Responding to a Changing Climate: An Investigation of the Psychosocial Consequences of Climate Change and Community-based Mental Health Responses in High River

By: Katie Hayes

A dissertation in conformity with the requirements for a Doctor of Philosophy at the Dalla Lana School of Public Health at the University of Toronto

© Copyright by Katie Hayes 2019
Responding to a Changing Climate: An Investigation of the Psychosocial Consequences of Climate Change and Community-based Mental Health Responses in High River

Katie Hayes

Doctor of Philosophy

Dalla Lana School of Public Health

University of Toronto

2019

Abstract

This dissertation explores the psychosocial consequences of climate change and psychosocial adaptation opportunities in High River, Alberta. Influenced by the theoretical approach of Political Ecology, I investigate community impacts and community-based mental health responses in High River following the 2013 Southern Alberta floods. Research methods include: a desktop climate change and health vulnerability and adaptation assessment that includes over 116 data sources; telephone interviews with key informant health and social services leaders (n = 14); four focus group sessions with front-line health and social services workers (n = 14); and, semi-structured interviews (n = 18) with a sample of community-members exposed to the 2013 flood and who self-identify in any one or more ways: female, youth, elderly, non-white, someone living in a low socio-economic status, someone with pre-existing health concerns. A total of 46 participants were recruited in this research. Results of the empirical investigation in High River are showcased in three manuscripts. The first manuscript, informed by critical Political Ecology, is an investigation of sociopolitical conditions that influence health inequities and adaptation opportunities (or lack thereof) in a changing climate in High River. The second is an empirical exploration of the long-term psychosocial consequences of the 2013 flood, relating these
consequences to the broader issue of climate change and psychosocial health. The third manuscript is an exploration of how the long-term psychosocial risks and impacts of the 2013 flood are being addressed via response interventions and connecting these lessons-learned to the broader topic of climate change and psychosocial adaptation. This research suggests that a Political Ecology lens can support a critical analysis of what the environment means and to whom, with a particular focus on what adaptation to our changing climate means and to whom. Further, findings from this empirical research suggest that there are a range of psychosocial outcomes related to the 2013 Southern Alberta flood, and these outcomes continue to affect the psychosocial wellbeing of High River residents, particularly those most marginalized, five years post-flood. Findings also suggest that there are lessons-learned from High River about actions to support or enhance psychosocial adaptation to a changing climate.
Acknowledgements

I gratefully acknowledge the guidance and feedback from my supervisor, Dr. Blake Poland, and my committee members, Dr. Donald Cole and Dr. Branka Agic. Your collective encouragement throughout the research process as well as your engagement in the material was invaluable. I also very much appreciate your gentle nudges to look deeper and more critically at the subject matter.

To my friends and family who have cheered me on since the beginning. Your encouragement means the world to me. To my lovable beagle, Karma, our daily walks gave me a much-needed reprieve from my thesis work.

To my partner, Barry, I could not have made it this far without your love and support. Your engagement and curiosity with my work helped me to see things in new ways. You are so skillful in lifting me up when the road ahead looks too difficult to travel. Your clarity of mind and warmth of heart are something I cherish deeply.
# Table of Contents

Abstract .............................................................................................................................. ii  
Acknowledgements .......................................................................................................... iv  
Table of Contents ............................................................................................................... v  
List of Tables .................................................................................................................... ix  
List of Figures .................................................................................................................. x  
List of Images .................................................................................................................... xi  
List of Appendices ........................................................................................................... xii  
Terminology ....................................................................................................................... xiii  

## Chapter 1: Introduction and Rationale ................................................................. 1  
1.1 Introduction ............................................................................................................... 1  
   1.1.1 Defining key terms ............................................................................................ 2  
   1.1.2 An Introduction to Psychosocial Health in a Changing Climate ......................... 4  
1.2 Rationale .................................................................................................................... 6  
1.3 Research Questions ................................................................................................... 8  
1.4 Outline and Dissertation Chapters ........................................................................... 9  

## Chapter 2: Background .......................................................................................... 11  
2.1 The Climate Change Problem .................................................................................... 11  
2.2 Climate Change and Health ...................................................................................... 12  
2.3 Climate Change and Health Inequities .................................................................... 13  
2.4 The Role for Public Health ....................................................................................... 15  
2.5 Summary ................................................................................................................... 16  

## Chapter 3 Literature Review .................................................................................. 17  
3.1 Climate Change and Mental Health: Risks, Impacts and Priority Actions ................. 19  
   3.1.1 Abstract .......................................................................................................... 20  
   3.1.2 Background ..................................................................................................... 21  
   3.1.4 Discussion ....................................................................................................... 26  
   3.1.5 Conclusion ....................................................................................................... 44  
3.2 Addressing Mental Health in a Changing Climate: Incorporating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments .......... 46  
   3.2.1 Abstract .......................................................................................................... 46  
   3.2.2 Introduction ..................................................................................................... 47  
   3.2.3 Background ..................................................................................................... 48  
   3.2.4 Methods .......................................................................................................... 53
Chapter 5: Empirical Investigation

5.1 Towards a Critical Political Ecology of Climate Change and Mental Health

5.1.1 Abstract

5.1.2 Introduction

5.1.3 Background

3.3 Factors Influencing the Mental Health Consequences of Climate Change in Canada

3.3.1 Abstract

3.3.2 Introduction

3.3.3 Methods

3.3.4 Results

3.3.5 Discussion

3.3.6 Conclusions

3.2 Table 1. Monitoring and Measuring the Climate Change Impacts to Mental Health

3.2.7 Discussion

3.2.6 Analysis

3.2.5 Results

3.2.4 Monitoring and Measuring the Climate Change Impacts to Mental Health

3.2.3 Introduction

3.2.2 Conclusions

3.1 Table 2. Research Methods Summary

3.1.6 Political Ecology Theory and Methodology

3.1.5 Critical Political Ecology

3.1.3 Political Ecology and Climate Change

3.1.2 Evolution and Tensions of Political Ecology

3.1.1 Abstract

Chapter 4: Theory and Methodology

4.1 Theoretical Orientation

4.1.1 Political Ecology: Overview and History

4.1.2 Evolution and Tensions of Political Ecology

4.1.3 Political Ecology and Climate Change

4.1.4 Political Ecology of Health

4.1.5 Critical Political Ecology

4.1.6 Political Ecology Theory and Methodology

4.2 Methodology

4.3 Case Study Approach

4.3.1 Context

4.3.2 Rationale for ‘Casing’ High River

4.4 Methodological Approach

4.4.1 Mixed Methods Research Design

4.5 Methods

4.5.1 Methods Overview

4.5.2 Ethical Considerations

4.5.3 Climate Change and Health Vulnerability and Adaptation Assessment

4.5.4 Key Informant Interviews

4.5.5 Psychosocial Asset Mapping Via Focus Groups

4.5.6 Interviews with Marginalized Community Members

4.6 Cross-Method Analytical Strategy

4.7 Limitations

4.8 Summary
Appendix

Chapter 6: Discussion and Implications

6.1 Introduction ................................................................................................................. 292

6.2 Reflections on the Field ............................................................................................... 293

6.3 Contributions ............................................................................................................... 298

6.4 Integrative Discussion and Implications for Research and Practice ......................... 303

6.5 Path Forward .............................................................................................................. 306

References ....................................................................................................................... 309

Appendix .......................................................................................................................... 329
Appendix A: Supplementary materials for Addressing Mental Health in a Changing Climate: Incorporating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments ................................................................. 329
  Table S1. Summary of Articles Included in Review ........................................................................................................ 329
  References for Supplementary Materials ....................................................................................................................... 392

Appendix B: University of Toronto Ethics .......................................................................................................................... 412

Appendix C: Alberta Health Services Ethics ....................................................................................................................... 413

Appendix D: Key Informant Interview Guide ..................................................................................................................... 415

Appendix E: Key Informant Interview Codebook .............................................................................................................. 417

Appendix F: Focus Group Guide ........................................................................................................................................ 424

Appendix G: Focus Group Codebook ............................................................................................................................... 426

Appendix H: Face-to-face Interviews - Semi-Structured Interview Guide ................................................................. 443

Appendix I: Face-to-Face Interview Codebook ................................................................................................................ 444
# List of Tables

Table 1. Monitoring and Measuring the Climate Change Impacts to Mental Health (Chapter 3.2) .......................................................... 67

Table 2. Research Methods Summary (Chapter 4.5) ........................................ 142

Table 3. Psychosocial Asset Mapping (Chapter 5.3) ...................................... 270

Table 4. Implications for Psychosocial Adaptation Policy and Practice (Chapter 5.3) ................ 270

Table S1. Summary of Articles Included in Review (Appendix A) .................. 305
List of Figures

Figure 1. Factors that Influence the Psychosocial Health Impacts of Climate Change

(Chapter 3.3) ........................................................................................................................................... 87

Figure 2. Summary of the Findings (Chapter 5.2) .............................................................................. 228
List of Images

Image 1. High River, Alberta (Chapter 4.3) .................................................................118

Image 2. Flood Hazard Map (Chapter 5.1) .................................................................184

Image 3. Topographical Map of High River, Alberta (Chapter 5.1) .............................185
List of Appendices

Appendix A: Supplementary materials for Addressing Mental Health in a Changing Climate: Incorporating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments ............................................................... 305

Table S1. Summary of Articles Included in Review .......................................................... 305

References for Supplementary Materials ...................................................................... 368

Appendix B: University of Toronto Ethics ........................................................................ 388

Appendix C: Alberta Health Services Ethics .................................................................... 389

Appendix D: Key Informant Interview Guide .................................................................. 391

Appendix E: Key Informant Interview Codebook ............................................................. 393

Appendix F: Focus Group Guide ..................................................................................... 400

Appendix G: Focus Group Codebook .............................................................................. 402

Appendix H: Face-to-face Interviews - Semi-Structured Interview Guide .................... 419

Appendix I: Face-to-Face Interview Codebook ................................................................. 420
Terminology

**Adaptation**: Adaptation refers to actions that emphasize coping and thriving within a changing climate.1

**Affirmative Mental Health**: Includes states of mental well-being, altruism, compassion and Post-Traumatic Growth.2,3

**Climate Change**: The Intergovernmental Panel on Climate Change (IPCC) defines climate change as “a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer” (p. 120).

**Climate Justice**: Climate justice refers to leaving fossil fuels in the ground, intergenerational justice, and just and equitable transition to renewable resources.4

**Disaster Mental Health Field**: The disaster mental health field focuses on specific extreme events (like technological disasters, environmental disasters, biohazard disaster) and subsequent mental health outcomes.5

**Ecoanxiety**: anxiety people face from constantly being surrounded by the wicked and threatening problems associated with a changing climate.6

**Ecological grief (ecogrief)**: distress related to ecological loss or anticipated losses related to climate change.7

**Ecoparalysis**: the complex feelings of not being able to take effective action to significantly mitigate climate change risks.6

**Environmental Justice**: Environmental justice is considered a lens, a theoretical approach, and a movement that addresses environmental racism and supports the inalienable right (of all people) to clean air, water, and land.8,9

**Environmental Racism**: Using the definition provided by Brulle and Pellow (2006), environmental racism, “is racial discrimination in environmental policymaking, the enforcement of regulations and laws, the deliberate targeting of communities of color for toxic waste facilities, the official sanctioning of the life-threatening presence of poisons and pollutants in our communities, and the history of excluding people of color from leadership of the ecology movements” (p. 278).

**Health**: Using the definition provided by the World Health Organisation, health is defined as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”10.

**Health Equity**: Using the definition provided by the World Health Organisation, “Health equity” or “equity in health” implies that ideally everyone should have a fair opportunity to
attain their full health potential and that no one should be disadvantaged from achieving this potential”\textsuperscript{11}.

**Public Health (the field of):** Using the definition of the American Public Health Association, the field of public health “promotes and protects the health of people and the communities where they live, learn, work and play”\textsuperscript{12}; public health researchers and practitioners work to prevent disease and illness, and promote and protect human health.

**Psychosocial:** psychosocial health is the interplay between social and psychological conditions that shape wellbeing\textsuperscript{13}. Psychosocial health includes mental health, which encompasses the states of mental wellbeing, experiencing mental problems (like worry, grief, stress), and mental illness (like psychosis, depression, and Post-Traumatic Stress Disorder)\textsuperscript{14}; and, social aspects that include relationships with others and one’s culture and context\textsuperscript{13}.

**Psychosocial Adaptation:** psychosocial adaptation opportunities refer to any form of policy, practice, or behaviour that supports or enhances psychosocial coping and thriving in changing climate, with aim of moving towards enhancing (transformational) resilience\textsuperscript{15, 16, 17}.

**Mental Health:** Traditionally mental health and mental illness have been framed as two related but distinct states\textsuperscript{18}. In this dissertation, mental health is conceptualized as existing on a continuum between mental illness and wellbeing and includes states of mental wellbeing, experiencing mental problems (like worry, grief, stress)\textsuperscript{17}, and mental illness (like psychosis, depression, and Post-Traumatic Stress Disorder)\textsuperscript{12, 19}.

**Mental (and Psychosocial) Health Outcomes:** refer not only to the consequences related to the risks and impacts of climate hazards on psychosocial health, but also the resulting response interventions that address these risks and impacts.

**Mitigation:** Refers to actions to reduce the effects of climate change, for example reducing Greenhouse gas emissions\textsuperscript{1}.

**Resilience:** Resilience is a multidimensional construct that has been conceptualized in a variety of different ways in the climate change literature For example, in the climate change literature, a generally accepted definition is that resilience is a capacity. For example Wilson (2013) defines resilience as: “the capacity of a system to absorb disturbance and reorganize while undergoing change to still retain essentially the same function, structure, identity, and feedbacks”\textsuperscript{20}(p. 1218). In the disaster mental health literature, resilience — or more aptly resiliency — is often conceptualized as a trait or an ability. For example, Kumar (2016) describes resilience as: “the ability of an individual or a system to recover from a setback, adapt well in the face of trauma, and survive and thrive despite significant adversity and stress”\textsuperscript{21} (p. 3).

**Sociopolitical Conditions:** A basic definition of sociopolitical is: “relating to, or involving a combination of social and political factors”\textsuperscript{22}. Social factors include things like, interactions amongst humans and groups and social institutions, and political factors include things like, dominant political ideologies, governance, and policies. Sociopolitical conditions refer to political, economic, environmental, cultural and social conditions that shape lived experiences.
Solastalgia: “the distress and isolation caused by the gradual removal of solace from the present state of one's home environment”\textsuperscript{23} (p. 50).

Transformational Resilience: Transformational resilience is not simply a bouncing back from climate disruptions but a ‘bouncing forward’ that requires a reckoning with sociopolitical conditions that shape social, environmental, and climate injustices in order to move towards environmental health equity\textsuperscript{24}.
Chapter 1: Introduction and Rationale

1.1 Introduction

The global climate change problem presents serious risks to the health and survival of people and the planet\(^\text{25}\). Some of the most dangerous public health consequences of climate change include: water and food shortages, damages to infrastructure and human settlements, increases in morbidity and mortality, and the impacts to psychological and social wellbeing (otherwise referred to as psychosocial wellbeing) of populations at large\(^1\). One of the most nascent topics within the climate change and health research domain is the risks and impacts of a changing climate on psychosocial health. It is within the research domain of climate change and psychosocial health that I focus my thesis dissertation.

My thesis research examines the psychosocial consequences of climate change and psychosocial adaptation opportunities through an empirical investigation of the psychosocial consequences of climate change and community-based mental health responses in High River, Alberta, Canada. In particular, my research focuses on the inequitable risks and impacts of climate change-related extreme weather on those most marginalized and what is being done to address these risks and impacts. My research is influenced by the theoretical lens of Political Ecology, where I problematize what climate change, psychosocial health, and adaptation means and to whom in the town of High River.

Briefly, Political Ecology is a theoretical orientation that investigates the nature-society relationship by problematizing what the environment means and to whom, with an emphasis on two key tenets: nature and culture are inseparable; and, that capitalist political economies act as central forces that shape this nature-culture relationship\(^{26, 27, 28}\). In my research, the theoretical lens of Political Ecology allows me to explore the political and economic activity in both the
town of High River and the Province of Alberta and how this multi-scalar* activity influences the nature-culture relationship of High River residents experiencing the psychosocial consequences of climate change and community-based mental health responses. More specifically, a Political Ecology lens allows me to conduct an initial exploration of the often hidden or obscured sociopolitical† conditions that shape health inequities, perceptions about climate change and mental health, and adaptation opportunities (or lack thereof) in a changing climate in High River, Alberta. An in-depth discussion of my theoretical orientation can be found in section 4.1 of this dissertation.

Before providing an overview of my research, it is prudent to define some key terms that will be used throughout this dissertation, and to provide a brief overview of psychosocial health in a changing climate.

1.1.1 Defining key terms

In this dissertation, I rely upon an understanding of mental health as existing on a continuum. I use the term mental health when I refer to specific mental health outcomes like, distress, trauma, grief, and wellbeing. Throughout this dissertation, I use the term psychosocial when I comment on outcomes that are inextricably tied to psychological as well as social wellbeing. For example, there are economic burdens associated with flooding, in particular a lack of insurance coverage for flood-related damages, this can put stress and strain on personal and community-level resources, leading to family and community breakdown, stress, and violence29, 30, 31.

---

* Multi-scalar refers to multiple scales of political economies (e.g. at difference scales of geographic governance, like municipal, provincial, federal or territorial scales of governance).
† A basic definition of sociopolitical is: “relating to, or involving a combination of social and political factors”22. Social factors include things like, interactions amongst humans and groups and social institutions, and political factors include things like, dominant political ideologies, governance, and policies.
Psychosocial health is defined in this dissertation as the interplay between social and psychological conditions that shape wellbeing\textsuperscript{13}. Psychosocial health includes mental health, which encompasses mental wellbeing, experiencing mental problems (like worry, grief, stress)\textsuperscript{32}, and mental illness (like psychosis, depression, and Post-Traumatic Stress Disorder)\textsuperscript{14}; and, social aspects that include relationships with others and one’s culture and context that affect wellbeing\textsuperscript{13}. Traditionally mental health and mental illness have been framed as two related but distinct states\textsuperscript{18}. In this dissertation, mental health is conceptualized as existing on a continuum between mental illness and wellbeing and includes states of mental wellbeing, experiencing mental problems (like worry, grief, stress)\textsuperscript{17}, and mental illness (like psychosis, depression, and Post-Traumatic Stress Disorder)\textsuperscript{12,19}.

In this dissertation psychosocial adaptation opportunities refer to any form of policy, practice, or behaviour that supports or enhances psychosocial coping and thriving in changing climate, with aim of moving towards enhancing (transformational) resilience — a concept that is explored below\textsuperscript{15,16,17}. In the climate change and health context, adaptation is a term that is often used synonymously with the term resilience. Resilience is a multidimensional construct that has been conceptualized in a variety of different ways in the climate change literature, a generally accepted definition is that resilience is a capacity. For example, Wilson (2013) defines resilience as: “the capacity of a system to absorb disturbance and reorganize while undergoing change to still retain essentially the same function, structure, identity, and feedbacks”\textsuperscript{20} (p. 1218). In the disaster mental health literature, resilience — or more aptly resiliency — is often conceptualized as a trait or an ability. For example, Kumar (2016) describes resilience as: “the ability of an individual or a system to recover from a setback, adapt well in the face of trauma, and survive and thrive despite significant adversity and stress”\textsuperscript{21} (p. 3). In both cases described above,
resilience appears to be synonymous with term adaptation\(^1\). Resilience is often conceptualized as ‘bouncing back’ from climate disruptions, without much recognition of sociopolitical conditions that shape health inequities. Whereas the newly-minted term, ‘transformational resilience’, is not simply a bouncing back from climate disruptions but rather a ‘bouncing forward’ that requires a reckoning with sociopolitical conditions that shape social, environmental, and climate injustices in order to move towards environmental health equity\(^2\).

A Political Ecology lens helps to enhance my understanding of the key differences between the aforementioned definitions of adaptation, resilience, and transformational resilience by allowing me to see the role of sociopolitical conditions that shape inequities, which often remain unaddressed in much of the framing of adaptation and resilience in the literature on climate change and community health. A Political Ecology lens also prompts me to investigate what these terms mean and to whom — investigating whose knowledge and experiences of climate change impacts and adaptations have traditionally been silenced or hidden in the study of climate change and health. These topic areas will be explored in greater detail throughout chapter 4 and chapter 5.

### 1.1.2 An Introduction to Psychosocial Health in a Changing Climate

The emerging literature on climate change and psychosocial health reveals a number of climate change-related mental health problems and illnesses, including: Post-traumatic stress disorder, depression, anxiety, exacerbated psychosis, vicarious trauma, survivor guilt, anxiety, grief, fear, worry, substance misuse, suicidal ideation, and suicide from climate hazards like melting sea ice, extreme temperatures, and extreme weather events\(^7, 33, 34, 35, 36, 37\). Many people

\(^1\) Importantly, the terms adaptation and resilience, as conceptualized in an ecological context, have more nuanced meanings (see \(^39\)). The definitions of resilience that I provide explore the concept from the mental health and climate change perspectives.
exposed to extreme events and disasters will experience psychological distress; however, these experiences may be normal, acute reactions to abnormal events and most people will improve over time\textsuperscript{5,38}. People may also experience severe and long-lasting distress resulting from disasters that can result in long-term mental health burdens\textsuperscript{5,38}.

Importantly too, it is not about pathologizing mental problems related to climate change, but also recognizing that the trauma and distress experienced by people in response to climate change are normal responses to our climate in crisis. Author Carolyn Baker, suggests that we need to shift our language of ‘climate change’ towards ‘climate trauma’, in so doing allowing us to see “a new and unprecedented form of collective trauma” (as cited in \textsuperscript{39}). The exploration of mental health and climate change that I conduct in this dissertation is set against this backdrop, wherein I explore the range of thoughts, feelings, and behaviors related to our collective trauma from the current climate crisis, thus going beyond a discussion of specific medicalized, diagnostic states.

There is also some literature highlighting more affirmative mental health outcomes, like altruism, compassion, resiliency, and Post-Traumatic Growth\textsuperscript{5} that can occur in the wake of extreme weather events related to climate change\textsuperscript{2,3}. The literature also documents many of the indirect psychosocial consequences from climate hazards, like for example: community strain and conflict as resources become scarce; food and water insecurity; violence; displacement; and, a loss of a sense of place due to things like melting permafrost, pervasive drought, and extreme weather events\textsuperscript{7,36,37,40,41,42}. Notably too, the current base of literature on climate change and psychosocial health notes the inequitable burden of poor mental health outcomes on those most marginalized in society, based on factors such as: race, age, gender, socioeconomic status, 

---
\textsuperscript{5} Post-Traumatic growth refers to a sense of meaning in one’s life\textsuperscript{192}. 
culture, and ability\textsuperscript{13, 34, 36, 43}. For example, the climate change and health literature suggests that populations most affected by changing climatic circumstances and poor health tend to be\textsuperscript{1, 43, 44, 45}:

- Indigenous, who rely on subsistence hunting and gathering;
- marginalized peoples (racialized people, people with disabilities, people with low socioeconomic status, women, children, elderly), who tend to have poorer health than non-marginalized groups due to a variety of social determinants like inadequate housing, lack of access to basic resources and education, underemployment, racialization and discrimination, and low-social capital; and,
- individuals and communities whose occupations rely on land and ecosystems-based resources (e.g. farmers, herders, fisherfolk, outdoor labourers).

