      | Action Barriers               | 16                        |
|  | Communication Barriers        | 10                        |
| <b>Potential of HP as messengers</b> (Just because they can doesn't mean they are)       | Potential of HP as messengers | 14                        |
| <b>Communication Methods</b> ('One size fit's all won't fit everyone')                   | Content                       | 13                        |
|  | Techniques-Approaches         | 15                        |
| <b>Engagement Enhancement</b> (Education is key to engagement)                           | Collaboration                 | 8                         |

## Appendix XII – Knowledge Translation Output

This report will be a synthesis of all findings from my project, including current perceptions of climate-health leaders, communication lessons and engagement recommendations. Below is an example of a communication output that will be created for distribution to interested health professionals.

 Lakehead  
UNIVERSITY

# Communicating Climate Change for Health Professionals

Lessons from climate-health leaders in Northern Ontario

- **1**

### Health-centred messaging

Messages should focus on leveraging your established knowledge of health to create personal connections to climate change

ex. "Sam, you may notice your COPD symptoms are worse lately. This could be indicative of the increased heat events we're experiencing."
- **2**

### Actionable

Messages should be clear, and contain immediate actionables that clients can complete easily

ex. "Pat, you've mentioned you want to improve your cardiovascular health. Cycling will help with this, and also helps reduce your carbon footprint."
- **3**

### Contextualised

Messages should localize the issue, highlighting the impacts seen and experienced by clients in their home or community.

ex. "So, Alex, you say that your asthma has been worsening lately. This makes sense, as we've got a forest fire burning nearby."
- **4**

### Highlight resiliency

Messages should be constructed using a strengths-based approach, emphasizing opportunity to build upon existing capacity.

ex. "Taylor, it's great you want to make healthier nutrition choices. How can we make this work in your community?"