Importantly, the above marginalized groups can have intersecting social locations, which are often compounded by the threat multiplier of climate change. In Chapter 2, I provide a more detailed overview of the current literature on climate change and psychosocial health highlighting health inequities in a changing climate. Below, I provide an overview of my research rationale before presenting my research questions.

1.2 Rationale

The risks and impacts of climate change to psychosocial health have been well-established by scholars around the globe (see\textsuperscript{7, 15, 34, 36, 37, 40, 43, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55}). A handful of these scholars take an equity-lens to the topic area, exploring the disproportionate risks and impacts to the psychosocial health of marginalized populations (See\textsuperscript{34, 36, 37, 47}). While there is a clear base of empirical literature describing the problem area of climate change impacts on psychosocial health and the unequal risks and impacts to marginalized groups, there are three notable gaps in the current climate change and psychosocial health literature that my dissertation research sought to address in some capacity. Firstly, there are few empirical studies investigating
the long-term psychosocial consequences of climate change. In Canada, there are no known studies addressing this research gap. Secondly, there is a gap in knowledge with respect to how the long-term risks and impacts are being addressed via response interventions e.g. via public health prevention interventions (commonly referred to in the climate change literature as mitigation strategies) and/or public health protection measures (commonly referred to in the climate change literature as adaptation strategies). Thirdly, the majority of the current literature lacks substantive theoretical depth and there is a dearth of climate change and health literature that engages with social theory to explore underlying root causes of environmental inequities, perceptions about climate change and mental health, and adaptation opportunities (or lack thereof). Scholars within the climate change and psychosocial health field of study tend not to rely upon social theory to explain environmental inequities.

While much of the empirical research in this domain describes the experiences of marginalized groups (e.g. farmers, Indigenous people, and women), few studies explore the sociopolitical roots of inequity that exacerbate the disproportionate climate change-related psychosocial health burdens to those most marginalized in society. Further, few studies analyse how sociopolitical conditions shape perceptions about climate change risks and impacts to mental health. Notably, there are some Political Ecology studies that explore what adaptation to a changing climate means and to whom (see for example28,56, 57); however, there are no known studies explicitly exploring psychosocial adaptation from a Political Ecology lens.

My research aimed to address the three aforementioned research gaps through an empirical investigation of the long-term psychosocial consequences of climate change and community-based mental health response in High River, Alberta, Canada. In this research, I investigated the long-term psychosocial consequences of the 2013 Southern Alberta flood,
paying close attention to the risks and impacts upon those most marginalized in the community (based on age, gender, socioeconomic status, ability, race, and culture). My research was also an initial exploration of the perceptions of climate and psychosocial health among High River residents who had experienced the 2013 flood first-hand, and among those who supported psychosocial adaptation before, during, and after the flood. Influenced by Political Ecology, I conducted an initial exploration of what the environment in High River means and to whom and how the nature-society relationship in High River is shaped by sociopolitical conditions that influence psychosocial consequences of climate change and community-based mental health responses.

The objectives of my research were to contribute to the climate change and mental health literature and provide public health audiences — including public health researchers, practitioners, and policy-makers — with evidence of the long-term implications of climate change-related extreme weather impacts on mental health. A further objective was to present my empirical findings in such a way as highlight how these findings may be useful to public health policy and practice on climate change and mental health in a Canadian context. From a theoretical standpoint, my research objectives were to explore the nature-society relationship in High River and problematize and explore the sociopolitical conditions that can influence the psychosocial consequences of climate change and community-based mental health responses.

1.3 Research Questions

Noting my research aims and objectives outlined above, my research asked the following questions:

- What are the long-term psychosocial consequences of the 2013 Southern Alberta flood in High River, Alberta? And, what implications does an exploration of the long-term
psychosocial consequences of the 2013 flood have on the field of climate change and health?

- What is the health and social service response** to the long-term consequences of the 2013 flood in High River, Alberta? And, how can an understanding of this response support community-level psychosocial adaptation to a changing climate?
- How can the application of social theory to the study of climate change and mental health elucidate inquiry into the sociopolitical conditions that shape climate change and mental health outcomes, inequities, and response interventions?

1.4 Outline and Dissertation Chapters

In Chapter 2, I provide a background on the overarching climate change problem, highlighting fundamental issues within the study of climate change and health (including a focus on health inequities and the role for public health in addressing climate change). I then provide a literature review of the field of study on climate change and mental health in Chapter 3. This literature review is delivered in three separate manuscripts (see sections 3.1, 3.2, and 3.3), all of which have been published by peer-reviewed journals.

In Chapter 4, I provide an overview of my theoretical framework, my case study approach, and an overview of my mixed methods research methodology. Specifically, section 4.1 is an overview of Political Ecology; section 4.2 is a presentation of my research methodology; section 4.3 details my case study approach; section 4.4 is an overview of my methodological approach; and, section 4.5 is an outline of my research methods. In section 4.6, I discuss my

** Response refers to the response interventions undertaken by public health and social sector institutions and community-based organizations.
cross-method analytic strategy and analytical rigour. Section 4.7 outlines my research limitations.

I address my aforementioned research questions in the three distinct manuscripts in Chapter 5. All three manuscripts have not yet been published, however, they have been written to be submitted for publication. These three manuscripts are located in the ‘Empirical Investigation’ chapter of this dissertation as each manuscript explores empirical findings from my investigation in High River. In section 5.1, I analyze my research findings by engaging with the lens of critical Political Ecology (PE). In this manuscript, I explore how sociopolitical conditions shape climate change and mental health outcomes, inequities, and response interventions. In section 5.2, I explore the long-term psychosocial consequences of the 2013 Southern Alberta flood. In section 5.3, I explore how the long-term psychosocial risks and impacts of the 2013 Southern Alberta flood were responded to by health and social service workers. Each manuscript begins with a brief overview of the journal that I intend to publish in. This brief overview also details my role as lead-author in each of these manuscripts and the roles of my co-authors.

To note, there are a total of six manuscripts included in this dissertation, for which I am the lead author on all manuscripts. I close my dissertation with a final chapter (Chapter 6) that summarizes and synthesizes the information from all six of the manuscripts included in this dissertation. I conclude with a discussion of my intended contributions to the field of public health. I also provide an integrated discussion based on all six manuscripts and recommendations for future research and practice.
Chapter 2: Background

Climate change and psychosocial health is a burgeoning domain of study. To better understand the foundations of this domain, it is prudent to firstly explore the nature of the climate change problem, impacts on health, and populations most at risk. The section below provides an overview of the climate change problem, including: a brief discussion of climate change attribution science; an overview of how climate change impacts health; and, the disproportionate impacts of climate change on those most marginalized, which includes a brief review of health inequities. This section concludes with an overview of the role for the field of public health in addressing climate change and health issues.

2.1 The Climate Change Problem

The Intergovernmental Panel on Climate Change (IPCC) defines climate change as “a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer”\(^\text{1}\) (p. 120). While there are natural changes to the climate (for example, volcanic eruptions and solar cycles linked to La Niña and El Niño), evidence indicates that the dire global temperature projections are predominately due to anthropogenic (human-caused) climate change — namely, the consumption of fossil fuels (including fossil fuel-based products) and land-use changes like deforestation and (agribusiness) agricultural practices — that have been occurring since industrialization\(^\text{1}\). Importantly, it is difficult to attribute Greenhouse Gas (GhG) emissions to specific meteorological changes, and thus to specific health outcomes. What we know, however, is that climate change ‘loads the dice’ (so to speak), increasing the frequency, intensity, and complexity of extreme events which have health consequences (IPCC
Increasingly, attribution science††, is getting better at attributing how much past GhG emissions contribute to the probability of an extreme weather event occurring, thus helping us to ascertain how much climate change loads the dice\textsuperscript{58}.

2.2 Climate Change and Health

Anthropogenic climate change affects the health of citizens around the globe\textsuperscript{1,59}. To put the anthropogenic climate change problem into a health perspective, Gary Cohen, President and Co-founder of Health Care Without Harm states: “Our addiction to fossil fuels…. is killing more people than AIDS, malaria and TB [Tuberculosis] combined”; further, Cohen states: “In the 21st Century we can no longer support healthy people on a sick planet”\textsuperscript{60} (para. 14). The Lancet — one of the leading, global medical journals — published a report in 2009 stressing Cohen’s sentiments, noting that climate change is the largest, global public health threat of the 21st century\textsuperscript{44}. Since then, there have been numerous Lancet reports tracking climate change impacts to health and what is, and can be, done to address the problem\textsuperscript{61,62,63}.

There are significant physical public health threats related to a changing climate, including a rise in vector-borne disease (VBD), increased heat-related morbidity and mortality due to rising temperatures and heat waves, exacerbation of respiratory conditions linked to declining air quality, and, food and water-borne illness due to contamination\textsuperscript{13}. Scientists from the IPCC recently published a report with the World Health Organization (WHO) highlighting the consequences of climate change to health at 1.5 degrees Celsius and 2.0 Celsius noting that even a half a degree increase in temperature could have dire physical health effects, and that these effects would continue to disproportionately affect those most disadvantaged in society\textsuperscript{59}.

---

\textsuperscript{11} Attribution science in the study of climate change and health refers to attributing (or linking) Greenhouse Gas (GhG) emissions to meteorological events and then linking these events to health outcomes\textsuperscript{58}. 
Importantly, however, this report overlooked the projected mental health effects at 1.5 degrees Celsius and 2.0 Celsius, likely because there are few (if any) known publications documenting the mental health effects of climate change at specific projected, global temperatures.

The mental health implications of climate change, while a growing area of study, has historically been a neglected area of study because mental health in general tends to be overlooked. We know that the definition of health includes mental health (see the World Health Organisation’s definition of health that is defined as: “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”\textsuperscript{10}). However, in the field of health, mental health tends to be overlooked or treated as secondary to physical health. According to a recent Lancet Commission report, mental health is considered to be the most neglected health issues of our time\textsuperscript{64}, with the global burden of mental disorders having risen in all countries around the world despite research advances in preventing and treating mental disorders\textsuperscript{65}. This Lancet Commissions report highlights that “the quality of mental health services [globally] is routinely worse than the quality of those for physical health. Government investment and development assistance for mental health remain pitifully small. Collective failure to respond to this global health crisis results in monumental loss of human capabilities and avoidable suffering”\textsuperscript{65} (p. 1553). Importantly this neglect of a global health crisis exists without the added, and emerging, burden of climate change impacts to psychosocial health.

2.3 Climate Change and Health Inequities

Climate change has been called one of the most pressing health issues of our time and the health risks and impacts of climate change tend to fall disproportionately on marginalized groups who have contributed the least to the climate change problem\textsuperscript{13, 61, 66, 67}. Marginalization of groups occurs in an uneven world where discrimination based on race, gender, age, culture, and
socio-economic status permeates the entire social fabric of society. Thus, at the core of the climate change and health problem area are issues of distributive justice. Namely, environmental health burdens associated with climate change are unequally distributed to members of society who experience marginalization based on age, gender, race, ethnicity, ability, education, physical and mental abilities, and socioeconomic status. This phenomenon is referred to in the environmental justice literature as environmental health inequity.

Highlighting the work of prominent environmental health justice scholars, Masuda et al. (2010) suggest that environmental health inequity is a “double burden” for marginalized groups wherein “inequality resulting from stratified social environments lead to non-random variability in the quality of physical environments, and vice versa” (p. 454). Therefore, social and environmental inequities are mutually reinforcing.

Efforts to address environmental inequities related to climate change can be found in environmental justice movement more broadly and in the climate justice movement more specifically. Briefly, environmental justice is considered a lens, a theoretical approach, and a movement that addresses environmental racism and supports the inalienable right (of all people) to clean air, water, and land. Climate justice is slightly more nuanced. It addresses human rights, development, and climate change. The climate justice movement supports: leaving fossil fuels in the ground, intergenerational justice, and just and equitable transition to renewable resources. In recent years, eminent environmental health scholars have

---

11 It is important to differentiate between inequality and inequity; the former referring to the uneven distribution of environmental health impacts, whereas the later refers to unequal distribution of environmental health impacts based on socially determined factors of exclusion that are unfair and unjust. Often times the two terms are used interchangeably in the literature.

99 Environmental racism, as defined by Brulle and Pellow (2006), “is racial discrimination in environmental policymaking, the enforcement of regulations and laws, the deliberate targeting of communities of color for toxic waste facilities, the official sanctioning of the life-threatening presence of poisons and pollutants in our communities, and the history of excluding people of color from leadership of the ecology movements” (p. 278).
been calling for an integrated approach to environmental/climate justice and for public health to address the inequitable health consequences of climate change and environmental degradation. In 2014, the Planetary Health Manifesto was released, which calls for a social transformation of public health values and practices to incorporate planetary wellbeing, social and ecological justice, and the minimization of social inequities. This manifesto has been signed by more than 7,000 public health scholars. In 2015, Hancock et al. released a discussion paper through the Canadian Public Health Association calling for the field of public health to meaningfully address the Ecological Determinants of Health (EDoH), which include climate change and atmospheric changes; ecotoxicity and pollution; and resource, ecosystem, species depletion.

2.4 The Role for Public Health

As demonstrated above, the field of public health has been exhorted with addressing the social and environmental health injustices brought forward by climate change. Powers and Faden (2006) suggest that public health has a duty to address issues of equity and justice because “social justice [is] the foundational moral justification for health” (p. 81). Goodman (2014), reflecting on the aforementioned Planetary Health Manifesto, suggests that both public health and medicine have been tasked with addressing issues of social and ecological justice because they “can be independent voices of conscience which, along with 'empowered communities', can confront entrenched interests” (p. 1063). Further, in Hancock et al.’s (2015) discussion paper on the EDoH, authors contend that the public health community is well positioned to tackle the EDoH because: “We [the public health community] have successfully helped to create major societal shifts in favour of health numerous times before. We know how to do it, and we can do

---

*** Referring to public, private, and community-based organizations that address population-based disease prevention, health protection, and health promotion.
it again. While the changes we seek are large, and the forces we face are powerful, that was also the case in the long struggle to address the health problems created by the industrial revolution in the 19$^{th}$ century$^{74}$ (p. 15). The framing offered by Goodman (2014) and Hancock et al. (2015), suggest that public health practitioners, researchers, and decision-makers, play an essential role in helping to address what has been called the greatest public health issue of our time$^{74,77}$. For this reason, the primary audience for this dissertation is the public health audience.

2.5 Summary

This section has briefly explored the background on climate change and mental health, with a particular focus on health inequities and the role for public health. Now, I will take an in-depth exploration of the literature on climate change and mental health in the next chapter.
Chapter 3 Literature Review

The field of study of climate change and mental health, while nascent, has grown considerably in the past decade. Noting this, I felt it was prudent to investigate the current breadth and depth of literature in this field before conducting my empirical research in High River, Alberta. Between 2016 and 2017 as a research affiliate at Health Canada, I undertook a scoping review of this literature and incorporated my findings into three separate manuscripts.

The first paper, entitled: *Climate Change and Mental Health: Risks, Impacts and Priority Actions*, provides an overview of the global literature on climate change and mental health. I was the first author of this paper and undertook the literature review, developed the paper and incorporated contributions from contributing authors. Details on contributing authors’ roles can be found at the end of this published manuscript. This paper was published in *International Journal of Mental Health Systems* in June 2018.

The second manuscript for this literature review is entitled: *Addressing Mental Health in a Changing Climate: Incorporating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments*. This manuscript provides a review of the global literature and explores how to integrate mental health indicators into climate change and health vulnerability and adaptation assessments, highlighting specific risks and hazards, potential mental health outcomes, populations of concern, and indicators and measurement tools to assess the mental health outcomes related to climate change. This manuscript provides details on the scoping review methodology that support the findings. This paper was published in the *International Journal of Environmental Research and Public Health* in August 2018. I was the lead author conceptualizing the paper, conducting the formal analysis and writing the
manuscript. My thesis supervisor, Dr. Blake Poland, supported the conceptualization, review, editing and supervision of this manuscript.

The third, and final manuscript, of this literature review was published on May 2019 in the International Journal of Environmental Research and Public Health. This manuscript is entitled, *Factors Influencing the Mental Health Consequences of Climate Change in Canada*. This manuscript builds on the manuscript, *Addressing Mental Health in a Changing Climate: Incorporating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments*. This third manuscript differs from the second manuscript in that it is a commentary that provides a new assessment of the literature in order to highlight factors that influence the capacity to adapt to the mental health consequences of a changing climate. I was the first author of this manuscript, I conceptualized the paper, I conducted the formal analysis, and wrote of the manuscript. Contributing author roles can be found at the end of the manuscript. All three manuscripts that form this literature review can be found below, in section 3.1, 3.2, and 3.3.
3.1 Climate Change and Mental Health: Risks, Impacts and Priority Actions

Authors

Katie Hayes, PhD Candidate, Dalla Lana School of Public Health: University of Toronto, Toronto, Ontario, Canada, katie.hayes@mail.utoronto.ca

Blashki G, Nossal Institute for Global Health, University of Melbourne, Carlton, Victoria, Australia, gblashki@unimelb.edu.au

Wiseman J, Melbourne Sustainable Society Institute, University of Melbourne, Carlton, Victoria, Australia, jwiseman@unimelb.edu.au

Burke S. E.L. Australian Psychological Society, Level 11, 257 Collins St, Melbourne, Victoria, Australia, s.burke@psychology.org.au

Reifels L, Centre for Mental Health, Melbourne School of Population and Global Health, The University of Melbourne, Carlton, Victoria, Australia, l.reifels@unimelb.edu.au

Journal: International Journal of Mental Health Systems

Published: June 2018
3.1.1 Abstract

Background: This article provides an overview of the current and projected climate change risks and impacts to mental health and provides recommendations for priority actions to address the mental health consequences of climate change.

Discussion and Conclusion:

The authors argue the following three points:

- firstly, while attribution of mental health outcomes to specific climate change risks remains challenging, there are a number of opportunities available to advance the field of mental health and climate change with more empirical research in this domain;
- secondly, the risks and impacts of climate change on mental health are already rapidly accelerating, resulting in a number of direct, indirect, and overarching effects that disproportionally affect those who are most marginalized; and,
- thirdly, interventions to address climate change and mental health need to be coordinated and rooted in active hope in order to tackle the problem in a holistic manner.

This discussion paper concludes with recommendations for priority actions to address the mental health consequences of climate change.

Keywords: Climate Change, Mental Health, Attribution, Mitigation, Adaptation
3.1.2 Background

It is well understood that human health is threatened by the impacts of climate change\textsuperscript{44,78,79}. In the 2017 Lancet Countdown on Climate Change and Health, authors state: “The human symptoms of climate change are unequivocal and potentially irreversible — affecting the health of populations around the world today”\textsuperscript{63} (p. 1). Climate change is no longer a looming threat but rather a destructive reality with dire predictions for the future. The World Health Organization (WHO) estimates an increase of 250,000 excess deaths per year between 2030 and 2050 due to the “well understood impacts of climate change”\textsuperscript{80} (p. 6). Impacts include heat-related morbidity and mortality, increases in vector-borne diseases (e.g. dengue fever, malaria), increased respiratory illness, and morbidity and mortality due to extreme weather events\textsuperscript{13,81}. The lesser-known, and often overlooked, effects of climate change include the risks and impacts to mental health— the focus of this article.

Mental health refers not just to mental illness, mental problems, and mental disorders, but also includes states of mental wellness, emotional resilience and psychosocial wellbeing\textsuperscript{14,82,83}. Psychosocial wellbeing is the interplay between social and psychological conditions that shape human welfare; a broad term which encompasses the states of being mentally healthy, experiencing mental problems, and mental illness\textsuperscript{13,14}.

Investigating the current state of evidence and knowledge about the climate change impacts to mental health, this article pays particular attention to the inequitable impacts of climate change on the mental health of marginalized and vulnerable populations. We argue the following three points: firstly, while attribution of mental health outcomes to specific climate change risks remains challenging, there are a number of opportunities available to advance the field of mental health and climate change with more empirical research in this domain; secondly,
the risks and impacts of climate change on mental health are already rapidly accelerating, resulting in a number of direct, indirect, and overarching effects that disproportionately affect those who are most marginalized; and finally, interventions to address climate change and mental health need to be coordinated and rooted in active hope in order to tackle the problem in a holistic manner. This paper explores each of these facets and concludes with recommendations to enhance the state of knowledge and actions on climate change and mental health. Before diving into the topic area, a brief overview of climate change and health effects are noted in the sections below.

3.1.2.1 Climate Change and Health

An extensive body of research continues to strengthen knowledge about the impact of climate change on physical health, including for example, a rise in vector-borne, water and food-borne diseases; an increase in acute and chronic respiratory conditions (including asthma and allergies); and, heat-related and extreme weather-related morbidity and mortality. Indirect health implications that are increasingly recognised in global reports on climate change and health include illness related to food and water safety, under-nutrition related to food insecurity, malignant melanoma from UV exposure, and chronic kidney disease from dehydration. In late 2017, the Lancet released its first, full tracking report on climate change and health. In this report, there is an explicit request for more information on, and actions to address, the “often-unseen” impacts of climate change on human health, notably, the mental health consequences of climate change.

3.2.1.2 Climate Change and Mental Health

The expanding research literature on climate change and mental health includes increasing evidence that extreme weather events — which are more frequent, intense, and
complex under a changing climate — can trigger Post-Traumatic Stress Disorder (PTSD), Major Depressive Disorder (MDD), anxiety, depression, complicated grief, survivor guilt, vicarious trauma, recovery fatigue, substance abuse, and suicidal ideation\textsuperscript{34, 36, 40, 43, 46, 49, 50, 53, 58, 86, 87, 88, 89, 90}. Incremental climate changes, such as rising temperatures, rising sea levels, and episodic drought, can change natural landscapes, disrupt food and water resources, change agricultural conditions, change land use and habitation, weaken infrastructure and give rise to financial and relationship stress, increase risks of violence and aggression, and displacement of entire communities\textsuperscript{43, 61, 85, 91, 92}. The overarching threats of a changing climate, can also incite despair and hopelessness as actions to address the ‘wicked problem’ of climate change seem intangible or insignificant in comparison to the scale and magnitude of the threats\textsuperscript{23}. Paradoxically, these same disastrous circumstances may also inspire altruism, compassion, optimism, and foster a sense of meaning and personal growth (otherwise referred to as Post-Traumatic Growth) as people band together to salvage, rebuild, and console amongst the chaos and loss of a changing climate\textsuperscript{2, 3}.

3.1.2.3 Climate Change and Health Inequity

It is well understood that climate change augments existing inequalities, rendering those most marginalized at greater peril to the health consequences of a changing climate\textsuperscript{93, 61, 94}. In fact, the first key message from the Lancet’s Countdown on Climate Change and Health report emphasizes the disproportionate impact climate change has on the world’s most marginalized people and the consequential impacts this has on these populations if social and environment justice concerns are not addressed\textsuperscript{61}. Watts et al. (2017) state: “By undermining the social and environmental determinants that underpin good health, climate change exacerbates social, economic, and demographic inequalities, with the impacts eventually felt by all populations”\textsuperscript{61}.
Those who are at greatest risk to the effects of climate change are those who are most marginalized based on socially and environmentally mediated factors, such as socioeconomic status, culture, gender, race, employment, and education. Marginalized groups who tend to be the most affected by the mental and physical health implications of climate change are: Indigenous peoples, children, seniors, women, people with low-socioeconomic status, outdoor labourers, racialized people, immigrants, and people with pre-existing health conditions. Importantly, these marginalized groups are not homogenous. People may experience intersections of marginalization based on a variety of the above social indicators.

3.2.1.4 Exploring the Relationship Between Mental Health and Climate Change

An updated overview of recent evidence on the mental health implications of climate change is timely given the ongoing, rapid expansion of research in the broad field of health and climate change as well as increasing public concern about climate change trends and risks.

Since 2007, media reports on climate change and health have increased by 78% and the academic literature on climate and health issues has tripled. There is also increasing public and academic recognition of the extent to which rising global temperatures threaten planetary and human health. While public awareness about the health implications of climate change continues to grow, the topic of mental health is frequently absent from this discourse. In some ways, this reflects the global discourse, where, in comparison to physical health, mental health in general has been neglected.

Globally, the prevalence of mental health issues is extremely high even without considering the added mental health consequences of a changing climate. Based on a 10-year

systematic analysis of global burden of disease from 1990-2010, Murray et al. (2010) find that mental illness comprises 7.8% of the global burden of disease\textsuperscript{101}. Mental and behavioural disorders also account for the greatest global burden of Years Lived with a Disability (YLDs)\textsuperscript{102}. Vigo et al. (2016) contend that these figures are actually much higher if co-morbidities related to mental illness are considered within burden of illness studies and if a more accurate definition of mental illness is used, a definition that includes health behaviours like self-harm and suicide\textsuperscript{64}. The failure of global investment in mental health care to address the consequences and impacts of rapidly escalating levels of mental illness has been described as a “global tragedy” reflecting a long “legacy of the neglect and marginalization of mental health”\textsuperscript{102} (p.66) . Similarly, authors from the 2016 Lancet report on sustainable development and global mental health describe the state of mental health as the “most neglected of all human health conditions” and a “failure of humanity”\textsuperscript{103}. The inattention to mental health is of particular concern in the field of climate change and mental health given the evidence that psychological impacts from any form of disaster exceed physical injury by 40 to 1\textsuperscript{104}, and that since 2000 the frequency of climate change-related weather disasters has increased by 46%\textsuperscript{61}. Crucially, it is the most marginalized who are especially vulnerable to climate change’s impacts on mental health. As McMichael notes, climate change acts as a health “threat amplifier”, compounding existing social injustices\textsuperscript{66}. There is, therefore, a strong case for continuing to explore and communicate research and policy learning about the relationship between climate change and mental health – especially as the topic area pertains to health equity.
3.1.4 Discussion

3.1.4.1 Exploring the Challenges and Opportunities of Attribution

The lack of attention to the topic of climate change and mental health is often imputed to the challenges of attribution. Attribution in this case is the scientific association between greenhouse gas emissions and meteorological change on the one hand, and between climate change-related meteorological change and mental health effects on the other. There is now an increasingly strong body of literature which highlights the causal linkages between climate change and extreme weather events (see 58, 105, 106, 107, 108, 109). One of the key messages within this literature is that while we cannot say with certainty that any one specific extreme weather event is directly caused by climate change; we do know that because of climate change, extreme weather is more generally on the rise, making extreme weather events more frequent, intense, and complex. In other words, climate change therefore ‘loads the dice’ for more weather extremes.

Within the disaster mental health literature, the links between extreme weather events and mental health effects are well established (see for example 110, 111, 112, 113, 114, 30, 115, 116, 117). However, many of these studies tend not to connect extreme weather to a changing climate — instead referring to extreme weather events as natural disasters rather than events linked to anthropogenic climate change. Studies within this domain tend to focus on mental health outcomes of specific hazard events (e.g. the 2004 Tsunami in Malaysia, Hurricane Katrina in 2005; Southern Alberta floods in 2013) positioning each hazard as an isolated incident unconnected to the wicked problem of climate change. The risk of overlooking or minimizing the role of climate change within these hazardous events is that this creates a reactive culture of
emergency response that inhibits appropriate and effective adaptation planning and preparation for complex emergencies that a changing climate can create.

An additional concern is that much of the disaster mental health research has traditionally focussed on three distinct phases (the emergency and crisis stage, the post-impact stage, and the rehabilitation and recovery phase)\(^{115}\), while little attention has been paid to psychosocial phenomena that can occur during the pre-disaster phase. Such phenomena include, for example, heightened anxiety levels, feelings of impending doom, hopelessness, and fatalism that can be triggered by approaching extreme events or associated weather warnings; and which may also be amplified due to the perceived risk of subacute, environmental changes like rising temperatures and episodic droughts\(^{51, 86, 87}\).

### 3.1.4.1.1 Key Challenges of Attributing Climate Change to Mental Health

Attribution related to climate change and mental health can be challenging for four key reasons: firstly, there is a risk of pathologizing common transitory distress responses to abnormal events and underdiagnosing mental health effects of a changing climate; secondly, there is a wide array of potential climate change and mental health outcomes related to a changing climate; thirdly, there is substantial scope with respect to the timing of the climate change effects on mental health, thus causal links become harder to determine; and finally, attribution related to climate change and mental health is not well understood because of the complex interaction between mental health and other social determinants of health.

There is a simultaneous risk of pathologizing ‘normal’ responses to a changing climate and of underdiagnosing the real mental health effects of a changing climate. Pathologizing ‘normal’ responses to disaster situations may result in a failure to differentiate between mild transitional distress or grief and more severe, persistent mental health problems. Both
overinflating or underinflating mental health outcomes associated with climate change can lead to erroneous prevalence estimates and skewed assumptions about mental health service needs. A further consideration noted by Whaley (2009) in the aftermath of Hurricane Katrina is that in some cases medical professionals did not assess pre-existing mental health conditions and, therefore, attributed disaster trauma as a typical stress response, or alternatively diagnosed patients with stress response when in fact there were much larger mental health issues related to the effects of the Hurricane that went undiagnosed. Crucially important to consider is that pre-existing mental health conditions or problems can be exacerbated or even triggered by changes in climate.

As noted earlier, mental health includes states of mental wellness as well as mental problems and disorders. With this in mind, the current application of tools to assess mental health have some limitations. Researchers tend to conceptualize mental health solely as mental illness and mental problems, administering surveys using validated instruments that assess mental health problems and issues like: generalized anxiety disorder (using the General Anxiety Disorder, GAD-2 questionnaire), PTSD (PCL-6 checklist), and psychological distress (via the General Health Questionnaire, GHQ-12) following an extreme weather event. Few empirical studies that use these survey methods capture positive psychological consequences of extreme weather events, like feelings of compassion, altruism, sense of meaning, post-traumatic growth, or even increased acceptance of climate change and engagement with climate mitigation. This information can elucidate the complexity of mental health impacts from a changing climate and also help to understand any predisposing factors that may influence positive mental health outcomes and build psychosocial resilience.
Timing of psychosocial implications from climate related hazards poses another challenge. Scholars have discovered wide-ranging timeframes for the psychosocial impacts to manifest. Azuma et al. (2014) find that the incidence of psychological disorders (including PTSD) tended to be most significant within 6 months after a flood\textsuperscript{119}. Kessler et al. (2008) conducted interviews with Hurricane Katrina survivors 5-8 months post-event and 1-year post-event, these authors found an increase in mental health disorders as time progressed\textsuperscript{122}. For example, PTSD increased from 14.9\% at 5-8 months to 20.9\% after 1 year. Anderson et al. (2017) suggest that psychosocial impacts tend to peak within the first-year, post-extreme weather event\textsuperscript{124}. Tunstall et al. (2006) on the other hand, found that residents who experience significant flooding self-report long-term psychosocial impacts (namely anxiety when it rains) from 2.5 to 5 years post-flooding\textsuperscript{111}. A recent news article suggests that over 7,000 people who experienced Hurricane Katrina in 2005 are still receiving mental health care for trauma associated with the Hurricane\textsuperscript{96}. Noting that psychosocial health outcomes can have latent effects, or that these outcomes can occur as a result of sequelae, knowing how and when to study the climate change-related impacts and psychosocial outcomes becomes increasingly challenging — especially if the aim is to demonstrate the magnitude and attribution of effects.

Distilling the precise impact of climate change on mental health can be difficult to separate from other social determinants. As Watts et al. (2017) note, measuring the impacts of climate change on mental health is challenging not only because of attribution but also because of the “complicated nature of mental health, which embraces a diverse array of outcomes (e.g. anxiety and mood disorders), many of which co-occur and all of which vary with contexts and during lifetimes. Mental health impacts are often products of long and complex causal pathways, many of which can be traced back to distal but potent root causes, such as famine, war, and
poverty, of which climate change is an accelerator\textsuperscript{61} (p. 14). Mental health, like physical health, is shaped by social and ecological factors that can influence – and often amplify – other determinants of health, like a changing climate.

3.1.4.1.2 Opportunities of Attributing Mental Health to Climate Change

It is important to locate climate change within the discourse on mental health because the frequency, intensity, duration, and complexity of climate change effects is on the rise and thus climate-related mental health outcomes are also increasing – adding to the already burgeoning burden of mental illness and mental problems globally. Acknowledging the mental health consequences of climate change helps the mental health community to discern and anticipate patterns of mental illness, like for example PTSD following extreme weather events. Also, an understanding of the unequal impacts of climate change on marginalized groups supports public health prevention strategies that seek to protect those most susceptible to mental illness and mental problems.

There is a risk that climate-related psychosocial consequences may become diluted in the high prevalence of mental health disorders globally; therefore, there is a need for additional research within the specific domain of climate change and mental health. If there is a better understanding of the linkages between climate change and mental health, there are more opportunities to understand and address climate change and mental health via actions rooted in climate change mitigation and adaptation that support psychosocial resilience. Specifically, the field requires more empirical research on the mental health consequences of climate change, especially as this research relates to marginalized communities and the risks and impacts associated with chronic climate change-related hazards and consequences (like sea-level rise, rising temperatures, and ecological degradation). To address the overarching interplay of social
and environmental determinants of health that can magnify climate change-related risks on mental health, a health equity approach to this area of study is required. Secondly, there is a need to better understand climate change-related hazards within the context of mental health sequelae. Research in this area could help to explore the complexity of climate change and mental health attribution by recognizing the role of predisposing mental health conditions while also taking into account the perceived and actual risks and impacts related to a changing climate. This type of research can support a better understanding of the triggers and timing of climate change-related mental health effects as well as support policy and program development for mental health resources.

Attributing mental health outcomes to climate change also presents opportunities to assess, build, and strengthen mental health systems. In 2015, the World Health Organization (WHO) set forth the framework for building climate resilient health systems. This framework provides guidance for health professionals to predict, prevent, and prepare for climate change-related shocks with the ultimate aim of protecting population-level health by increasing health systems’ capacity to cope, adapt, sustain, and strengthen in the wake of a changing climate. While the framework overlooks the intricacies of mental health systems — like the current and prevailing lack of mental health infrastructure, funding, and resourcing globally — it does provide the necessary guidance to build mental health systems resiliency. Articulating climate change as a determinant of mental health not only brings awareness of the broad consequences of climate change on health but also supports the enhancement of mental health systems.

In sum, the key benefits of understanding the linkages between climate change and mental health include: enhanced knowledge of patterns of illness; an added emphasis on the global call to action to reduce and address climate change risks and impacts; in-depth knowledge
of the risks and impacts to marginalized communities; and, better planning for mental health response and mental health systems resiliency.

3.1.4.2 Current Risks and Impacts of Climate Change on Mental Health

It is challenging for people to recognise changes in climate because these changes appear distant or abstract – especially because climate is often confused or lost in perceptions about weather or seasonal change. The influential sociologist Anthony Giddens refers to this space and time distancing of the climate change problem as the Giddens Paradox. The Giddens Paradox states that: “since the dangers posed by global warming aren’t tangible, immediate or visible in the course of day-to-day life, many will sit on their hands and do nothing of a concrete nature about them. Yet waiting until such dangers become visible and acute – in the shape of catastrophes that are irrefutably the result of climate change – before being stirred to serious action will be too late” (p. 2). Marshall (2015) contends that part of the time and space distancing of the climate change problem, and thus the reluctance to act, is reinforced by the Western political discourse on climate change as a future-facing problem that intentionally overlooks the centuries of industrialization, fossil fuel consumption, and land degradation that contribute to anthropogenic climate change. Marshall (2015) calls for a reckoning with this discourse by noting: “climate change is a future problem. But it is also a past problem and a present problem. It is better thought of as a developing process of long-term deterioration, called, by some psychologists, a “creeping problem.” The lack of a definite beginning, end, or deadline requires that we create our own timeline. Not surprisingly, we do so in ways that remove the compulsion to act. We allow just enough history to make it seem familiar but not enough to create a responsibility for our past emissions. We make it just current enough to accept that we
need to do something about it but put it just too far in the future to require immediate action” (p. 64).

Noting the Giddens Paradox and the reckoning that Marshall (2015) asks us to have with the “creeping problem” of climate change, it becomes important to confront the current mental health consequences related to climate change that are happening now. To do so, it is useful to explore the conceptual framework of climate change and mental health developed by Berry et al. (2010). These authors organize climate change-related hazards into three categories: acute (flooding, hurricanes, etc.), sub-acute (pervasive drought), and chronic (rising sea-level, increasing temperatures). These climate change-related hazards lead to a variety of direct, indirect, and overarching psychosocial consequences that are occurring now — disproportionately affecting those most marginalized.

Direct psychosocial consequences of climate change include trauma related to extreme weather events, like floods, hurricanes, wildfires, and heat waves. Indirect mental health consequences of climate change occur through social, economic, and environmental disruptions (e.g. famine, civil conflict, displacement, and migration) related to a changing climate. The overarching psychosocial consequences of climate change relate to the long-term emotional distress caused by awareness of the threats and impacts of climate change on the current and future wellbeing of the earth and its inhabitants. The multidimensional climate change and mental health pathway leads to a variety of unequal psychosocial consequences explored below.

3.1.4.2.1 Direct Mental Health Consequences of Climate Change

There is now an extensive and rapidly expanding body of research exploring the current mental health consequences of climate change-related extreme weather events. Extreme heat events and humidity have been noted to increase hospital admissions for mood and behavioural
disorders, including schizophrenia, mania, and neurotic disorders. Scholars in the field note that heat-related mental health morbidity tends to occur most often in people with impaired thermoregulation, namely people with pre-existing mental health illness and problems, people taking prescription medications (specifically lithium, neuroleptic and anticholinergic drugs), and those with substance abuse (alcohol and drugs) problems. Extreme heat is also linked with an increased risk of wildfires, which also directly impact mental health. Bryant et al. (2014) mapped the psychological outcomes of the Black Saturday bushfires in Victoria, Australia; in communities most at risk to the impacts of bushfires, these authors found incidences of PTSD, psychological distress, and depression related to the fires.

The direct mental health consequences related to flooding and hurricanes are also well documented. In a study of 30 locations in England and Wales, Tunstall et al. (2006) conducted interview surveys with residents affected by flooding. They found that psychological impacts were more commonly reported than physical effects. One study researching the psychosocial impacts following Hurricane Katrina estimates that 20 to 35 percent of survivors experienced some form of mental health issue following the disaster. Galea et al. (2007) reported a 31.2% prevalence of anxiety-mood disorders amongst Hurricane Katrina survivors, while Rhodes and Chan (2010) found that nearly half (47.7%) of marginalized community members of New Orleans (mainly low-income, African American women) showed probable signs of PTSD after Hurricane Katrina.

While PTSD is often reported as one of the most severe mental health impacts related to acute climate change-related disasters, there have also been increasing reports of suicide and suicidal ideation following extreme weather events. Chand et al. (2008) note one Italian study that found higher rates of suicide in northern communities with greater climate variability.
Dodgen et al. (2016) highlight the risk of homicide-suicides after extreme weather events by noting the doubling of these incidents following Hurricane Andrew in 1992 in Miami-Dade County\textsuperscript{130}. There is also observed evidence of increased suicidal thoughts (from 2.8\% to 6.4\%) and plans to commit suicide (from 1.0\% to 2.5\%) 18-months after an extreme weather event\textsuperscript{130}. Notably, however, the overall evidence linking changing climate and suicide is still inconclusive. Studies on suicidality in natural disaster contexts, for example, vary considerably in study methodology and timeframes considered, with recent reviews indicating divergent trends in suicidality rates following exposure to extreme events, ranging from an initial decline, to neutral effects, all the way to a delayed increase in suicidality\textsuperscript{140}.

On a deeper level, the psychological responses of communities and individuals to disasters are complex and varied and do not necessarily simply result in more mental illnesses. Rebecca Solnit (2010), in \textit{A Paradise Built in Hell}, usefully describes the complicated psychosocial consequences that can arise after an extreme weather event as, “that sense of immersion in the moment and solidarity with others caused by the rupture in everyday life, an emotion graver than happiness but deeply positive. We don’t even have a language for this emotion, in which the wonderful comes wrapped in the terrible, joy in sorrow, courage in fear. We cannot welcome disaster, but we can value the responses, both practical and psychological”\textsuperscript{141} (p. 5). Exploring the complexity of psychological responses in the book, \textit{Climate change and human well-being}, Weissbecker et al. (2011), discuss the full spectrum of psychosocial consequences of climate change-related events ranging from mental illness to more positive experiences like ‘Post Traumatic Growth’ (PTG), empathy, compassion, altruism, and emotional resilience\textsuperscript{53}.
3.1.4.2.2 Indirect Mental Health Consequences of Climate Change

The indirect mental health consequences of climate change can occur as a result of damages to physical and social infrastructure, physical health effects, food and water shortages, conflict, and displacement from acute, subacute, and chronic climatic changes. One of the most well-documented climate hazards that indirectly influences mental health is drought. Long-term droughts affect food and water supplies and can subsequently affect the economic and mental wellbeing of land-based workers, most often impacting those living in rural and remote communities. In a quantitative analysis of drought and distress in Australia over a seven-year period, authors found that rural dwellers experience more distress due to the droughts than their urban counterparts. In a systematic review of the literature, authors note the most prominent causal pathway linking drought and mental health is via the economic effects from land degradation. These effects are most prominent amongst farmers whose economic livelihoods depend on environmental conditions. Exemplifying this, a 2008 study in New South Wales, Australia reports that nearly three quarters of farmers report stress related to persistent drought. Some authors also suggest that income insecurity related to drought increases the risk for suicide among farmers.

Long-term drought has also been increasingly linked to conflict and forced migration, which can influence psychosocial outcomes like the propensity for stress, PTSD, anxiety, and trauma. The Institute for Environment and Human Security of the United Nations University estimates that migration due to climate change may vary drastically, citing estimates of between 25 million to 1 billion by 2050, with 200 million as the most frequently cited estimate. The rise in the number of ‘climate migrants’ has been identified as a significant risk by an increasing number of defence and security experts. Gleick (2014) postulates that the civil conflict in
Syria can be traced to the agricultural failures in 2006-2009 and the returning drought in 2011\textsuperscript{41}. In 2011, over 1.5 million Syrians moved from rural, agricultural areas to urban areas seeking refuge from the pervasive drought, failed agriculture, and lack of food and water\textsuperscript{41}. Pervasive ecological degradation, poor policy response to water and food insecurity, and ongoing tensions between rural and urban community members, have arguably all contributed to civil unrest and ongoing conflict in Syria\textsuperscript{41}. According to the United Nations, the number of displaced Syrians has reached over 5 million people in the past 5 years\textsuperscript{148}. Migration from a war-torn country to a host country where culture, language, and lifestyle may be vastly different may also contribute to psychosocial malaise as displaced migrants can face stressors associated with xenophobia and racism from people in their new host country\textsuperscript{41}. Conversely as Siriwardhana and Stewart (2013) note, displacement may also support psychosocial resilience by fostering hope and belonging for refugees in host countries where they feel welcomed, safe, and experience better living conditions\textsuperscript{149}.

At the community level the indirect mental health consequences of climate change are understudied. These consequences may include things like a diminishment in community cohesion, the loss of community identity, threats to a sense of continuity and sense of belonging as people are forced to move in and out of communities because of environmental stressors, and an undermining of cultural integrity if people have to leave their homelands\textsuperscript{43}. Migration challenges the identity, sovereignty and heritage of people who have to leave their homelands. It also challenges the integrity and continuity of people’s traditional ways of life. Threats to community health also include an increased likelihood of criminal behaviour, violence and aggression as community members experience various stressors related to climate change\textsuperscript{43}. 
3.1.4.2.2 Overarching Psychosocial Consequences of Global Climate Change

Awareness of the looming threats and current risks and impacts of climate change presents challenges to emotional and social wellbeing\textsuperscript{127}. Since early 2007, environmental philosopher Glenn Albrecht and colleagues have taken note of emotional distress related to the awareness of the overarching problem humans face as a result of global climate change\textsuperscript{6}. Albrecht et al. (2007) suggest that this awareness contributes to ‘psychotropic syndromes’. Psychotropic syndromes include phenomena such as ‘ecoanxiety’, ‘ecoparalysis’, and ‘solastalgia’\textsuperscript{6}. ‘Ecoanxiety’ refers to the anxiety people face from constantly being surrounded by the wicked and threatening problems associated with a changing climate\textsuperscript{6}. ‘Ecoparalysis’ refers to the complex feelings of not being able to take effective action to significantly mitigate climate change risks. ‘Solastalgia’ refers to “the distress and isolation caused by the gradual removal of solace from the present state of one's home environment”\textsuperscript{23} (p. 50). The term ‘solastalgia’ is also commonly referred to throughout much of the literature on climate change and mental health to articulate the feelings associated with displacement following a climate change-related extreme weather event\textsuperscript{40}. This new vocabulary provides the language to explore some of the broader mental health implications of escalating climate change risks.

For many people, climate change is experienced by way of vicarious threats or as an existential threat to civilisation\textsuperscript{127}. People may experience vicarious threats when they receive weather warnings related to future disaster seasons or when they hear about environmental stressors experienced by people in other places. For many people, this is largely how climate change is experienced – not as a direct threat, but as a global threat, often distant in time and place, or as a threat to our very way of life. Qualitative research finds evidence of some people...
being deeply affected by feelings of loss, helplessness, and frustration as they engage with the problems of global climate change\textsuperscript{150}.

3.1.4.3 Priority Actions to Address Climate Change and Mental Health

Acting on the health consequences of climate change requires actions rooted in both mitigation and adaptation at all levels – from global to local – and from all sectors and individuals. Climate change mitigation refers to overarching efforts to reduce greenhouse gas emissions and enhance carbon sinks to slow the speed, scale, and magnitude of climate change\textsuperscript{1}. Key climate change mitigation priorities include reducing energy demand (through reduced consumption and increased energy efficiency); a swift and equitable transition from fossil fuels to renewable energy; reducing emissions from agriculture and forestry; and strengthening land-based emissions sequestration. Climate change adaptation refers to interventions that respond to the effects of climate change by adjusting, moderating, and coping with the risks and impacts of climate change\textsuperscript{1}. Adaptation is ultimately affected by the capacity to adapt, which is the ability and willingness to respond to climate change mediated by individual and collective agency\textsuperscript{17}. Adaptive capacity is determined by things like: governance, economics, infrastructure, technology, information and skills, institutions, and equity\textsuperscript{151}. Examples of adaptation interventions that address climate change and health include: surveillance and monitoring of disease burdens related to climate change and health; education (e.g. public health promotion of the risks of vector-borne illness), and capacity building (e.g. psychological first-aid, and surge capacities at hospitals and health care facilities); preparing for extreme weather events; and re-locating entire communities to geographic areas where sea-level rise and frequent extreme weather events are less-likely to occur\textsuperscript{13}.
Within international approaches to combat climate change there is a significant focus not only on mitigation but also adaptation. From the Paris Accord to the Lancet Countdown on Climate Change, to the Planetary Manifesto and climate action marches – policy makers, academics, and the general population are taking steps to mitigate and adapt to the current threats and impacts to preserve a future for the next generation\textsuperscript{25,61}. These actions, however, often fail to address the gap between stated goals of emissions reduction commitments and the speed of actions required to keep global warming well below 1.5 to 2 degrees Celsius\textsuperscript{152}. 

With a specific focus on mental health and climate change, there are a number of global programs in place that indirectly address the topic area — like for example measures to enhance and protect mental health in the Sustainable Development Goals 2016-2030\textsuperscript{153}; efforts by the Movement for Global Mental Health to increase the holistic conceptualization of health to incorporate mental health\textsuperscript{154}; the Sendai Framework, a 15-year disaster risk reduction program\textsuperscript{155}; and, the United Nations Human Settlement Program that promotes sustainable urban development\textsuperscript{156}. There is a need, however, to harness health and mental health related synergies amongst these global agreements since none of these in and of themselves will likely be sufficient to address the future risks and impacts of climate change.

Coordinated, collaborative efforts to address the mental health implications of climate change not only require policy frameworks but also concrete actions on behalf of mental health practitioners. Such concrete actions may include: communicating about climate change and mental health in a way that helps people to see that it is relevant and salient to them; advocacy for greenhouse gas reductions in health care facilities and engagement in efforts to reduce the environmental footprint of the health care sector; and, engaging in adaptation measures like preparing for and responding to extreme events.
3.1.4.3.1 Psychological Adaptation

Psychological adaptation requires a set of responses, it requires an acknowledgement of the grave threats posed by climate change and the profoundly consequential global crisis. It requires coping strategies to manage the feelings and thoughts that arise so that people can face up to, and come to terms with, these threats and consequences rather than avoiding the creeping problem of climate change. It also requires behavioural and psychological engagement, in which people change and adjust their behaviour and lifestyle in order to reduce the threat and protect themselves.

Active hope — something Macy and Johnstone (2012) champion — supports psychological adaptation. Active hope is required to move hopeful intentions from a passive state where waiting for someone else to take-on the task of addressing the climate change problem is replaced with an active process of climate change mitigation and adaptation behaviours. The key point here is that hope alone cannot provide sufficient protection from the escalating risks of climate change. This active process occurs when the reality of the problem is acknowledged as is the magnitude of the problem, intentions to address the problem are set, and engaged actions take place. While these three steps may oversimplify the complexity of acting in the face of bureaucracy, climate denialism, or downright avoidance and ignorance of the magnitude of the problem area, these three steps are indeed the pivot points of transformation. These pivot points, however, need to be upheld by global political will and policy commitments that tackle the problem at the appropriate scale and speed. To do so, public awareness of the severity, magnitude and range of health impacts — current and projected — is required to pressure governments and communities to act now. Also, discernible interventions are needed to
demonstrate a tangible path forward to respond to the risks and impacts we face in a changing climate. Examples of these types of interventions are explored below.

3.1.4.3.2 Adaptation Measures

Adaptation measures that address the psychosocial impacts of climate change come in a variety of forms, i.e. policies, practices, behavioral interventions, community-based interventions, specific training, and pharmacotherapeutics. Some general approaches to address climate change-related mental health problems or illnesses include: primary care interventions, individual and group-based therapy, cognitive based interventions (including cognitive based therapy, cognitive restructuring, and, stress inoculation training), and crisis counselling\textsuperscript{124}. More broadly, emotional resiliency may be sustained by engaging with art, literature, and spirituality. In addition to the above, the list below contains some specific priority adaptation mechanisms that ought to be considered to support population-level mental health in a changing climate:

- policy responses: improving access and funding to mental health care;
- surveillance and monitoring: administering epidemiological surveys after extreme weather events, and monitoring emergency department visits during heat waves and following extreme weather events;
- practice: the application of a stepped-care approach to mental health that is often used in disaster mental health to support different levels of interventions depending on the timing of the disaster and the level of distress [see\textsuperscript{158, 159}];
- preparation and response: climate change adaptation/ resilience planning in the mental health system;
- community-based interventions: climate change resilience plans that address psychosocial wellbeing; and,
• special training for care providers and first responders: e.g. Psychological First Aid.

Other innovative approaches to addressing mental health and wellbeing in a changing climate writ large include experiencing and preserving nature. Koger et al. (2011) suggest that environmental preservation provides people with a sense of stewardship and personal investment that can help people overcome feelings of hopelessness, anxiety, and ecoparalysis. Koger et al. (2011) suggest: “if people feel a deep connection to places, wilderness, and other species, then threats to these others are much more likely to be viewed as personal issues” (p. 230). Other research on the restorative benefits of natural environments and settings has found that biodiversity in natural environments is important for human health and wellbeing and has a particularly positive effect on mood, attention and cognition. A common practice in Japan to reduce stress and anxiety is the practice of shinrin-yoku, otherwise referred to as forest bathing. In a study by Lee et al. (2011), authors found that forest bathing resulted in decreased cortisol levels, pulse rates, and negative feelings and significantly increased positive feelings.

Research on people’s interactions with nationally important ecosystems, like World Heritage Areas for example, highlights positive impacts including quality of life, a sense of place and belonging, self-identity, restoration and inspiration.

While there are a number of interventions to support psychosocial wellbeing within a changing climate, it is important to highlight that many of these interventions are still quite nascent and administered in ad hoc fashion, and these interventions are mainly accessible in developed countries. Sustainable mental health care in developed and developing nations is urgently needed as the realities of climate change become more and more apparent – especially for those most marginalized. Further, there are research needs in this domain where the efficacy and accessibility of mental health interventions-related to climate change are assessed.
3.1.5 Conclusion

Climate change affects mental health in a variety of direct, indirect, and overarching pathways — disproportionately affecting those most marginalized. The mental health implications of climate change can result in mental problems and illness as well as affirmative psychosocial outcomes. While the timing and triggers associated with climate change and mental health may vary, making it challenging to establish the manifold links between climate change and mental health, the opportunities of attributing mental health to climate change support climate mitigation as well as mental health action and psychosocial resiliency. Global commitments, like the Paris Accord, the SDGs, and the Sendai Framework are needed to help advance global mental health and climate action; however, coordination amongst these commitments is required — as are concrete actions on behalf of health practitioners — if the issue of mental health and a changing climate is to be efficiently and holistically addressed. Further, a reckoning with social, environmental, and climate injustice is needed if actions to address climate change and mental health are to be rooted in health equity. Transformative action — where inequities are addressed, active hope is demonstrated, and communities are mobilized — is the defining opportunity of the 21st century to address the climate change impacts on mental health.

Declarations

- Ethics approval and consent to participate
  - Not Applicable
- Consent for publication
  - Not Applicable
- Availability of data and material
  - Not Applicable
• Competing interests
  o The authors declare that they have no competing interests.

• Funding
  o There are no funding arrangements to declare.

• Authors' contributions
  o GB conceived of this paper and developed the paper outline. KH undertook the literature review, developed the paper and incorporated co-author contributions. GB, JW, SB, and LR contributed generally to successive iterations of the paper. All authors approved the final manuscript.

Acknowledgements
  o Thank you to the anonymous reviewers for their valuable feedback.
3.2 Addressing Mental Health in a Changing Climate: Incorporating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments

Authors
Katie Hayes: Dalla Lana School of Public Health, University of Toronto, Toronto
Blake Poland: Dalla Lana School of Public Health, University of Toronto, Toronto

3.2.1 Abstract

A growing number of health authorities around the world are conducting climate change and health vulnerability and adaptation assessments; however, few explore impacts and adaptations related to mental health. We argue for an expanded conceptualization of health that includes both the physiological and psychological aspects of climate change and health. Through a review of the global literature on mental health and climate change, this analytical review explores how mental health can be integrated into climate change and health vulnerability assessments and concludes with recommendations for integrating mental health within climate change and health vulnerability and adaptation assessments.

Keywords: Climate change; mental health; vulnerability; assessment
3.2.2 Introduction

It is well understood that climate change affects health; most articles addressing the topic area cite the proclamation made in the 2009 Lancet article, Managing the health effects of climate change, that “climate change is the biggest global health threat of the 21st century”\textsuperscript{14}, where health is understood to mean physical health. The lesser known, and often overlooked, health impact of climate change is the mental health implications from our changing climate. Often, this oversight is due to the general lack of attention to mental health within broader conceptualizations of health, and also to the challenges of monitoring, assessing, and predicting the mental health implications from climate change-related hazards. We argue for an expanded conceptualization of health that includes both the physiological and psychological aspects of climate change and health.

There is also an overarching misunderstanding that mental health equates only to mental illness and mental problems. However, mental health, like physical health, includes states of affirmative health, wellbeing, and emotional resilience, as well as illness. Moreover, mental health is encapsulated in the conceptualization of psychosocial health—the interplay of psychological and social wellbeing\textsuperscript{13}. In other words, things that affect our social world like climate change-related income insecurity, food and water insecurity, and conflict and displacement have implications for psychological as well as social wellness. A further consideration is that a holistic understanding of mental health, often found within Indigenous ways of knowing, includes spiritual wellbeing and connectedness to nature and one’s environment\textsuperscript{164}.

Arguably, because the mental health implications from a changing climate are often overlooked, there is a weakened understanding of the burden of illness associated with climate
change. A focus on climate change and mental health can help enhance the understanding of factors that may enhance psychosocial resilience. Briefly, psychosocial resilience is defined here following Kumar (2016), as: “the ability of an individual or a system to recover from a setback, adapt well in the face of trauma, and survive and thrive despite significant adversity and stress”\(^{21}\) (p. 3). One way to evaluate climate change implications for health is through climate change and health vulnerability and adaptation assessments (CCHVAA). CCHVAAAs are policy-relevant tools that capture evidence of the health consequences related to climate change, as well as interventions that support adaptation to a changing climate. While a growing number of health authorities around the world are conducting CCHVAAAs, to our knowledge, few explore impacts and adaptations related to mental health. Typically, assessment tools overlook mechanisms that can support assessment-users to capture evidence of the mental health implications of climate change.

Following a brief overview of research on the mental health consequences of climate change, we explore tools and approaches that support assessment-users to monitor, measure, and evaluate the mental health implications of climate change—including mental wellbeing, resilience, mental illness and mental problems. We explore how mental health can be integrated into climate change and health vulnerability assessments, and we conclude with recommendations to support this integration.

3.2.3 Background

3.2.3.1 Climate Change and Health

The Lancet’s Commission on Health and Climate Change warns that climate change is affecting health now and these health effects will continue to grow and magnify if efforts to mitigate and adapt to these changes are not addressed globally in a collective and timely manner.
Further, these climate change health effects amplify existing inequities—placing marginalized people, who generally have contributed the least to the climate change problem, at the greatest risk.

While the physiological health impacts of climate are well known, psychological aspects remain relatively unexplored. Some well-known health implications of climate change include: a rise in vector-borne diseases; heat-related morbidity and mortality; injury and illness from extreme weather events; increased cardiovascular disease and increased aeroallergens from poor air quality; and water and food security concerns from water and food-borne illnesses and malnutrition. Lesser known climate change impacts on mental health include direct climate impacts, like extreme heat or extreme weather events (including floods, wildfires, hurricanes, heat waves, etc.); indirect, like the social strain and resource loss related with drought, sea-level rise, melting permafrost, or overarching impacts associated with the knowledge and awareness of climate change impacts on planetary and public health.

Notable direct climate-related hazards that affect mental health include: extreme heat, extreme weather events, and morbidity associated with vector-born disease (VBD). Extreme heat has been shown to increase mood and behavioral disorders amongst people with pre-existing mental illness and the elderly who have poor thermoregulation. Extreme weather events, like flooding, hurricanes, and wildfires have been linked to depression, anxiety, post-traumatic stress disorder (PTSD), suicidal ideation, substance abuse, vicarious trauma, loss of identity and a loss of a sense of place, relationship strain, and helplessness. Vector-borne diseases like West Nile Virus and Lyme disease may compound mental health issues for people with pre-existing mental health illness by contributing to cognitive, neurological, and mental health problems.
At the community level, climate change-related drought and sea-level rise can threaten natural resources, placing strain on communities, resulting in displacement, violence, and crime. Further, a loss of land-based activities and occupations, due to a changing climate, can affect personal and community socioeconomic status leading to social and economic instability, loss of community, and a disrupted sense of belonging. This is particularly evidenced in the north where climate changes are more pronounced, and their impacts felt more keenly by those living on the land. The overarching awareness of climate change as a threat to well-being and survival is also a source of distress, anxiety, and fear; this awareness, however, may also trigger climate change mitigation and adaptation behaviors that support community and build psychosocial resilience. Importantly, there is research that suggests that extreme weather events may also, in some cases, incite compassion, altruism, and trigger post-traumatic growth—wherein trauma may be met with personal strength, a sense of belonging, gratitude for existence, hope, and transformation. The psychosocial outcomes related to a changing climate are thus broad and wide-ranging.

3.2.3.2 Study Populations

While the mental health implications of climate change can affect anyone, the impacts tend to be amplified in populations who are most marginalized. Much of the current, empirical literature is focused on the mental health implications of climate change for Indigenous peoples, compounding existing social inequities stemming from a legacy of colonization. In Australia, researchers have found that Indigenous groups tend to be most exposed to the extensive and reoccurring effects of wildfires and drought, which threaten agriculture, food and water supplies, and social and economic wellbeing, leading to a whole host of psychosocial trauma.
In Canada’s circumpolar north, a team of researchers conducted a multi-year study on the climate change-related mental health implications to Inuit people\textsuperscript{86, 171}. They found that warming temperatures and melting sea ice affect food security, culture, travel, and autonomy of Inuit people, thus impacting a sense of place and identity and contributing to mental health problems and addictions\textsuperscript{86, 171}. Other populations disproportionally at risk for the mental health consequences of climate change include: children, seniors, women (particularly pregnant women), resource-based workers (including farmers and fishers), people with low socioeconomic status, and people with related, pre-existing conditions\textsuperscript{43, 127, 130, 168}. What is clear is that climate change is an environmental determinant of health that disproportionately affects those who are most marginalized based on existing social determinants of health\textsuperscript{63}.

### 3.2.3.3 Climate Change and Health Vulnerability and Adaptation Assessments

Increasingly, CCHVAAs are being conducted around the world to help inform public health decision-makers about the risks, impacts, and vulnerabilities associated with climate change and health. These assessments also help decision-makers identify opportunities to build or enhance health adaptations to a changing climate, including: public education regarding heat health and vector-borne disease risks and how people can protect themselves from these; and health sector preparation for surge capacities during and after extreme weather events\textsuperscript{13}. CCHVAAs can be conducted at all levels from local to federal. In Canada, national climate change and health assessments have been conducted as early as 1997\textsuperscript{172} and Health Canada is preparing for the upcoming release of a national climate change and health assessment in 2021\textsuperscript{173}. As of 2017, nine sub-national (including regional, provincial, and municipal) climate change and health assessments have been completed or are nearing completion in Canada\textsuperscript{174}. The
US and the UK have federal mandates to prepare CCHVAAs every four to five years so that decision-makers are abreast of the latest science and research\textsuperscript{175, 176}.

The current body of assessment reports present compelling information about the region-specific physical health implications of climate change; however, few assessments present information on mental health effects. Notably, the forthcoming Health Canada assessment is developing a chapter on the mental health consequences of climate change\textsuperscript{173}. Another noteworthy exception is the 2016 US Climate Change and Health Assessment that devoted an entire chapter to reviewing the current literature on the topic\textsuperscript{130}. In that review, authors point out that there are currently no psychosocial impact assessments that empirically measure and “identify important changes in mental health and well-being associated with climate change”\textsuperscript{130} (p. 288). They suggest that psychosocial impact assessments and monitoring programs ought to be implemented within assessments to provide standardized methods to measure and predict the psychosocial outcomes from a changing climate\textsuperscript{130}. Fritze et al. (2008) echo these sentiments and voice a concern: “What kinds of indicators, data sets and data analytic techniques will be needed to predict and monitor the health and mental impacts of climate change?”\textsuperscript{127} (p. 8).

The discussion section below explores these key questions while noting the challenges and opportunities for incorporating mental health indicators into assessments. We provide guidance on how to incorporate climate change and mental health monitoring and surveillance strategies into CCHVAAs with the aim of supporting a comprehensive valuation of all of the health implications from climate change, as well as to facilitate an understanding of what is needed to support psychosocial resilience and climate change and health adaptation.
3.2.4 Methods

A global scoping review was conducted on literature at the intersection of climate change, mental health, and psychosocial resilience. A scoping review is one of many different types of literature reviews. It is similar to an evidence mapping review in that a scoping review employs a systematic search for evidence to respond to specific research questions and maps the evidence; going further than a mapping review, a scoping review typically adds a narrative about the evidence\textsuperscript{177}. A scoping review differs from a systematic review in that a scoping review does not evaluate the quality of the evidence found in the literature; further, a scoping review may include both peer-reviewed and grey literature\textsuperscript{177,178}. This scoping review includes a review of literature on the topic area as well as a review of the theory and methodology applied to the topic area to better understand the current thinking and empirical approach to the study of climate change and psychosocial health.

This review was conducted between November 2016 to July 2017 for all English articles on the topic area published between 2000 to 2017. Literature included peer-reviewed empirical studies (qualitative, quantitative, and mixed methods) as well as literature reviews, grey literature, and commentaries on the subject matter. The following databases were incorporated in this search: PubMed, Scopus, PsycINFO (Proquest), Cochrane Review, and Google Scholar, using the following keywords (as well as synonyms and related words): “mental health” or “psychosocial” and “climate change”, and “risk” or “impact”, or “adaptation” or “response” or “resilience”. A total of 9079 articles were retrieved. After removing duplicates and scanning the title and abstract of all articles for relevancy, a total of 325 remained. After reviewing the full journal articles, removing irrelevant articles and then searching the reference list of applicable articles, 276 relevant articles were retained.
3.2.5 Results

Of the 276 relevant articles, the majority (58%) of the articles were literature reviews, including systematic, narrative, and theoretical reviews. Less than 1% of the literature captured was grey literature and only three commentaries were included. The remaining 93 articles were empirical studies; 41% of these articles were quantitative studies, the majority of which were surveys using validated instruments to assess for PTSD, anxiety, and depression. These surveys were administered to understand the psychosocial outcomes related to climate-related extreme weather events — control groups typically included populations who had not experienced extreme weather events first hand. Another 46% were qualitative studies (predominantly interviews and focus groups), and the remainder of the empirical studies (13%) were mixed methods studies that included a combination of interviews and quantitative surveys. A summary of the literature reviewed for this scoping review can be found in the Supplementary Materials (see Appendix A).

Importantly, the bulk of empirical literature on climate change and mental health outcomes revealed in this scoping review pertains to direct impacts (like climate-related extreme weather events, e.g., flooding, heatwaves, etc.) at the individual-level from climate-related extreme weather events; as such, the discussion section below emphasizes how to assess the individual mental health outcomes of these direct, climate-related hazards. Notably, there is much less literature on how to assess more chronic climate change related effects (e.g., psychosocial consequences of melting permafrost, sea-level rise, and the overarching awareness of climate change), and less literature on how to assess mental health outcomes of climate change hazards at the group or community level; where possible, we have indicated indicators and measurement tools found in the literature that pertain to chronic climate change related
hazards to mental health, as well as indicators and measurement tools that assess climate change hazards beyond individual-level analysis. These gaps in research are acknowledged and future research recommendations are noted in the conclusion and recommendation section.

3.2.6 Analysis

After reviewing the emergent themes from the scoping review, we asked the following key questions of the current body of knowledge on climate change and mental health as it pertains to CCHVAs to guide the analysis:

- How can mental health considerations be integrated into CCHVAs?
- How can the current literature support health authorities to assess the burden of mental illness in relation to climate change?
- How can the current literature support health authorities to assess positive mental health in relation to climate change?
- What would a comprehensive assessment of climate change impacts to mental health look like?
- What are the limitations of integrating mental health indicators into climate change and health assessments?
- What are the opportunities of assessing mental health adaptation opportunities?

These guiding questions helped to reveal the current state of evidence on climate change and mental health, including methods, approaches, documented outcomes, and the authors’ understanding of CCHVA tools and the information health authorities need to be able to address mental health within CCHVAs.
3.2.7 Discussion

This section provides an overview of key concepts related to the field of climate change and mental health, an exploration of current research methods and approaches in the field and addresses why the gaps in research on climate change and mental health exist—including an exploration of attributional challenges. Following these topic areas, we provide an overview of key themes that emerged from the scoping review as they pertain to an application of climate change, mental health knowledge and evidence into CCHVAA.

3.2.7.1 Defining Health

For climate change and health adaptation assessments to truly capture the health implications of climate change, a holistic conceptualization of health is needed in the planning and implementation of these assessment tools — one that includes both physical and mental health, and that captures affirmative mental and physical health as well as infirmity and disease. Further, we maintain that it is important to understand that mental health is located in the larger domain of psychosocial wellbeing, which links psychological and social wellness. Psychosocial wellbeing is affected by social, spiritual, ecological, historical, and economic circumstances, and is ultimately affected by the social determinants of health.

3.2.7.2 Current Methods and Approaches

With a specific focus on empirical studies that link climate change and mental health in this scoping review, empirical studies tend to apply either surveys or interview methods to learn about the lived experience of psychosocial distress associated with a changing climate. There are very few studies that assess psychosocial resilience or affirmative mental health outcomes related to a changing climate. Most surveys exploring psychosocial distress rely on self-reported accounts from people who have experienced extreme weather events. These surveys employ a
variety of survey tools and scales (that have been validated in most cases) to assess how extreme
temperatures or extreme events impact people’s mental health and wellbeing. For example,
Albrecht et al. (2007) use the Environmental Distress Scale (EDS) to assess wellbeing in
changing environmental conditions\textsuperscript{6}. Alderman et al. (2013) use the Kessler 6 (K6)
psychological distress scale, the Post-Traumatic Stress Disorder-Civilian checklist (PCL-C), and
the Groninger Sleep Quality Scale (GSQS) to assess the psychological impacts of flooding\textsuperscript{113}.
Eisenman et al. (2015) also used the Kessler 6 (K6) psychological distress scale to understand
psychological distress related to the impacts of forest fires in Australia\textsuperscript{121}. Crabtree (2013)
conducted interviews and administered the General Health Questionnaire (GHQ) to understand
psychosocial resilience post-flood\textsuperscript{120}.

In the study of Inuit in the circumpolar north noted earlier, researchers took a mixed-
methods approach that included 72 qualitative interviews and questionnaires\textsuperscript{40}. In this same
multi-year study, researchers conducted interviews and surveys, as well as photovoice methods,
to understand how climate change impacts Inuit in Canada’s northern communities\textsuperscript{179}.
Photovoice had research participants taking photographs that visually represent how climate
change impacts their health and wellbeing\textsuperscript{179}. Another approach has been to document
emergency room visits for patients checking-in for mental health issues during heat waves or
periods of extreme temperatures\textsuperscript{180, 181, 182}. Following the 2013 southern Alberta flood, Sahni et
al. (2016) reviewed prescription drug records to document an increase in new prescriptions for
anti-anxiety and sleep aid medication following this extreme weather event\textsuperscript{110}.

These examples illustrate the range of both qualitative, quantitative, and mixed methods
approaches used to understand the mental health effects related to a changing climate. Notably
absent are methods that simultaneously address both positive and negative psychosocial impacts, a topic that will be addressed later in this discussion.

3.2.7.3 The Challenges of Attribution

Mental health is understudied in the field of climate change and health in part because of the challenges of attributing particular extreme weather events to climate change, as well as attributing mental health outcomes to climate change related extreme weather. Directional causality of the former has been well established by scholars in the climate change field who note that anthropogenic climate change affects (at the aggregated level) the frequency, magnitude, and intensity of extreme weather\(^{183}\). However, attributing causality of a specific event to climate change is challenging. Attributing climate-related extreme weather to mental health outcomes is also challenging because there are few visible indicators of trauma when people are experiencing mental illness, mental problems, or affirmative mental health; as such, it becomes more difficult to establish direct cause and effect relationships\(^{62}\). Further, mental problems and mental illness remain stigmatized around the world and people may avoid talking about or seeking mental health care in an effort to avoid stigmatization. Another reason why attribution is challenging is because mental health outcomes may emerge months or years after a traumatic experience, and triggers may not be obvious, even to those experiencing them, nor consciously related to the traumatic experience.

Of note, the bulk of the literature describes three key timeframes for the onset of psychosocial impacts: immediate (hours, days, weeks), mid-range (e.g., six months to a year), and one year and beyond\(^{43, 111, 118, 124, 127}\). Immediate effects of extreme weather events are referred to as acute trauma and are often framed as normative responses to disaster (e.g., ‘normal reactions to abnormal situations’). This kind of trauma tends to subside once security and safety
are established. Mid-range and long-term psychosocial stressors highlighted in the literature tend include anxiety, depression, stress (including PTSD), and drug and alcohol abuse that can occur after an extreme event or related to the awareness of the threats posed by a changing climate. An additional challenge to address is that the mental health implications of climate change may not be linked to one or more climate-related weather extremes, but rather to the overarching awareness of the climate change problem, which to date has received little attention in the field of psychology and psychiatry.

Despite the challenges of attributing climate change to mental health, there are advantages to doing so. Firstly, a better understanding of the true burden of illness associated with climate change can emerge — one that reflects a more holistic conceptualization of health. Identifying climate change as a determinant of mental health may help to reduce stigma. With the knowledge that environmental factors shape mental health, people may be more likely to engage in help-seeking behaviors; further, this knowledge may also encourage environmental stewardship. Locating mental health problems within the broader field of anthropogenic climate change may encourage climate change mitigation behaviors and advocacy for climate action. A robust understanding of the mental health outcomes from climate change—an understanding that includes the affirmative mental health outcomes like post-traumatic growth, altruism, and compassion—can inform the investigation of factors that can enhance or build psychosocial resilience.

The extent to which individuals feel capable of taking effective action to reduce climate-related risks may play an important role in shaping psychosocial responses to climate change. Some of the psychosocial outcomes that tend to be overlooked in the literature are the complicated and, at times, affirmative mental health effects of responding to a changing climate.
Changing climates can stimulate civic action to strengthen climate change mitigation and adaptation outcomes while also encouraging altruism, compassion, and growth. One example of this is the Transition Town movement, a network of citizen-led initiatives in communities around the world that often includes a Heart and Soul group; the Transition Town movement explores the psychosocial impacts of peak oil, climate change, and environmental degradation\textsuperscript{185}. Butler et al. (2014) note that engagement in groups like Transition Town provides a space not only for activism, but also improved overall mental health related to collaborative, community-based resilience\textsuperscript{83}. Collective action provides communities and individuals with ways to navigate the wicked problems related to a changing climate while strengthening emotional resilience, in addition to building community resilience and hopefully impacting climate change itself. Some examples of co-benefits that support psychosocial health without further contributing to carbon emissions include: walking and biking instead of driving, eating plant-based foods and reducing meat consumption, and engaging in community-based projects focused on environmental stewardship\textsuperscript{160}.

3.2.7.4 Integrating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments

Like most assessment tools, the basic steps in CCHAAs include framing the assessment, assessing indicators, and monitoring and evaluation. The World Health Organization (WHO) guidance document on CCHVAAs describes these as\textsuperscript{186}:

Step 1: Scanning and scope the assessment;

Step 2: Assess vulnerabilities;

Step 3: Assess future climate impacts;

Step 4: Assess adaptation opportunities;
Step 5: Manage and monitor risks through an iterative process, including an evaluation of health harms in other sectors.

While these steps do not actively exclude mental health indicators, mental health tends to be missed in CCHVAAAs. The reasons sometimes given for this include: a lack of awareness about mental health and climate change indicators, scarcity of surveillance data, perceived lack of effective mental health care responses, and mental health is seen as less of a pressing concern (in comparison to physical health effects)\textsuperscript{103}. Despite this, research demonstrates that mental health effects from any form of disaster far exceed the physical health implications\textsuperscript{104}. Further, the multi-causal pathway linking climate change to mental health developed by Helen Berry and colleagues indicates that there are a number of direct (e.g., extreme weather), indirect (e.g., economic loss due to drought or displacement due to sea-level rise) and overarching (awareness of the climate change problem) pathways from which mental health may be affected by climate change, suggesting there are in fact numerous climate-related indicators affecting mental health\textsuperscript{168}.

Existing guidance frameworks that support the evaluation of the mental health implications of policies, programs, and strategies include the Wellesley Institute’s primer report entitled Mental Well-Being Impact Assessment, and the UK’s Mental Well-being Impact Assessment toolkit\textsuperscript{187, 188}. While these frameworks can be integrated into existing CCHVAA tools, there are no known applications to date. Both frameworks incorporate a health equity lens and take a holistic approach to mental health, wherein mental health is seen to include mental well-being as well as mental problems and illness, and the objectives of these mental well-being impact assessment frameworks is to minimize mental health problems and issues and maximize mental wellbeing. These assessment frameworks support the analysis of the mental health.
consequences of a specific policy, project, or service; however, they do not provide guidance on specific measurement or monitoring techniques.

3.2.7.5 Assessing the Burden of Mental Illness in Relation to Climate Change

To support the monitoring and surveillance of mental health indicators in a changing climate, specific strategies are needed. There are a number of disaster mental health tools that can be repurposed to address climate-related disasters. The Inter-Agency Standing Committee (IASC), developed in partnership with the WHO, created a set of guidelines on mental health and psychosocial support in emergency settings\(^1\). The IASC guidelines recommend epidemiological surveys of mental disorders and distress of the general population following extreme weather events that take into consideration indicators of risk (e.g., marginalized status) and protective factors (e.g., access to mental health care). One potential toolkit that can be administered in this regard is the Disaster Psychological Assessment and Surveillance Toolkit (Disaster-PAST), an open-access resource that provides psychosocial assessment and surveillance tools to improve disaster preparedness and response and to enhance community recovery\(^2\). This toolkit was developed by the Louisiana State University Health Sciences Center Department of Psychiatry and the Louisiana State Department of Health and Hospitals Office of Behavioral Health following Hurricane Katrina\(^3\). Disaster-PAST provides a framework for three distinct post-disaster screening phases: the immediate screening phase (1–60 days post-event); the recovery screening phase (60 days–1 year post-event); and the extended screening phase (over one year post-event)\(^4\). Some of the validated scales used in this toolkit include the Generalized Anxiety Disorder Scale (GAD-7), the Center for Epidemiologic Studies Depression Scale (CES-D), and the Post-Traumatic Stress Checklist (PCL-C)\(^5\). One of the benefits of Disaster-PAST is that it provides distinct time frames to assess the state of mental health following an extreme event,
taking into account that the timing and triggers related to a changing climate vary. A drawback of this toolkit, however, is that it focuses primarily on mental health illness and mental problems and overlooks the positive mental health impacts of climate-related extreme weather events.

It is important to highlight that while epidemiological surveys can provide useful information on distress, coping, and recovery, there is a tendency for these to exaggerate mental health disorders, especially if they are administered soon after a disaster because people may self-report mental health disorders that are not actually pathological but rather normal responses to abnormal situations. Also of note, many survey tools have not been validated in cultural contexts outside of the western world, so their use may be geographically and contextually limited. As a result of these limitations, IASC recommends that special consideration be given to validating survey instruments in specific cultural contexts and that assessment indicators include severe mental health problems (e.g., suicidal tendencies, dangerous behaviors and behaviors that impair daily functioning) to better gauge the state of mental health beyond mental disorders that may not be pathological. Further, we argue that it is equally important to include positive mental health outcomes to better gauge the full scope of psychosocial outcomes.

3.2.7.6 Assessing Positive Mental Health in Relation to Climate Change

In “A Paradise Built in Hell” (2009), Rebecca Solnit aptly describes the complicated psychosocial consequences that can arise during and after an extreme event as:

“that sense of immersion in the moment and solidarity with others caused by the rupture in everyday life, an emotion graver than happiness but deeply positive. We don’t even have a language for this emotion, in which the wonderful comes wrapped in the terrible, joy in sorrow, courage in fear. We cannot welcome disaster, but we can value the responses, both practical and psychological”\(^{141}\) (p.5). What Solnit describes is something akin to, but perhaps more than,
‘coming to our senses’. She describes how habitual norms of respectful distance, busyness, and isolation are suspended in disasters in ways that allow for deep connection, a sense of contribution and aliveness. Given the tragedy of disaster, these conflicting emotions are often unsettling.

In “Climate Change and Human Well-being”, Weissbecker (2011), explores a range of psychosocial consequences of climate change. This range includes the propensity for mental health problems and illness as well as empathy, compassion, altruism, emotional resilience, and post-traumatic growth (PTG).53

Understanding the positive mental health outcomes following a climate-related event is pertinent because this information can provide insights into the complex, multidimensional effects of a changing climate on human health and wellbeing, and this understanding may also support climate change and health adaptation efforts. One suggested approach is to assess post-traumatic growth (PTG) after a climate change-related extreme weather event. Tedeschi and Calhoun (1995), who coined the term, describe it as “significant beneficial changes in cognitive and emotional life beyond levels of adaptation, psychological functioning, or life awareness that occur in the aftermath of psychological traumas that challenge previously existing assumptions about self, others, and the future”191 (p. 226). Some scholars define PTG as a specific form of resilience192. Resilience in the mental health literature is often conceptualized as an outcome of the coping process, as an adaptive process, or as a multifaceted construct that encompasses both process and outcome191. Some scholars contend that PTG is distinct from resilience, because PTG is a transformative193. Regardless, PTG is considered an affirmative, psychosocial response to trauma, and this response ought to be considered in an investigation of climate change hazards and their effects on mental health.
As with PTSD, scholars note that PTG tends only to occur in the context of significant traumatic stressors\(^2\). Traditionally PTG is measured via interview questions or via surveys. Interview questions often probe participants to “to identify the ways in which their lives had changed as a result of their trauma”, or to probe how participants perceive growth after experiencing trauma\(^{194}\) (p. 48). Surveys are often conducted using one of the three psychometrically validated scales: Stress-Related Growth Scale (SRGS), the Post-Traumatic Growth Inventory (PTGI), and the Benefit Finding Scale (BFS)\(^{194}\). Researchers often verify self-reported survey and interview outcomes by conducting interviews or surveys with people who are close to respondents or by using control and comparison groups\(^{194}\). We note that several questions remain, including whether the concept of PTG is only culturally relevant to the western world, and just like measuring and monitoring mental health illness or problems after a traumatic event, what is the best timing to assess for PTG.

3.2.7.7 Towards a Comprehensive Assessment of Climate Change Impacts to Mental Health

We have highlighted several measurement tools that can support the monitoring and surveillance of climate change impacts to mental health. What is needed is a comprehensive approach to the measurement and monitoring of the multi-causal pathways of climate impacts to mental health and an evaluation of the resources that support mental health in a changing climate. Specifically, we argue that monitoring and surveillance strategies that support health officials’ understanding of the full spectrum of climate impacts to mental health are needed. These strategies ought to include direct impacts from extreme weather events, the indirect impacts from climate hazards (e.g., drought, sea-level rise) that affect economic and social security and subsequently have mental health implications, as well as indicators that address the overarching awareness of the climate change problem that affects psychosocial wellbeing. The
last point is particularly resonant given how much we are now being informed by the media that this is something we should be worried about. Further, a robust understanding of availability and access to mental wellness resources and interventions is needed to better understand health adaptations to our changing climate.

Table 1 outlines measurement and monitoring techniques that can be incorporated into Step 2 (assessing vulnerabilities) of existing CCHVAAs. The climate hazards that are listed in the first column are the climate-related hazards that are most known to affect mental health, as indicated in the literature. The ‘Populations of Concern’ column lists population groups who have been found to be most affected by each hazard type. Importantly, the population groups mentioned in this table are not mutually exclusive groups, in so far as people may belong to more than one social group. The column entitled ‘Potential Mental Health Outcomes’ highlights the possible mental health consequences of specific climate hazards. These potential outcomes are not meant to be an exhaustive list, but rather a list of some of the mental health outcomes found within the literature on climate change and extreme weather. The last column highlights some ways in which mental health outcomes from a changing climate can be surveyed and monitored. These measurement tools have been chosen based on their application in prior studies that address mental health surveillance and monitoring related to climate change and/or extreme weather.
<table>
<thead>
<tr>
<th>Climate Hazard</th>
<th>Populations of Concern</th>
<th>Potential Mental Health Outcomes</th>
<th>Indicators and Measurement Tools</th>
</tr>
</thead>
</table>
| Extreme Heat   | • People with pre-existing mental health conditions.  
• People taking psychotropic medications that affect thermoregulation.  
• Elderly (who have poor thermoregulation).  
• People with substance abuse problems  
• People living in urban heat islands  
• Urban poor without access to air conditioning  
• Those living on the street  
• Outdoor laborers | • Exacerbated mood or behavioral disorders  
• Violence  
• Aggression  
• Suicide  
• Other | • Monitor emergency department visits after heat waves for an increase in patients reporting mood or behavioral disorders.  
• Monitoring mortality statistics following extreme heat events – look for co-morbidities related to mental health and incidents of suicide.  
• Interviews or questionnaires with people who experienced heat waves or extreme heat events to ask about their mental health in relation to heat events.  
• Review of police records following extreme heat events to monitor elevated incidents of violence or aggression. |
| Extreme Weather Event (flood, hurricane, drought, mudslides, etc.) | • Gender (Female)  
• Sex (Female, particularly pregnant women)  
• Age (children, infants, seniors)  
• Race and ethnicity (non-Caucasian, non-white)  
• Immigrants  
• People with pre-existing health conditions  
• People with low-socioeconomic status | • Post-traumatic stress disorder (PTSD)  
• Depression (including major depressive disorders)  
• Anxiety  
• Suicidal ideation  
• Aggression | • Surveys  
Self-report surveys of general health. Consider using:  
- General Health Questionnaire (GHQ)  
Self-report surveys of mental illness and mental problems. Consider using any, or a combination of:  
- Disaster-PAST [61]; the Generalized Anxiety Disorder Scale (GAD-7); the Post-Traumatic Stress |
<table>
<thead>
<tr>
<th>Climate Hazard</th>
<th>Populations of Concern</th>
<th>Potential Mental Health Outcomes</th>
<th>Indicators and Measurement Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• The under and non-insured (health care and home insurance)</td>
<td>• Substance abuse and addiction</td>
<td>Disorder Checklist (PCL); The Center for Epidemiologic Studies Depression Scale (CES-D); the Kessler Psychological Distress Scale (K6)</td>
</tr>
<tr>
<td></td>
<td>• The under-housed and homeless</td>
<td>• Violence</td>
<td>Self-report surveys of affirmative mental health. Consider using:</td>
</tr>
<tr>
<td></td>
<td>• Outdoor laborers</td>
<td>• Survivor guilt</td>
<td>- Stress-Related Growth Scale (SRGS); Post-Traumatic Growth Index (PTGI); Benefit Finding Scale (BFS)</td>
</tr>
<tr>
<td></td>
<td>• First responders</td>
<td>• Vicarious trauma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Altruism</td>
<td>• Compassion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Compassion</td>
<td>• Post-traumatic growth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Monitor emergency department visits after extreme weather events for an increase in patients reporting mental health problems or illness.
- Review of new prescription use for mental health and behavioral disorders after an extreme weather event.
- Interviews with primary care physicians and mental health care providers about any surges in patients reporting mental health
<table>
<thead>
<tr>
<th>Climate Hazard</th>
<th>Populations of Concern</th>
<th>Potential Mental Health Outcomes</th>
<th>Indicators and Measurement Tools</th>
</tr>
</thead>
</table>
| Vector-borne disease (VBD) (e.g., Lyme Disease, West Nile Virus, Ticks) | - Homeless  
- People with pre-existing mental health conditions  
- Outdoor workers | - VBD disease (particularly: Lyme Disease or West Nile Virus) and compounded mental health problems (e.g., cognitive or neurological impairment, behavioral disorders) | - Interviews or questionnaires with patients who have been diagnosed with VBDs to ask about perceptions of their mental health.  
- Interviews with primary care physicians and mental health care providers about any mental health co-morbidities for patients diagnosed with VBDs. |
| Sea-Level Rise or Melting Permafrost | - People who work or live near the ocean (sea-level rise) or in the arctic  
- Outdoor laborers  
- Indigenous people | - Anxiety, worry, or fear of displacement  
- Anxiety, worry, or fear of job loss  
- Loss of place (grief, solace) | - Interviews or questionnaires with residents who have or are experiencing sea-level rise or prolonged drought in their communities. Interview questions may focus on the mental health implications of: displacement, job loss associated with sea-level rise, infrastructure damage, |
<table>
<thead>
<tr>
<th>Climate Hazard</th>
<th>Populations of Concern</th>
<th>Potential Mental Health Outcomes</th>
<th>Indicators and Measurement Tools</th>
</tr>
</thead>
</table>
| Climate Change writ large (i.e., awareness of climate change threats to human and planetary health and survival) | - People at greater risk from and exposure to climate change  
- Researchers investigating climate change  
- Environmental and climate change activists  
- Environmental studies students  
- Outdoor recreationalists  
- Indigenous peoples | - Anxiety  
- Worry  
- Stress  
- Fear | - Interviews or questionnaires with people who experience concern, anxiety, worry, related to awareness of climate change threats.  
- The Generalized Anxiety Disorder Scale (GAD-7) |

- Agricultural or resource loss and resource scarcity, food and water safety and security.
Once information about the mental health vulnerabilities associated with climate change has been incorporated into Step 2, health authorities are then able to proceed with Step 3 (assessing future climate impacts). Predicting the mental health impacts from climate change is similar to predicting the physical health impacts; predictions are based upon an analysis of past health trends related to climate change and modelling future climate changes. Most climate change projections are based upon predictions of greenhouse gas (GHG) emissions, social (lifestyle, energy and technology use), environmental (land use patterns), and demographic factors (population size). The most widely used projections are the representative concentration pathways (RCPs) as described in the Intergovernmental Panel on Climate Change (IPCC) fifth assessment. The RCPs incorporate “four different 21st century pathways of GHG emissions and atmospheric concentrations, air pollutant emissions and land use. The RCPs include a stringent mitigation scenario (RCP2.6), two intermediate scenarios (RCP4.5 and RCP6.0) and one scenario with higher GHG emissions (RCP8.5). Scenarios without additional efforts to constrain emissions (’baseline scenarios’) lead to pathways ranging between RCP6.0 and RCP8.5”  

Information from the RCPs, combined with localized weather and climate data, and health vulnerabilities assessed in Step 2, all support Step 3 of climate change and health assessments.

3.2.7.8 Limitations of Current Efforts to Integrate Mental Health Indicators into Climate Change and Health Assessments

A few limitations with the table above are important to highlight here. Firstly, there are fewer empirical studies in the scoping review that reveal indicators and measurement tools related to chronic climate change-related hazards (e.g., sea-level rise, melting permafrost, and climate change writ large) compared to the empirical evidence related to direct climate change hazards (e.g., extreme heat, extreme weather events). As such, the indicators and measurement tools for direct climate hazards appear more robust. Secondly, empirical studies in the scoping
review tend to rely upon individual-level indicators of mental health consequences of climate change; as such, there are fewer measurement tools that can be applied at the group or community level. Notably, this may prove to be more labor and cost intensive for health authorities; one suggestion would be to partner with academic institutions for this type of individual-level analysis. Thirdly, there are few recommendations in the literature on the timelines for monitoring mental health outcomes from climate hazards via emergency department visits, medical records, and syndromic surveillance. With the exception of heat waves—where the time frame to monitor emergency departments is directly linked to the duration of the heat wave—there are no clear timelines for monitoring medical records and emergency department visits when it comes to mental health outcomes related to climate-related extreme weather hazards or more chronic climate-related hazards (e.g., sea-level, melting permafrost, knowledge of climate change writ large). As noted above in the section on attributional challenges, mental health outcomes from a climate-related hazard may emerge long after a hazard has passed; thus, the timeframe to study the mental health outcomes remains a challenge. Finally, there is currently a lack of available guidance on how to accurately monitor International Classification of Disease (ICD) codes related to broad mental health indicators, like depression for example.

The objective of providing Table 1 is to provide health authorities with initial guidance to support the integration of mental health into CCHVAAs based on the current state of evidence on climate change and mental health. This table is not meant to be a prescriptive application but rather an iterative template to support the ongoing measurement and monitoring of the mental health consequences of climate change.
3.2.7.9 Assessing Mental Health Adaptation Opportunities

To support health authorities with the mental health considerations of Step 4 (assessing adaptation opportunities), this section provides some guidance based on recommendations by IASC. This section concludes with an example of research methods based on IASC recommendations. The IASC guidelines recommend mapping and monitoring psychosocial resources and skills within the community affected by a disaster and mapping the interdisciplinary relationships that can enhance or improve the psychosocial response\textsuperscript{189}. This type of surveillance is particularly useful to understand the current breadth and depth of psychosocial resources to support communities before, during, and after a climate-related event; further, this information is useful for policy and program planning as it can reveal skill and resource gaps, providing critical information to support mental health adaptation to a changing climate.

Taking note of this recommended approach, the lead author (Hayes) is conducting her doctoral research on psychosocial adaptation to a changing climate. In this research, she investigates and maps the resources (programs, policies, support networks, services, etc.) available to support the long-term mental health and wellbeing of people in the town of High River, Alberta who experienced the 2013 super flood. Prior to 2001, southern Alberta (where High River is located) was exposed to frequent drought; since 2005, there has been an increase in extreme precipitation and flooding events, the most notable occurring in 2013 that resulted in four deaths and a declared state of emergency where the entire population of High River was displaced\textsuperscript{195}. High River, like many communities around the globe, is experiencing the health effects of climate-related extreme weather events. The methods outlined below can be applied, in
part or in full, in other communities to support an assessment and evaluation of mental health care capacity in a changing climate.

The research in High River begins with a rapid vulnerability and adaptation assessment that scans and scopes the current and future climate change impacts to mental health in High River and locates key resources that support mental health and wellbeing before, during, and after climate-related extreme weather events. Following this, key informant interviews are conducted with municipal government representatives, public health officials, emergency response members, and mental health care providers to understand the mental health response and response capacity before, during, and after the flood. The 2013 flood acts as the primary focusing event for research participants. The next phase of the research includes a critical discourse analysis of policy documents and media articles that outline responses in High River to the psychosocial health consequences of climate change. The researcher is mapping psychosocial assets in the community; this will be achieved by conducting focus groups with front-line public health workers to explore the formal and informal psychosocial health care resources available to people in High River. Formal health care resources may include things like access to therapies, counselling, and pharmacotherapeutics; informal mental health care resources may include faith-based institutions and community support groups. The inclusion of informal mental health care is important in this research because there are many psychosocial adaptation opportunities that lay outside formal mental health care. For example, Joanna Macy’s “Work that Reconnects” provides practices and networks to support people to confront the psychological and spiritual effects of environmental degradation and awaken to renewed hope and active engagement to address climate change implications to wellbeing\(^\text{157}\). Carolyn Baker’s “Navigating the Coming Chaos” is a toolkit designed to support people as they consciously awaken to their climate reality
through emotional and spiritual resiliency\textsuperscript{196}. By mapping both the formal and informal (or non-traditional) mental health care opportunities, we are better able to capture and assess the full spectrum of psychosocial adaptation opportunities.

The last phase of research consists of face-to-face interviews with a sample of marginalized community members to explore their experiences with psychosocial response interventions. The aim is to understand the psychosocial resource supports from the perspective of the residents who are most vulnerable to the impacts of a changing climate based on their social status, and to acquire an understanding of the accessibility of mental health resources (formal and informal) to those who are at highest risk. To our knowledge, this is the first comprehensive research project that investigates psychosocial resources to support the mental health consequences of climate change in this way, from a variety of resident and mental health professional perspectives. Results are anticipated to be available in late 2019.

3.2.8 Conclusions

In the aftermath of Hurricane Katrina and Hurricane Sandy, public health officials in the U.S advocated for the application of vulnerability and adaptation assessments to support and enhance response interventions to extreme weather events. Schmeltz et al. (2013) notes that “vulnerability assessments provide the evidence and build the political will necessary to design, fund, and implement adaptive measures that reduce the costs of interventions and responses, protect vulnerable populations, and save lives during extreme weather events.”\textsuperscript{134} (p.800). The integration of mental health measurement and monitoring strategies within CCHVAAs can support decision makers with evidence-based information on the psychosocial consequences of a changing climate, and therefore support better planning, preparation for, and adaption to the mental health implications of climate change.
3.2.8.1 Recommendations

As noted, the majority (58%) of articles in this scoping review on mental health and climate change comes in the form of literature reviews. With that said, however, this scoping review identified a number of peer-reviewed, empirical studies on the topic area (93 articles). The current state of evidence in this field provides health authorities with a basis of knowledge to support an exploration of mental health and climate change in CCHVAAs. While the field of climate change and mental health is growing, it is noted that additional empirical studies on climate change and mental health are needed to advance evidence and knowledge in this field of study and to strengthen decision-making regarding climate change and mental health adaptation. In particular, what is needed is empirical research that supports surveillance and monitoring of the psychosocial consequences of climate change that explores:

- the mental health consequences of indirect and chronic climate hazards (like pervasive drought, sea-level rise, and melting permafrost; and loss of community when entire towns are affected by climate-related events);
- the overarching mental health implications related to the knowledge of climate change writ large (e.g., amongst climate change researchers, environmental activists, and others immersed in the science and work associated with climate change and environmental degradation);
- affirmative mental health outcomes related to community resilience in the aftermath of extreme weather events (a.k.a. post-traumatic growth);
- the application of measurement and monitoring tools that investigate group and community-level mental health outcomes related to climate hazards (e.g., community resilience, sense of community, mutual aid, etc.); and,
• research that addresses the timing and triggers of mental health outcomes related to climate change hazards (e.g., initial versus delayed impacts, both positive and negative).

A further recommendation in this research domain includes: guidance for health authorities on how to accurately monitor International Classification of Disease (ICD) codes related to broad mental health indicators.

The opportunities to explore the risks, impacts, and response interventions related to climate change and mental health have policy implications that support climate change mitigation and adaptation as well as population-level mental health. One of the chief aims of documenting the mental health implications of climate change is to support and enhance the sustainability and resilience of mental health systems — a topic area that tends to be absent from the discourse on the resilience of broader health systems. Through an evidence-based review of the potentially long-term mental health consequences of climate change, decision makers have a better understanding of where and how to invest in mental health infrastructure and resources. Additionally, assessments that investigate and map formal and informal mental health interventions can provide decision makers and communities with a robust understanding of all resources currently in place, or needed, to address climate change-related distress, enhance affirmative mental health, and support psychosocial resilience.

**Author Contributions:** Conceptualization, K.H and B.P Formal Analysis, K.H. Resources, K.H.; Writing-Original Draft Preparation, K.H.; Writing-Review & Editing, B.P; Supervision, B.P.

**Funding:** This research received no external funding.

**Acknowledgments:** The authors would like to thank the insightful comments of two anonymous reviewers.

**Conflicts of Interest:** The authors declare no conflict of interest.
3.3 Factors Influencing the Mental Health Consequences of Climate Change in Canada

Authors
Katie Hayes: Dalla Lana School of Public Health, Toronto, Ontario
Peter Berry: Climate Change and Innovation Bureau, Health Canada, Ottawa, Ontario; Faculty of Environment, University of Waterloo, Waterloo, Ontario
Kristie L. Ebi: Center for Health and the Global Environment, University of Washington, Seattle WA


3.3.1 Abstract

Climate change is increasing risks to the mental health of Canadians. Impacts from a changing climate may outstrip the ability of Canadians and their health-sustaining institutions to adapt effectively and could increase poor mental health outcomes, particularly amongst those most marginalized in society. A scoping review of literature published between 2000-2017 explored risks, impacts, and vulnerabilities related to climate change and mental health. In this commentary, authors present a new assessment of evidence from this scoping review and highlight factors that influence the capacity to adapt to the mental health consequences of a changing climate. Findings from this assessment reveal eleven key factors that influence the capacity to adapt, including: social capital; sense of community; government assistance; access to resources; community preparedness; intersectoral/transdisciplinary collaboration; vulnerability and adaptation assessments; communication and outreach; mental health literacy; and, culturally relevant resources. Attention to these factors by Canadian decision makers can support proactive and effective management of the mental health consequences of climate change.
Keywords: climate change; mental health; adaptation; extreme weather; adaptive capacity; marginalized populations

3.3.2 Introduction

Canadians are increasingly vulnerable to climate change impacts, including impacts to mental health. The mental health outcomes related to climate change affect the way people think, act, feel, and interact, and they can arise from short-term hazards, like flooding or hurricanes, or from an understanding of the potential long-term effects of climate change. Mental health effects related to climate change include mental illness and mental challenges as well as positive mental health outcomes.

Recently, a scoping review by Hayes and Poland (2018) identified and synthesized evidence from the global literature on risks, impacts, and vulnerabilities related to climate change and mental health with a specific focus on the Canadian context. Notably missing in the global literature on climate change and mental health is a focus on psychosocial adaptation to a changing climate. This topic area is particularly salient in Canada, given it is warming twice as fast as the global average, thus both mitigation and adaptation efforts are urgently needed to protect human and planetary health. In this commentary, authors present a new assessment of this original scoping review, exploring factors that influence the capacity to adapt to the mental health consequences of climate change in Canada. While the lessons-learned from this commentary can be applied in other countries, this commentary focuses on the Canadian context to provide information required by decision makers facing challenges addressing climate change

---

*** The term mental health is encapsulated in the definition of psychosocial health. Psychosocial health refers to psychological and social wellbeing.

§§§ Mental illness refers to conditions that result in moderate to severe mental disorders.

**** A scoping review refers to a type of literature review where researcher map evidence in a particular area of study, synthesize this evidence, and provide a narrative of the evidence, while also identifying gaps in the literature.
on mental health now. The objectives of this commentary are two-fold: 1) to identify response interventions and factors (at the societal level††††) that influence the capacity to adapt to the mental health consequences of a changing climate; and 2) to provide lessons-learned for climate change adaptation in Canada.

Before delving into the topic area, it is prudent to define three key terms used throughout this document. First, response interventions refer to any form of formal or community-based care, policies, or programs that support mental health. Second, adaptation in this report refers to any mechanism, practice, or behaviour-change that helps people, communities, and institutions cope with the mental health impacts of climate change and thrive, increasing their resilience to future impacts17,151. Third, adaptive capacity determinants refer to factors at the individual level or societal levels that support or enhance adaptation. At the individual level, adaptive capacity is determined by individual agency, the perceived need to adapt, the willingness to adapt, and the availability of resources to support adaptation17. At the societal level, adaptive capacity determinants include things like: governance, economics, infrastructure, technology, information and skills, institutions, and equity151. The focus of this article is on societal level adaptive capacity determinants that support mental health in a changing climate.

3.3.3 Methods

In this commentary, we provide a new assessment of literature from a recent scoping review that explored the risks, impacts, and vulnerabilities related to climate change197. We review the evidence of climate change impacts to mental health and assess information that supports psychosocial adaptation to a changing climate in the Canadian context.

†††† Societal level response interventions herein refer to: response interventions that can be taken by federal, provincial, municipal, or local decision-makers, to support adaptation within Canadian society.
The original scoping review captured literature from peer-reviewed and grey sources. As research on climate change and mental health is relatively nascent, both peer-reviewed and grey literature were needed to understand the breadth and depth of climate change risks and impacts on mental health. Inclusion criteria for the original scoping review study included all English peer-reviewed and grey-literature published globally between 2000 and 2017 relating to climate change and mental health. Publications were included if they addressed: how a changing climate affects mental health (e.g. risks, impacts, and vulnerabilities) and/or how climate-related impacts to mental health are managed (e.g. responses and response capacity). Articles were excluded if they only included a passing mention that climate change impacts mental health or a passing mention about responding to the mental health consequences of climate change.

The original scoping review drew upon the global literature, applying lessons-learned to a Canadian context. All types of literature were included in the scoping review search strategy, including: literature reviews, empirical studies, and reports. The original search terms included: “mental health” or “psychosocial” and “climate change”, and “risk” or “impact”, or “adaptation” or “response” or “resilience”, as well as synonyms and related words. The terms “resilience” and “global warming” were not explicitly included in the formal search terms; however, in the snowball search (highlighted below), the first author searched for literature that used these terms as well as “extreme weather”. The first author established the search strategy and conducted the literature review in consultation with the second author of this commentary. The following databases were used to search for peer reviewed literature: PubMed©, Scopus©, PsycINFO (Proquest)©, Cochrane Review©, and Google Scholar™. The initial search captured 9,079 articles. A snowball search identified a further 25 articles. Duplicates were removed and articles
not meeting the inclusion criteria were removed after a review of all abstracts. A total of 276 articles met the inclusion criteria.

The original scoping review protocol was not registered; however, a summary of the literature reviewed for this scoping review — including the literature type, study design and location, participants, and outcome measures — can be found in the supplementary materials in the publication by Hayes and Poland (2018). The analyses performed by Hayes and Poland (2018) focused on the use of mental health indicators in climate change and health vulnerability and adaptation assessments in Canada. The new assessment presented in this commentary goes beyond the original study by highlighting factors that influence the capacity to adapt to the mental health consequences of climate change in order to support effective management of these consequences by Canadian decision-makers.

Analysis of the literature in this new assessment was informed by descriptive qualitative analysis of emergent themes pertaining to climate change and mental health adaptation. The first author of this paper conducted this analysis; the second and third authors provided their expert judgement on this analysis based on their experience in the field of climate change and health adaptation (see for example). As the objective of this commentary was to identify societal level factors that influence adaptation to the mental health consequences of climate change in Canada, the lead author conducted a descriptive qualitative analysis of emergent themes using a generic qualitative research method. Briefly, a general descriptive method does not conform to any specific, established method (like grounded theory for example) and is theoretically interpretively focused. This interpretive analysis included a review of the literature for themes that pertain to the aforementioned societal level adaptive capacity determinants, including: governance, economics, infrastructure, technology, information and
skills, institutions, and equity. The first author reviewed the literature and made notes of re-occurring emergent themes pertaining to psychosocial adaptation and adaptive capacity in an Excel spreadsheet; the second and third author reviewed these emergent themes based on their expert judgement. These emergent themes are explored in section 3.4 below.

3.3.4 Results

The majority of the articles in the original scoping review came from literature reviews (58%), followed by empirical research (42%), and finally by commentaries and grey literature (1%) [2]. Before delving into a discussion of the analysis from the reassessment of the literature, it is prudent to briefly highlight the key findings from the original scoping review as these findings enhance our understanding of climate change and mental health adaptation. There were three key findings: 1) there are a range of mental health risks and impacts from a changing climate; 2) there are unequal risks and impacts to people based on social and environmental factors; and, 3) there are a range of response interventions that support mental wellness in a changing climate. These three core findings from the original scoping review are briefly presented followed by an in-depth discussion of factors that influence adaptation to the mental health consequences of climate change.

3.3.4.1 Mental Health Risks and Impacts of Climate Change

The literature reveals that the mental health outcomes related to climate change can include: post-traumatic stress disorder (PTSD), anxiety, depression, complicated grief and survivor guilt, recovery fatigue, and suicidal ideation from climate-related extreme weather events like heatwaves, floods, hurricanes, and wildfires [36, 43, 49, 50, 51, 85, 86, 90, 184, 198]. Other psychological impacts may include weakened social ties, increased stress levels, and addictions, aggression, and violence related to resource scarcity caused by hazards such as rising heat levels,
rising sea levels, and episodic droughts. Also of concern, are emotions that affect mental health and can result in mental challenges, like worry, anxiety, and feelings of impending doom, related to the overarching awareness of climate change and the risks it poses to planetary and public wellbeing. The mental health consequences of climate change may emerge immediately following an exposure to a climate change-related hazard, or months to years later. Further, while there are a host of psychological sequelae from climate-related extreme weather events and gradual climate change, people and communities with access to physical and psychological support can experience post-traumatic growth after an adverse event, which can give rise to feelings of optimism and altruism and foster compassion, generosity, a sense of meaning in a person’s life and support broader community resilience. However, the literature documenting positive mental health outcomes related to climate change is scant.

3.3.4.2 Unequal Risks and Impacts

The literature highlights that underlying the mental health consequences of climate change are issues of environmental justice that occur at the confluence of the Social Determinants of Health (SDoH) and the Ecological Determinants of Health (EDoH). The SDoH are factors that determine or influence health outcomes and health status, including employment, education, income, housing and working conditions, physical environments, social supports, access to healthcare, culture, gender, and childhood experiences. The EDoH are environmental factors — like climate change and atmospheric changes; ecotoxicity and pollution; and resource, ecosystem, and species depletion — that influence the capacity of health systems and individuals, and thereby affect health outcomes. The SDoH and the EDoH help us understand that the mental health risks and impacts of climate change are unevenly distributed
because of social and environmental factors, such as environmental racism, poverty, and social injustices.

3.3.4.3 Response Interventions

To better understand psychosocial adaptation opportunities to climate change events in Canada, it is valuable to recognize the current range of response interventions\textsuperscript{51, 86, 127, 184, 211}. These include:

- policy responses that tend to enhance funding or access to mental health care;
- specific practices and behavioural interventions, such as inpatient or outpatient mental health care or counselling, and alternative mental health therapies like mindfulness;
- community-based interventions, like self-help groups, faith-based care or civic action groups;
- mental health care training, like Psychological First Aid (PFA);
- awareness-raising of the mental health implications of climate change (e.g. via research dissemination and public health campaigns); and,
- integration of mental health care into disaster risk management plans.

All of these interventions may be specific to enhancing individual well-being, for example counselling services, or implemented at the societal level, such as policies that enhance access to services\textsuperscript{184}. Interventions may be specific to addressing mental illness and challenges or enhancing positive mental health outcomes, such as environmental civic action groups that aim to reduce climate change impacts while fostering a sense of community, hope, meaning, and purposeful action\textsuperscript{197}. Importantly, these interventions require actions by a variety of actors from various disciplines and these interventions operate across short- to longer-term time scales\textsuperscript{184}.
3.4.4.5 Exploring Psychosocial Adaptation Opportunities

As noted earlier, analysis in this reassessment of the scoping review literature included a qualitative analysis of emergent themes pertaining to climate change and mental health adaptation and expert judgement of climate change and health adaptation indicators. This analysis revealed that the effectiveness of currently available response interventions noted above is limited by an incomplete understanding of factors that can influence the capacity for adaptation by individuals and health decision makers. These key factors, herein referred to as ‘influencing factors’, that emerged in this reassessment of the literature include: social capital\textsuperscript{46, 48, 204, 213, 214}, sense of community\textsuperscript{94, 135, 215, 216, 217}, government assistance\textsuperscript{3, 46, 51, 92,127}, access to resources\textsuperscript{51, 213, 218, 219, 220, 221, 222}, community preparedness\textsuperscript{195,135,219}, intersectoral/transdisciplinary collaboration\textsuperscript{30, 222, 223, 224}, vulnerability and adaptation assessments\textsuperscript{13, 173,197,225}, communication and outreach\textsuperscript{43, 135, 38, 226}, mental health literacy\textsuperscript{135,219,227,228}, and culturally relevant resources\textsuperscript{86, 85, 21,135,228,45}. These influencing factors can either support positive health outcomes when these factors are in place or when absent, act as barriers to psychosocial adaptation achievement and realization. Figure 1 is an original figure developed by authors of this paper to represent the connection between findings from the original analysis and the reassessment.
3.3 Figure 1. Factors that Influence the Psychosocial Health Impacts of Climate Change

Figure 1 A framework showing the mental health consequences of climate change and how these consequences are mediated by the social and ecological determinants of health, response interventions, and factors that influence psychosocial adaptation that can either support positive health outcomes when these factors are in place or when absent act as barriers to psychosocial adaptation.
3.3.5 Discussion

The influencing factors identified in this research are discussed below along with examples drawn from the mental health response to Canada’s most recent, and costliest, disasters: the 2016 Fort McMurray, Alberta wildfires and the 2013 Southern Alberta flood. Importantly, these influencing factors appear in no order of prioritization because knowledge of the importance of these factors does not allow for their prioritization and many work in combination to enhance psychosocial adaptation and resilience. Based on our analysis and awareness of climate change and health adaptations, it is our perspective that all of these factors in combination would optimize psychosocial adaptation in a changing climate.

3.3.5.1 Social Capital

In the literature on climate change and mental health, one of the most frequently highlighted factors that protects mental health and well-being is social capital. Social capital is inextricably linked with mental health, perhaps because social capital helps to reduce social isolation, loneliness, and feelings of abandonment. Social capital can be described as: “the potential embedded in social relationships that enables residents to coordinate community action to achieve shared goals, such as adaptation to climate change” (p. 502). Scholars note that social capital may outweigh economic assistance or assistance from aid groups or governments in post-disaster recovery and it underpins resilience. LaLone argues that community disaster planning and response organizations need to consider the role for social capital in supporting and enhancing recovery efforts. Dynes [as cited in] suggests that the typical ‘command and control’ style of government-led emergency response tends to overlook the significance and effectiveness of social capital in supporting recovery, and as such supporting

---

†††† Where applicable Canadian literature exists.
and building social capital ought to figure as a central response strategy for governments responding to communities in distress.

### 3.3.5.2 Sense of Community

A sense of community is nested within the conceptualization and practice of social capital, and similar to social capital, a sense of community (e.g. the feeling of togetherness and belonging) supports resilience in the face of a changing climate\(^9\),\(^13\),\(^5\),\(^16\),\(^2\). A sense of community and social support can play vital roles in psychological and psychosocial well-being, especially after a disaster. The catastrophic nature of disasters often results in displacement, fractured communication, and disconnection from homes and communities\(^13\). A key priority after a disaster is to rebuild community networks and to form new social connections\(^9\),\(^2\). A sense of community often requires strong leadership — either formal governmental leadership, or grassroots-led leadership, where leaders establish community trust, inclusivity, and foster empowerment\(^2\).

### 3.3.5.3 Government Assistance

Government programs play a key role in providing and enhancing access to mental health care\(^3\),\(^4\),\(^5\),\(^1\),\(^2\),\(^2\). Mental illness in Canada is very costly; a recent report by the Canadian Mental Health Association estimated that 500,000 Canadians miss work every week due to mental health issues, costing the Canadian economy approximately $51 billion dollars per year\(^2\). Government programs can contribute to psychosocial well-being in the face of a changing climate through policy and program implementation or funding. In recent years, government assistance was integral in helping to address the mental health outcomes of climate-related events. The Province of Alberta, for example, responded to the 2013 Southern Alberta floods by allocating $50 million dollars to specifically support the current and future mental health
health needs of Albertans affected by the flood, along with the creation of the first Chief Mental Health Officer\textsuperscript{222}. These funds were primarily used to deploy mental health practitioners from other cities and provinces to affected areas in Southern Alberta and to hire additional mental health specialists\textsuperscript{222}.

Government assistance is an important part of mobilizing mental health care to support psychosocial response in the aftermath of climate-related emergencies. As the timing of mental health outcomes vary and can linger for many years, and because of the increasing frequency of climate-related extreme weather events, mental health needs, including programs and interventions to protect people, are likely to grow.

\textit{3.3.5.4 Access to Care: Financial}

Psychosocial wellbeing in a changing climate may be thwarted by limited financial or physical access to mental health care\textsuperscript{51, 213, 218, 219, 220, 221, 222, 228}. Lack of access may stem from economics, geography, poor government planning, lack of trust, and/or poorly trained health professionals who may not recognize mental health symptoms or inappropriately triage patients with mental health needs.

While Canada has a universal, single-payer health care system, access to mental health care can still be impeded by financial constraints and availability of services depending on where an individual lives\textsuperscript{218, 229, 230}. Mental health services vary by province and many mental health services are not covered under Canada’s universal health care program\textsuperscript{218}. Services covered by universal health care in Canada include in-hospital mental health care and out-patient services from primary care physicians, nurses, and psychiatrists\textsuperscript{218}. Patients seeking support outside of these professional domains will require private insurance to cover these expenses or they will need to pay for these services, which can make them inaccessible for many Canadians\textsuperscript{218, 230}. 
3.3.5.5 Access to Care: Physical

Another key issue related to accessing mental health care is that during and following extreme weather disasters, mental health care facilities may be inaccessible due to infrastructure damage to buildings or roads to these facilities\textsuperscript{51,221}. Further, mental health workers may not be able to reach health care facilities to provide care because of damage to their own property or to the roads they travel to reach care facilities, or due to personal injury\textsuperscript{221}. In addition, some remote communities may not have (or may not have enough) mental health care facilities, resources, or practitioners prior to an extreme event. In such cases, mental health care is often introduced in a community post-event for a short period of time; however, long-term mental health care needs are often unmet\textsuperscript{218}.

3.3.5.6 Community Preparedness

In Canada, emergency management planning related to climate change has become an increasing area of concern. For example, Public Safety Canada recently released an environmental management strategy that specifically addresses the need for collaborative emergency planning and response (at all levels of government) related to climate change hazards\textsuperscript{231}. Importantly, many preparedness plans and policies tend to overlook mental health care needs related to climate hazards. However, there are a few notable exceptions, such as the mental health and wellness recovery services guide to support Albertans affected by the 2016 wildfire; the guide targets residents, Alberta Health Services staff, physicians, and emergency responders\textsuperscript{223}. This recovery plan was developed in an intersectoral fashion via consultation with: Indigenous community members, the Federal Department of Indigenous Services, Alberta Health Services Addictions and Mental Health, the municipality of Wood Buffalo, clients, and community members\textsuperscript{223}. This plan targets the needs of Indigenous populations, outlines services
that are specific to marginalized community members, highlights services available immediately after a wildfire, and describes the medium to long-term services in place. Importantly too, the Canadian Psychological Association has crafted a list of mental health resources to support communities during and following emergencies, infectious disease outbreaks, and climate-related disasters (see 232). Emergency preparedness planning that incorporates strategies to support mental health and wellbeing can provide communities with the tools needed to enhance psychosocial recovery following extreme weather-related events135, 195, 219.

3.3.5.7 Intersectoral/Transdisciplinary Collaboration

A global review of the impacts of flooding on mental health from 2004-2010 noted that: “a multi-sector approach that involves communities as well as agencies is the best way to promote wellbeing and recovery”30(p. 1). Intersectoral, as well as transdisciplinary or multi-sector collaboration occurs when people or groups from different disciplines work together to tackle complex issues. In the case of climate change and mental health in Canada, this may include collaboration amongst: front-line mental health workers (e.g. psychiatrists, psychologists, psychoanalysts, counsellors, social workers, primary care physicians, community mental health care workers), faith-based and spiritual workers, emergency preparedness professionals, governments (at all levels), public health authorities, environmental and health NGOs, and climate and meteorological services30, 222, 223, 224.

3.3.5.8 Vulnerability and Adaptation Assessments

Climate change and health vulnerability and adaptation assessments provide information on how climate change affects health, describe populations most at risk, and outline specific actions to protect human health from climate change13. These assessments can support psychosocial wellbeing by detailing potential health risks and response opportunities at various
levels (e.g. local level, provincial/state-level, and national level assessments) and amongst various institutions (e.g. corporations)\(^{13}\).

In Canada, several climate change and health assessments have been completed at the municipal, regional and national levels, and amongst health units and acute care facilities (see \(^{13}, 151, 173, 225\)). However, mental health is often overlooked in these assessments because of the challenges related to climate change and mental health attribution and because of a lack of guidance on how to measure and monitor mental health effects related to climate change\(^{197}\). Notably, the next federal climate change and health assessment in Canada, to be released in 2021, will include a chapter detailing the climate change impacts to mental health\(^{173}\).

### 3.3.5.9 Communication and Outreach

The American Psychological Association (APA) *Mental Health and Our Changing Climate* guidance document highlights the imperative role for frequent and clear communication to support psychosocial wellbeing in a changing climate\(^{43}\). The United Nations Office for Disaster Risk Reduction (UNISDR) suggests that clear, early-warning communication efforts can save lives during extreme weather events\(^{38}\). Furthermore, communication can increase community resilience by supporting people to assess risks and respond before an extreme weather event occurs\(^{135}\).

Importantly, mass communication often relies upon technology so there is a need to build redundancy into technical systems (e.g. satellite communications, back-up generators, door-to-door emergency service response communications) before, during, and after extreme events\(^{135}\). Other features of communication systems that are required to support and protect the psychosocial consequences of climate change-related extreme weather are communication systems from local and trusted sources, such as meteorologists\(^{226}\).
3.3.5.10 Mental Health Literacy

Mental health literacy is defined as “the knowledge and beliefs about mental disorders which aid their recognition, management or prevention”\textsuperscript{227}. Two of the main objectives of enhancing mental health literacy are to support help-seeking behaviours of people afflicted by mental health problems, and to support the education of people that mental health, like physical health, exists on a spectrum where people may experience affirmative mental health, or mental health problems, or mental illness. An additional component of mental health literacy is to reduce the stigma of mental health by bringing awareness of how common mental health issues are and that mental health problems and mental illness can afflict anybody at any time throughout a person’s life\textsuperscript{227}.

Mental health literacy is a skill that is needed amongst all health care professionals. An issue that emerged in New Orleans after Hurricane Katrina was the lack of training and skills of first aid responders and physicians in dealing with psychosocial and psychological trauma\textsuperscript{135}; most first aid responders had to be trained in Psychological First Aid (PFA) in the initial weeks following the event\textsuperscript{135,219}. Further, the stigma of mental health challenges and illness can act as a significant barrier to accessing mental health care. The majority of Hurricane Katrina respondents who did not seek mental health resources indicated that they wanted to handle the distress themselves; furthermore, they felt that there were negative social consequences to being labelled mentally ill or having mental health challenges\textsuperscript{219}. One way of reducing the stigmatization of mental health challenges and illness is to increase mental health literacy amongst health care providers and the broader public. Both Psychological First Aid and Mental Health First Aid are two programs that can enhance mental health literacy.
3.3.5.11 Cultural Relevancy

Cultural relevancy refers to response interventions that are culturally relevant and appropriate to all backgrounds and identities\(^94\). Culturally relevant response interventions that support mental health and wellbeing require that mental health practitioners and para-practitioners (e.g. first responders) exhibit cultural empathy\(^{135}\). Cultural empathy refers to the awareness and understanding of different cultural backgrounds, identities, and experiences of a person or group\(^94, 135\).

In Canada, there are concerns about the lack of cultural empathy when dealing with Indigenous health writ large, and more specifically in acknowledging the role for Indigenous Knowledge on the topic of climate change and health\(^{233}\). Indigenous peoples are “often viewed as powerless victims of climate change, overlooking how social, cultural, and economic conditions determine how climate change is experienced, understood, and responded to, and downplaying the accumulated knowledge and wisdom embodied in traditional knowledge systems that can provide valuable lessons for adaptation”\(^{233}\). These lessons are founded upon traditional understanding of lands, cultural identity, social networks and a holistic understanding of health\(^85, 86, 233\). Failing to recognize the valuable role that Indigenous Knowledge plays is a key barrier to adaptation and resilience to climate change, especially considering that Indigenous peoples are amongst the most at risk, particularly to the mental health impacts\(^85, 86, 179\). Further, cultural empathy goes beyond recognizing the valuable role of Indigenous Knowledge but also means a depth of understanding about the heterogeneity amongst Indigenous groups and thus a heterogeneity of how psychosocial adaptation is most effectively employed and by whom\(^{17, 21, 233}\).
Indigenous Services Canada has specific programs on climate change and health in southern and northern Indigenous communities to increase resilience to impacts\textsuperscript{234}. There are numerous initiatives underway to engage with Indigenous communities and to integrate Indigenous Knowledge within climate change and health adaptation strategies, including on issues related to mental health impacts\textsuperscript{234}.

3.3.6 Conclusions

This commentary provides a reassessment of the scoping review conducted by Hayes and Poland in 2018 and a reflection on Canada’s costliest disasters (the 2016 Fort McMurray, Alberta wildfires and the 2013 Southern Alberta). In this commentary, authors explore a number of factors that influence psychosocial adaption to a changing climate in Canada, including: social capital; sense of community; government assistance; access to resources; community preparedness; intersectoral/transdisciplinary collaboration; vulnerability and adaptation assessments; communication and outreach; mental health literacy; and, culturally relevant resources. Importantly, our analysis is limited to key influencing factors that we deemed most applicable to a Canadian context. Absent from the analysis is a focus on factors that would be, for example, most relevant to low- and middle-income countries. While the analysis is centered on a Canadian context, these findings may be useful to decision makers in other jurisdictions and countries facing similar challenges responding to climate change impacts on mental health.

Climate change adaptation policies may benefit from knowledge of the mental health risks associated with a changing climate, resources required to reduce these risks, and of key factors that can influence the magnitude and pattern of mental health outcomes. Health authorities can obtain this information through vulnerability and adaptation assessments, and in collaborations with partners to reduce the health consequences of climate-related hazards.
Further, this information can be used by health care providers to support individuals and communities to more effectively manage mental health issues associated with climate variability and change.

**Author Contributions:** Conceptualization KH, PB and KE; Formal analysis KH; Resources: KH; Writing – Original draft preparation KH; Writing, Review, and Editing: KH, PB, KE

**Funding:** This research received no external funding.

**Acknowledgments:** The authors would like to thank the anonymous reviewers for their valuable input.

**Conflicts of Interest:** The authors declare no conflict of interest.
Chapter 4: Theory and Methodology

4.1 Theoretical Orientation

My research is influenced by the theoretical approach of Political Ecology (PE). Political Ecology is a theoretical approach — rather than a specific theory — that guides critical inquiry into how sociopolitical conditions shape the human-environment relationship. Briefly, sociopolitical conditions refer to political, economic, environmental, cultural and social conditions that shape lived experiences. In the manuscript, Critical Political Ecology of Climate Change and Mental Health, in section 5.1 of this dissertation, I provide an explicit overview of how my work is influenced by the theoretical orientation of Political Ecology (PE). Here, I provide a brief and broad overview of PE, how Political Ecology is similar and how it differs from Political Economy, and how Political Ecology guided my research methodology.

4.1.1 Political Ecology: Overview and History

Political Ecology is a subcategory of Political Economy. Political Economy is a theoretical approach to understanding the intersection between economics and politics in social life, whereas Political Ecology is an approach to understanding the intersection amongst ecology, economics, politics, social life. Eminent political ecologists, Blaikie and Brookfield, aptly note: “the phrase ‘Political Ecology’ combines the concerns of ecology and a broadly defined Political Economy. Together this encompasses the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself” (p. 17). A more detailed description of the similarities and differences between Political Ecology and Political Economy can be found in section 5.1.

Political Ecology (PE) is a term most often associated with anthropologist Eric R. Wolf who called attention to the role of power dynamics in human-environment relationships, in his
1972 publication, Ownership and Political Ecology\textsuperscript{240}. The most popular definition of the term comes from Blaikie and Brookfield (1987), which was noted above. The PE theoretical approach surfaced in the 1960s and 1970s during the ‘intellectual milieu’ when peasant studies became a focus and Marxist theories of development resurfaced\textsuperscript{26}. The development of the theoretical approach was driven by a confluence of factors, namely: the environmental crisis of the 1970s; Marxist perspectives on Political Economy; a shift towards ecological thinking; a reaction against Malthusian theories of over-population and consumption leading to degradation of the environment, health and economics; and a response to Garrett Hardin’s tragedy of the commons\textsuperscript{26, 241, 242}. A theoretically-informed Marxist PE approach confronts the deterministic thinking in Garrett Hardin and Thomas Malthus’ work and suggests that the tragedy of the commons is a more complex, relative issue marked by unequal power relationships occurring within global capitalist political economies that inevitably shape social-environmental conflicts\textsuperscript{241, 242}.

As a theoretical approach, PE has passed through a number of distinct waves. These include: Marxist theories of uneven control over natural resources (noted above); issues of regional Political Ecology that address local and cultural influences relating to the Political Economy of nature; geopolitical ‘Third World’ PE; and post-structural, post-colonial, feminist interpretations that tend to the role of identity and culture within the theoretical approach of PE\textsuperscript{235}. Influential scholars within PE include: Harold Brookfield, Susanna Hecht, Michael Watts, Ben Wisner, and Piers Blaikie, whose work in the 1970s and 80s critiqued cultural adaptation

\textsuperscript{240} Hardin (1968) contextualizes the tragedy of the commons by way of an example of herdsman and their flock: “Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all”\textsuperscript{393} (p. 246). In an effort to solve the tragedy of the commons, Hardin suggests two options: socialism or privatization \textsuperscript{394}. Favouring the latter, Leviathan approach, he states: “if ruin is to be avoided in a crowded world, people must be responsive to a coercive force outside their individual psyches” (Hardin 1978 p. 314 in \textsuperscript{394} p. 9).
and functionalist thinking and favoured an approach to the study of human-environment relationships that deconstructs how power is created and exercised to control resources and people\textsuperscript{26}.

Blaikie (1985) frames Political Ecology as an approach that “problematized what the environment meant and to whom” (as cited in \textsuperscript{26} p. 31). Taking this framing a step further, Braun (2015) describes PE as a critical reaction against “‘apolitical’ and ‘uncritical’ approaches to environmental crisis and environmental change”\textsuperscript{236} (p. 102). Analogous to the above statements, I conceptualize Political Ecology as a broad theoretical approach that contemplates and critiques the meaning of human-to-nature relationships with a specific focus on the role of sociopolitical conditions that shape environmental changes.

Specific areas that tend to be explored within PE theoretical approach to research are: relationships of power (i.e. how does power operate within human-human and human-nature relationships?); governance and economics (i.e. what types of, and how do, social structures**** and economic systems govern interactions between people and nature?); justice and equity (i.e. what are the unequal costs and benefits of environmental degradation?); and scale (i.e. how do we shift the focus away from local adaptation efforts and start to question the larger geopolitical context that impacts nature-environment relationships?)\textsuperscript{27, 236}. Central to investigating these questions is a focus on exploring the materiality of ecology and politics. Based on my understanding of the PE literature, I understand materiality to be the contextualizing of phenomena related to ecology and politics that includes the situating of phenomena in a number of ways (e.g. spatially, temporally, viscerally, and culturally)\textsuperscript{239}. I explore the materiality of my case study in-depth later in section 5.1 of this dissertation.

**** Social structures refer to: “market relations, property systems, state bureaucracies, legal systems, scientific paradigms, even state violence”\textsuperscript{236} (p. 102).
Two of the key tenets of Political Ecology are that nature and culture are inseparable, and that capitalist political economies act as central forces that shape this nature-culture relationship\(^{26, 27, 28}\). To put these tenets into perspective, Watts suggest that “nature and capital are constantly being produced and reproduced”; further, he notes: “There is no transcendent adaptive or ecological order, but an ecological system in which capital necessarily privatizes, commodifies, monetizes and commercializes every aspect of nature” (p. 32). Thus, capitalist political economies fundamentally shape ecologies.

The idea that nature and culture are inseparable phenomena relates to Marx and Engels (2000) conceptualization of a ‘second nature’, or a socialized nature (as cited in \(^{243}\)). Second nature differs from first nature in that first nature is considered to be ‘original’ or pre-human interaction. Since the genesis of the geological epoch of the Anthropocene, first nature no longer exists\(^{243}\). The Anthropocene is the current geological epoch whereby human activities dominate the global environment and influence earth’s ecosystems and geology\(^{244}\). With this new epoch upon us, Braun (2015) notes that “it is no longer [even] possible to imagine ‘nature’ and ‘culture’ as distinct ontological domains” (p. 106). The Anthropocene is a reminder of the scale and depth of human impact on the environment where nature and society intermingle in such a way that the risks posed by anthropogenic climate change may soon render the earth inhabitable\(^{236}\). The Anthropocene, and climate change more specifically, have become a central point of inquiry for many political ecologists who study the human-environment entanglement and ask questions about the ethical and moral obligation humans have to rectify relationships with the environment\(^{245, 246, 247}\).

Historically, political ecologists have grappled with the tension between approaching the human-nature relationship with a focus predominantly on either politics or ecology. Critical
political ecologist, Tim Forsyth, contends however, that the tensions within the PE approach reside in the delicate balance of articulating how politics and ecology speak to one another. PE is a broad approach with many different theoretical and methodological interpretations. One way to explore the diversity in this approach is to look at how it has evolved and how theorists within the broad approach have navigated these tensions.

4.1.2 Evolution and Tensions of Political Ecology

In its early stages, PE was oriented towards a structuralist ontology. Structural political ecologies provided detailed biophysical ecological analysis without necessarily debating the nature of biophysical knowledge — essentially accepting natural science as a fact. Early political ecologists rarely explored how power was negotiated outside of land tenure — neglecting power relationships within the state, community, household, etc. The 1990s, however, brought a wave of political ecologists (like: Lisa Gezon, David Harvey, Tania Li, Ramachandra Guha, and Joan Martinez-Alier) who began their research by exploring and identifying social differences (race, class, religion, gender, etc.) of populations under study and also the location (social, economic, cultural, political) of the researchers. This reflexive approach brought with it a shift in focus within the PE discipline. In the 1990s the biophysical ecology approach to PE was no longer the dominant approach as theorists begin to pose more questions about the role of politics. The current, dominant approach to PE is considered post-structuralist, discursive, and constructivist. Poststructuralist PE is firmly rooted in the critical social paradigm where discourse and practice are central to analysis. While both the structuralist and post-structuralist approaches to PE are rooted in a concern for social justice, poststructuralist PE is firmly rooted in the critical social paradigm that critiques the nature of knowledge about our biophysical realities and asks critical questions about whose
voices and knowledges are overlooked in the discourse and practice of human-nature relationship problems\textsuperscript{243, 252}.

4.1.3 Political Ecology and Climate Change

Within the field of environmental studies, PE is considered by some scholars as a particularly “popular academic approach” to “environmental problems, and injustices, many linked to globalization and neoliberal regimes”\textsuperscript{253} (p. 28). Neoliberal regimes, or rather neoliberalism more broadly, refers not only to a form of capitalism — whereby state interventions set up the rules for the capitalist market economy to flourish\textsuperscript{254} — but also to an overarching ideology that guides economic growth and consumption\textsuperscript{254}. George Monbiot (2016) suggests neoliberalism has become so pervasive that it is no longer identified just as an ideology, but rather is seen as “nothing more than a description of a neutral, natural force — a kind of biological law, like Darwin’s theory of evolution”\textsuperscript{255} (p.111). Political Ecology is a theoretical approach that attends to the workings of neoliberalism as a hegemonic force that governs institutions, political systems, individual and collective behaviours, and ways of knowing about the world. With regard to my work, Political Ecology is a helpful lens through which to problematize how macro-level forces (shaped by neoliberalism) influence health inequities and adaptation opportunities (or lack thereof) in a changing climate in High River, Alberta.

Particularly in the field of climate change, Political Ecology scholars are increasingly analyzing the role of “power, discourse, agency, the state, and governmentality” on issues such international climate negotiations and carbon pricing\textsuperscript{256} (p. 311). Further, the topic area of adaptation is increasingly under analysis by political ecologists who examine institutional barriers related to adaptation (see Pelling, 1999 in\textsuperscript{256}), and issues of inequity and injustice related
to adaptation, wherein political ecologists ask critical questions like: adaptation to what and for whom? (see\textsuperscript{56, 256, 257}).

As noted earlier, the issue of anthropogenic climate change and the Anthropocene\footnote{Briefly, anthropogenic climate change refers to human-activities that contribute to climate change\textsuperscript{1}, and the Anthropocene is the current geological epoch whereby human activities dominate the global environment and influence earth’s ecosystems and geology\textsuperscript{244, 256}.} have become popular topic areas amongst political ecologists\textsuperscript{56, 253, 256}. The Anthropocene has been the subject of inquiry for many political ecologists who study the human-environment relationship and ask questions about the ethical and moral obligation humans have to rectify relationships with the environment\textsuperscript{245, 246, 247, 256}. Some political ecologists approach the subject as an opportunity to propel deeper inquiry into the profoundly political nature of human-environment relationships\textsuperscript{28, 254}. Fletcher (2010) and Swyngedouw (2015) suggest that there is a real need to bring politicization of the environment to the forefront of PE-led inquiry to the topic area of climate change\textsuperscript{28, 254}. Swyngedouw (2015), for example, suggests that the opportunity to ‘rethink the political’ in the PE theoretical approach is especially urgent considering the dominant “techno-managerial environmental policy” goals that \textit{appear} to speak to the discourse of environmental sustainability and adaptation by asking for radical behavior change “but within the contours of the existing situation… so that nothing really has to change!”\textsuperscript{28} (p. 132 & 137). This is to suggest that decision makers’ over-reliance on technological innovation as a form of environmental policy response to the climate change issue is problematic because we are overlooking fundamental issues of consumption and growth operating at the core of neoliberal capitalist societies. Fletcher (2010) and Swyngedouw (2015) suggest that if we are to take the current ecological crisis seriously, we need to make space for questions that contemplate the legitimacy of all social-ecological interventions (policies, programs) and critically assess our
responses to climate change\textsuperscript{28, 254}. Moreover there is a need to consider how our responses to climate change are influenced by sociopolitical conditions that are bound by neoliberal ideologies of economic growth\textsuperscript{28, 254}.

An understanding of neoliberalism is important here because it helps us to better understand some of the underlying issues that manifest the climate change problem. While neoliberalism is often positioned solely as a form of economic capitalism that encourages constant growth, some scholars, like Fletcher (2010) for example, describes neoliberalism as an overarching force that governs human actions\textsuperscript{254}. These perspectives appear to demonstrate how neoliberalism acts as a hegemonic force that governs institutions, political systems, individual and collective behaviours, and ways of knowing about the world. Reflecting on Monibot’s (2016) and Fletcher’s (2010) concept of neoliberalism, and considering Swyngedouw’s (2015) call towards politicizing ecology, it becomes increasingly evident why there is a need to take a critical look at igniting the political element within ecology as the depolitization of neoliberalism sustains a culture of inequality, social and environmental injustice, and complacency.

Importantly, there is an increasing focus for political ecologists on responding to climate change, in particular there is a focus on exploring climate mitigation and adaptation policies\textsuperscript{56, 256, 258}. Briefly, mitigation policies emphasize a reduction of climate change effects and adaptation policies emphasize coping and thriving within a changing climate\textsuperscript{56}. Jennings (2011), for example, argues that a belief in climate change adaptation as inherently ‘good’, overlooks the broader socio-political system about which adaptation is spoken, and upon which adaptation is acted, to serve the dominant political interests\textsuperscript{56}. Taylor (2015) corroborates this, in his work that conceptually explores climate change adaptation within the field of international development through the lens of Political Ecology. In his work, Taylor (2015) problematizes the idea and
practice of adaptation, which has become the dominant approach to addressing the climate change problem in recent years. Taylor argues that we should be “extremely cautious” of “the apparent self-evidence of adaptation”57. Jennings (2011) and Taylor (2015) argue for a critical examination of whose version of adaptation is being considered and why. Jennings (2011) contends: “By taking this Political Economy for granted, the most socially and politically marginalized people will be ignored even when their practices qualify as adaptation and the policy goal is resilience. At the same time, marginalized groups will have little investment in maintaining the resilience of systems that merely reproduce the status quo power of elites”56 (p. 241). She contends that understanding the broader political and economic processes that shape mitigation and adaptation responses can support researchers and practitioners in “finding equitable solutions to human ecological problems”56 (p. 238). She is, however, not suggesting that mitigation and adaptation are merely “politicized endeavors” but rather to explore “what kinds of politics might be occurring” and how responses, like adaptation, “support political agendas”56 (p. 239). This type of critical inquiry can support public health audiences reflecting upon climate change and health adaptation efforts by asking, adaptation for whom and to what?

4.1.4 Political Ecology of Health

In regard to the topic of health, Political Ecology — unlike its theoretical predecessor Political Economy‡‡‡‡ — has traditionally only addressed health in limited ways259. However, in the past 10 to 15 years, there has been growth in the study of health from a PE theoretical approach to better understand health inequities (see 259, 260, 261, 262, 263, 264).

Political Ecology of health scholar, Brian King, contends that PE is a particularly apt theoretical approach to the study of health because: “It is at the nexus between social and

‡‡‡‡ Political Economy is an approach to understanding the intersection between economics and politics in social life238.
ecological processes that human health is shaped, and only in understanding the interactions between them can human health be properly understood”\(^{259}\) (p. 349). Going further, Porto et al., (2017) contend that PE is a particularly salient theoretical approach to problematize the role of sociopolitical conditions in shaping health because: “scientific analyses, especially those conducted from within the fields of biomedicine and public health, tend to depoliticize health issues as they de-contextualize the meaning of life, culture, and the struggles of communities and organizations”\(^{260}\) (p. 112). Porto et al. (2017) suggest that politicizing health is important to fully understand it as a “a dynamic, multidimensional, quantitative, adaptive, and evolutionary concept” bound by social, political, cultural, and biomedical influences\(^{260}\) (p. 114).

Importantly, a Political Ecology approach to mental health has been taken up Aggarwal et al. (2012), who investigate the Political Ecology of mental distress related to bioactive substances (e.g. chemicals found in plants and foods that affect the human body)\(^{265}\). The topic of climate change and health has been, in general, overlooked by political ecologists with the notable exception of Baer and Singer (2009)\(^{266}\). In their 2009 book, Global Warming and the Political Ecology of Health, Baer and Singer provide an in-depth conceptual analysis of how sociopolitical conditions shape health inequities related to climate change. Political Ecology, for Baer and Singer, is a theoretical approach that helps them to understand the “environmental-societal interaction” that is fundamentally shaped by political economic factors like: “capitalist production, market-driven distribution of resources, urbanization, and population growth” (p. 13). More specifically, authors contend that climate change is a significant factor that influences disease (or condition) movement and disease (or condition) clustering; further, they argue that climate change compounds pre-existing health issues and health inequities\(^{266}\).
4.1.5 Critical Political Ecology

In my work, I take a more nuanced approach to PE, called critical Political Ecology. Tim Forsyth, a leading critical political ecologist, describes the crux of critical PE as an understanding of the coevolution of politics and ecology. Because a central premise of critical PE is to question our understanding and use of biophysical science, Forsyth (2015) cautions that some environmental scholars have suggested that a critical PE analysis of climate science can seemingly support the denial of climate science. However, he argues that this suggestion “misses the point”; he asserts: “analysing political influences on knowledge about environmental problems is not the same as denying that problems exist” (p. 112). Forsyth suggests that an analysis of political influences on the topic area of climate change helps us to see “how different truth claims are supported by different social structures” and whose voices are being excluded (p. 113). A chief objective of a critical PE analysis to the topic of environmental problems, for Forsyth (2015) is to “consider the relationship between science and politics more transparently in order to make environmental science and policy more useful and effective” (p. 114). Forsyth contends that critical PE inquiry is rooted in both “epistemological skepticism” and “ontological realism” (p. 2). Emphasizing this statement, Forsyth eloquently argues that critical PE does not “imply a belief in naïve realism — or the idea that environmental change can be understood in any final and complete way — but that existing scientific constructions of environmental degradation can be made more beneficial, and less potentially damaging, to people previously unrepresented in the science process” (p. 2). In other words, ways of knowing environmental degradation can be enhanced by learning from and with people who tend to be most underrepresented in scientific knowledge production.
In my work, I take a realist critical Political Ecology approach to explore the human-nature relationship with an understanding that human-nature relationships are shaped through the coevolution of politics and ecology\textsuperscript{268}. That is to say that I see the world, and human experiences, as shaped by inextricably-linked biophysical realities and sociopolitical conditions. Thus, I locate my inquiry of the relationship between climate change and mental health through “ontological realism” and “epistemological skepticism”\textsuperscript{267} (p. 147). Which is to say that ontologically I believe that there are real and knowable truths, such as the science of climate change and climate change impacts on health. However, I believe that there are multiple ways of knowing about the science of climate change and its effects that ought to be critically examined. Key critical questions for me are: whose voices are often silenced within the study of climate change and health? What can these silenced voices tell us about the lived experiences of climate change and mental health? How do sociopolitical conditions shape the lived experiences of climate change and mental health? How do sociopolitical conditions shape marginalization and risk to the mental health effects of climate change? How do sociopolitical conditions shape perceptions of, and responses to, the mental health effects of climate change?

Further, like the critical political ecologist, Tim Forsyth, I believe that phenomena cannot fully be “understood in any final and complete way” but rather an exploration of the relationship between climate change and mental health, for example, through the lens of critical Political Ecology can reveal insights into the often hidden, or unseen, political-ecological shaping of this relationship\textsuperscript{268} (p. 2).

Similar to political ecologists Baer and Singer (2009)\textsuperscript{266} and Liverman (2015)\textsuperscript{256}, I contend that environmental health inequities are intertwined with the increasing socio-economic disparities manifested by neo-liberal ideologies operating within modern-day global capitalism.
that have accelerated the climate change problem. I understand neoliberalism to be the dominant form of ideological power that underscores post-industrial capitalism (which is the current form of economic power)\(^{254,255}\). As noted earlier, neoliberalism is an ideological approach to capitalism whereby state intervention is encouraged to construct the rules of the market economy (e.g. via deregulation and privatization policies) to enable capitalists to flourish\(^{254}\). Like scholars noted earlier, I understand neoliberalism to not only be a marked form of capitalism but also to be an ideological form of social control\(^{254,269}\).

I contend that sociopolitical conditions, like politics and economics driven by neo-liberal ideologies, have shaped and accelerated climate change and, thus, increased the risks and impacts to mental health, particularly to those most marginalized in society based on age, socioeconomic status, ability, race, gender, and ethnicity. Further, I approach my research with the assertion that economics and political conditions can influence and shape perceptions about and responses to the mental health consequences of climate change, thus affecting psychosocial adaptation.

4.1.6 Political Ecology Theory and Methodology

As noted earlier, PE is not considered a theory in and of itself, rather it is considered a theoretical orientation. Perrault et al. (2015) suggest that the theoretical and methodological expansiveness of PE cannot be captured coherently as a theory but rather its coherence comes from ‘theoretical commitments’ in all PE work. These commitments include: a commitment to critical social theory; a commitment to methodological rigour, and a commitment to social justice and emancipatory social change\(^{239}\). While these commitments can be found in most social theory research, it is the latter commitment, a commitment to social justice, that is particularly resounding in PE work. A commitment to social justice and emancipatory social changes within
PE research, is research that questions, challenges, and attempts to transform power relations embedded in ecological debates in order to “ensure an equitable transition toward an ecologically sustainable society” (p. 22). Reflecting on the above theoretical commitments, Zimmerer (2015) suggests that political ecologists are noted for their abilities to negotiate “the realities of multiple data sources and diverse interpretive paradigms” therefore producing original findings, advancing social ecological scholarship, and supporting emancipatory research (p. 162).

One example of advancing social ecological scholarship, notes Braun (2015), comes from a study by Sarah Whatmore and her team who researched flood mitigation in Yorkshire, England. These researchers conducted, what Braun (2015) refers to as an “experiment in knowledge production”, wherein citizens of Yorkshire participated in the research but the aim was not to empower citizen engagement but “to empower the situation to force thought in those affected by it, and thereby slow down the reasoning of established experts” (p. 104). This methodological approach allowed citizens “to build competencies and intervene on issues that were relevant to their lived experience”, thus exemplifying emancipatory social change research.

While political ecologists engage with a wide variety of disciplines, epistemologies, and methodologies that can often create tensions, PE is a theoretical approach that encourages the problem at hand — and commitments to emancipatory social and environmental justice — to guide research methods. My doctoral research aligns with these theoretical commitments of PE by: conducting a critical analysis of the sociopolitical conditions that shape the human-ecological relationships within the topic area of climate change and mental health (commitment to social theory); allowing the problem area guide my methodological approach, which is a mixed methods approach consisting of four data collection methods that will be
discussed in the section below (commitment to methodological rigour); and, conducting research focused on addressing health inequities related to the 2013 flood and disseminating this information to public health audiences in an effort to enhance psychosocial adaptation to a changing climate, particularly for those most marginalized (commitment to emancipatory social change).

4.2 Methodology

PE straddles the natural and social sciences, and as such, scholars informed by the theoretical approaches of PE employ a wide range of methodologies (i.e. theoretical frameworks, like qualitative, quantitative, and mixed methods) and methods (i.e. surveys, mapping, archival research, interviews, soil analysis, ethnography, etc.) in their work. Navigating a multitude of disciplines, research methods, and methodologies within the PE theoretical approach can be a challenge for researchers.

While much has been written about the theoretical underpinnings of PE, there are notable gaps in the PE literature on how to approach PE-informed studies. Noting these gaps, Doolittle (2010) has provided a detailed account of a mixed methods approach to PE in her exploration of Indigenous property rights and natural resource management in Malaysia. Taking a grounded theory research approach that connects inductive and deductive thinking, Doolittle (2010) conducted a literature review to identify emergent themes within her study, these themes included: historical controversies, theoretical debates, accepted wisdom, and contemporary policy debates. After identifying each theme, she developed key questions and forms of data collection to address each question. Methods for her study included case studies of two sites in Malaysia where she: collected archival data for each case site; conducted in-depth interviews to obtain oral histories from two key informants; collected data from participant observations,
surveys, and interviews; and, finally she collected data from sketch maps, interviews, and observations. This mixed methods approach allowed Doolittle to empirically investigate the nature-society relationship between colonial and postcolonial state rulers and native people regarding land rights. Using a Political Ecology lens, she was able to explore and problematize how resource control was “defined, negotiated, and contested by colonial state agents, the postcolonial Malaysian state, and natural resource-dependent communities for over a century” (p. 69). Doolittle’s theoretical orientation of PE and mixed methods methodological approach allowed her to explore the complex history of native land disputes through an investigation of relationships of power between state agents and Indigenous Malaysians.

Another notable mixed methods approach to PE research comes from Birkenholtz (2011) who took an explicit ‘Network Political Ecology’ orientation to his study in Rajasthan, India of groundwater-dependent irrigation farmers. Birkenholtz (2011) applied Network Political Ecology (NPE) theory to explore meso-scale (community) experiences of climate change vulnerability and adaptation. NPE combines regional Political Ecology and network theory. Regional Political Ecology is a theoretical orientation that addresses social power relations of local issues related to social-ecological relationships while considering political economies at multiple scales. Network theory is an approach to the study of the structures and relationships between social systems and entities. Birkenholtz (2011) approached his mixed methods study of Indian irrigation farmers by conducting ‘adaptive network mapping’ whereby he mapped the relationships, social-ecological processes, and institutions that contributed to, or hindered, adaptation; he also conducted household interviews with farmers to support his support this network mapping. Mapping (e.g. mapping relationships and assets) is a common method
within PE tradition\textsuperscript{270} — and something that I incorporate into my research, which I explore in section 4.5 of this dissertation.

Birkenholtz’s (2011) NPE theoretical and methodological approach allowed him to address the key question: “in what way will climate change induced perturbations affect social structures that currently mediate vulnerability rather than what impact will climate change induced perturbations have on social-ecological systems and economies?” \textsuperscript{276} (p. 310).

Birkenholtz (2011) stated that by: “prioritizing the former question, network Political Ecology is effectively positioned to identify and link existing causal processes that affect vulnerability and adaptation with ongoing processes of climate change induced variability” \textsuperscript{276} (p. 310).

Birkenholtz’s (2011) theoretical and methodological approach offered him the opportunity to explore foundational issues of equality and justice that operate at the core of the climate change problem area\textsuperscript{276}.

Doolittle (2010) and Birkenholtz’s (2011) empirical approaches to their research provided me with guidance on how mixed methods research has been used within a PE theoretical orientation. Their approaches characterize the description of PE methodology offered by Abel & Stepp who suggest that researchers “will need to let the problem at hand guide the choice of discipline(s) to apply, rather than let the discipline determine the limits of the problem itself” \textsuperscript{271}(p. 9). A pluralistic approach to PE research, like that taken by Doolittle (2010) and Birkenholtz’s (2011), lends itself well to mixed methods techniques.

While mixed methods may leave researchers open to criticisms that a comprehensive and unified scientific methodology is not being followed, Zimmerer (2015) suggests that PE avoids these criticisms by acknowledging its “ethics and philosophy of pluralism” by engaging with the partial and strategic use of either qualitative or quantitative methods \textsuperscript{270} (p. 161). As May et al.
(2017), highlight methodological pluralism ‘involves finding value in a variety of sources of information, including believing that no research method is inherently superior to any other’ (p. 100). I acknowledge my methodologically pluralistic understanding and approach to my research and engage with mixed methods research methodology to help me address my research questions. Before an in-depth exploration of my mixed methods research methodology, I firstly highlight my case study approach and provide more context on the town of High River as this information supports an understanding of my research methodology and informs my theoretical analysis.

4.3 Case Study Approach

After establishing my theoretical and methodological orientation and my research aims, I began to think through locations that would be fitting for my empirical study. I knew that I wanted to base my research in Canada because there was a dearth of research on climate change and psychosocial health nationally, and regionally; and also because Canada is one of the top ten contributors to anthropogenic climate change (in 2014, Canada emitted 1.6% of the global share of emissions). I also knew that I wanted to investigate the sociopolitical conditions that shaped the climate change and health problem; thus, it was important for me to locate my research in a geographic place that was rife with political, economic, social, and environmental factors related to climate change. In Canada, one of the most salient places that came to mind was the Province of Alberta where the oil sands industry is regarded as a central economic asset to Canada despite the industries’ contributions to runaway climate change. I also knew that as a student researcher, with limited research funding, that I would need to be realistic about the scope of my study. Noting the above factors, I thought about the most recent climate-related hazards that had taken place in Alberta (while reviewing the Canadian Disaster Database and...
landed upon the town of High River, Alberta, which had experienced the most significant effects of the 2013 Southern Alberta flood. In section 4.2.2, I explore (in detail) the reasons for choosing High River as the site for my empirical case study. Below, I highlight what a case study approach is, and why I chose a case study approach in my research.

I use Sandelowski’s (2010) definition of a case study, wherein a case study is defined “as singular combinations of diverse arrays of methodological approaches directed toward maintaining ‘empirical intimacy’ with one or more temporally and spatially defined objects researchers construct and target for study” (p. 153). I decided that I would maintain ‘empirical intimacy’ with the single geographic location of High River.

Importantly, as Ragin (1982) notes, cases are not “given or empirically discoverable”, rather they are made — in a constructionist sense (as cited in p. 154). Notably too, there are “persistent misconceptions that [a] case study signifies a methodology”; rather, case studies are subsets of quantitative, qualitative, or mixed methods studies and “researchers ultimately decide what the empirical units of study (e.g., individuals, families, organizations, events, settings, technologies, time periods) are cases of and, therefore, the relevant aspects of those units constituting those cases” (p. 154). Thus, researchers delineate and define cases based off of the empirical units they intend to explore.

In my research, I created my case by firstly locating my spatial and temporal unit of analysis. I established that the unit of study for my research case study would be the community of High River, Alberta five years after experiencing the 2013 flood and that my focus would be on community-based mental health responses to the psychosocial risks and impacts of a changing climate on marginalized peoples in High River, Alberta. While there is no unifying definition of community, I took a location-based approach and defined community by
geographic boundaries. Community-based mental health responses in High River in this research, included mental health care provided formally by mental health practitioners (e.g. psychiatrists, psychologists, social workers, psychoanalysts), para-practitioners (e.g. people trained in mental health first aid or psychological first aid), and professionals supporting safety and wellbeing (e.g. public sector institutions include government agencies focused on: emergency management, public safety, public health, and social services); as well as mental health care provided informally, by faith-based leaders, educators, health and social services groups, and non-governmental organizations.

While my empirical investigation took place five years after the flood (in 2018), my temporal unit of analysis also included an investigation of the psychosocial resources available before the flood (May 2012 to early June 2013), during (June 2013), and after (July 2013 to 2018) to better understand the long-term psychosocial consequence of the 2013 flood.

I also ‘cased’ High River by locating it in its broader provincial and federal context to better support a Political Ecology analysis of multi-scalar political economic activity that influenced the nature-society relationship in High River related to climate change and mental health. I do so by locating the town of High River in the province of Alberta, whose Political Economy (and also the Political Economy of Canada) is bound by neoliberal capitalist growth in the oil and gas industries (major industries in Alberta), which are major contributors to runaway climate change. I explore this casing in section 4.2.2 below.

In section 4.3.2, I explore what High River is a case of and the implications of treating High River as a case. Before this, I provide details on the geographic, ecological, demographic,

---

Multi-scalar refers to multiple scales of political economies (e.g. at difference scales of geographic governance, like municipal, provincial, federal or territorial scales of governance)
and political economic make-up of High River in section 4.3.1 below to better contextualize my case study.

4.3.1 Context

As noted above, my temporal unit of analysis included the time periods between 2012-2018 with the empirical investigation taking place in 2018. As such, much of the context I provide below is specific to this time period. Further, as my study investigates the nature-society relationship of High River community members to the flood, the ecology section below is focused on contextualizing flooding in the town. Also to note, much of the demographic information is pulled from the 2016 Canadian Census data as that is the most recent set of census data that details information on High River.

4.3.1.1 Geography

High River is located within the foothills of the Rocky Mountains in the Calgary region of Alberta, located approximately 67.7km south of Calgary. The elevation of the town is 1,363.60 m while the latitude is: 50°11'00.000" N and the longitude: 113°53'00.000" W. High River is geographically oriented in Southern Alberta (See Image 1).
4.3 Image 1. High River, Alberta

Source: Googlemaps

The Highwood River runs through the town of High River; it originates in the Canadian Rockies and ends in the Bow River, which is southeast of Calgary\textsuperscript{282}. High River is centrally located in a floodway along Highwood River, which runs for 31km through town\textsuperscript{284}. High River floods tend to happen in May and June when there is an early summer snowmelt runoff and/or during high precipitation seasons\textsuperscript{284}.

4.3.1.2 Ecology

High River was flooded in 1995, 2005, 2008, 2011, and 2013\textsuperscript{285}. Prior to the notable 2013 flood, the 2005 flood was the second most significant recent flooding event that took place on June 6-8 and resulted in the evacuation of 70 people from High River (a total of 7, 028 from the flood zone which included Calgary, Okotoks, and Red Deer County), 2 fatalities and an estimated total cost (to the Federal Government) of $129M\textsuperscript{195}. 

119
The 2013 Southern Alberta flood was the most significant, recent, flooding event in High River, and the second largest environmental disaster in recent Canadian history\textsuperscript{195, 285, 286}. On June 19\textsuperscript{th}, 2013, heavy rain hit Southern Alberta for approximately 18 hours\textsuperscript{195, 285}. Thirty local states of emergency were declared in Southern Alberta, including a declared states of emergency in High River\textsuperscript{286}. High River was particularly impacted by the flood because of its geographic location. As noted earlier, the town is located in the foothills of the Rocky Mountains, with the Highwood River starting at the base of the Rocky mountains and running approximately 31 kilometers through town\textsuperscript{284}. The speed of the Highwood River on June 19\textsuperscript{th}, 2013 was estimated to be faster than the speed of Niagara Falls\textsuperscript{195}. The entire town of 13,000 people was ordered to evacuate and there were four reported deaths resulting from the flood\textsuperscript{195}.

Importantly High River is located in the Province of Alberta, which has experienced some of the worst environmental disasters in Canadian history, including the costliest disaster in history, the 2016 Fort McMurray wildfires that resulted in 2 fatalities, 90,000 evacuations and an estimated $4b dollars’ worth of damages and the fires in Slave Lake that began on May 15, 2011 resulting in 12,055 evacuations and $552K worth of damages\textsuperscript{195}. Notably too, the Province of Alberta (more specifically Fort McMurray) is home to the oil sands which are major contributors to Greenhouse gas (GHG) emissions and ecological degradation.

This geographic information signals that High River is a flood-prone community that has recently experienced a number of flooding events, including Canada’s second largest environmental disaster in recent history, the 2013 Southern Alberta flood. This information also signals that High River is located in a province that has experienced a number of other significant weather events, and a province that is home to the oil sands — which is a major contributor to GhG emissions, and thus a contributor to anthropogenic climate change. This
information suggests that High River is a community on the front lines of climate change-related extreme weather exposures.

4.3.1.3 Demographics

High River is a town of approximately 13,000 people and, as of 2012, it is considered one of the fastest growing communities in Alberta in 2012. Since 2011, the town has grown by about 7%. High River is predominantly inhabited by adults between the ages of 15-64 (approx. 60% of the population) with those aged 65+ making up 22% of the population (which is double the provincial average) and those aged 14 and younger making up 18% of the population (which is on par with the provincial average). The majority of High River residents speak English (93%) with less than 1% speaking French (only), and 5% speaking both English and French. Less than 1% of people surveyed by Statistics Canada in 2016 speak neither English or French.

The majority (88%) of High River community members do not self-identify (based on the 2016 census) as visible minorities. Filipinos make up the largest visible minority group in High River at 7% of the population. The percentage of Aboriginal peoples living in the town of High River is 4%, the majority (66%) of those who identify as Aboriginal are Metis; 31% of those who identify as Aboriginal peoples identify as First Nations. According to the Statistics Canada, there are approximately 1,235 non-Canadian residents living in High River; there are approximately 1,760 immigrants in High River with 755 arriving between 2011-2016; approximately 42% of immigrants are between the ages of 25-44 years old. There are approximately 800 immigrants from Asia; 660 from the Philippines, and 575 from Europe. The majority (70%) of immigrants are economic immigrants. Cargill (a beef processing facility) is a major employer located just outside of High River; the facility employs approximately 2,000 employees, many of whom are temporary foreign workers. According to
the Cargill website: “Cargill in High River has been recognized as one of the pioneers for recruiting temporary foreign workers. Through working closely with the Alberta Government, the High River plant has successfully recruited 450 laborers from both the Philippines & Mexico and still continues to do so”\textsuperscript{288}. Notably, temporary foreign workers are not included in the Census data.

The above information signals that High River is a small town, primarily made up of Caucasian, non-immigrant adults. The largest visible minority population in High River are Filipinos, and the largest immigrant population is from Asia. The majority of immigrants come to High River for employment and the community has a number of temporary foreign workers who work at a large meat-packing facility near the town.

4.3.1.4 Income and Employment

Based on the 2016 Canadian census data, the median after-tax income was approximately $34,503, which is comparable to the provincial median after-tax income of $38,067\textsuperscript{287}. Of the 10,620 respondents for the most recent Canadian Census, 17% had no certificate, degree, or diploma, while 33% had a secondary (high school) diploma or equivalent\textsuperscript{287}. According to the 2016 census, the unemployment rate in High River (8.2%) was lower than the provincial average (9.0%)\textsuperscript{287}. Of the 6,840 in the labour force in High River, the majority of the population were either in sales or service (24%) or in trades, transport, and equipment (18%), or business and finance (15%)\textsuperscript{287}. According to the 2011 Community Wellbeing Index, High River has an above average: income, education, housing, labour force (than the rest of Canada)\textsuperscript{289}. Importantly, the economic impacts of the 2013 flood affected the labour force in a number of ways, including: job losses due to damaged businesses and income losses due to displacement and rebuilding of businesses. There are no known statistics available documenting the specific amount of financial
losses to businesses or incomes in High River; however, these figures are available in
neighbouring Calgary, which was flooded to a lesser extent but has a much larger population and
industry base. According to one report of financial losses one week after the 2013, Calgary saw
6,688 job losses and 140,000 workers economically impacted\textsuperscript{290}. The above information signals
that High River is a town that, likely, suffered economic impacts to industry after the flood
(although specific figures for the town are unavailable and this is tangentially based off of data
from Calgary).

The main industries in High River include: health care (Alberta Health Services is one of
the top five employers in Canada and one of the main health care employers in High River),
agriculture (mainly farming), and creative industries (including film and television)\textsuperscript{291}. It is
assumed that health care is prominent in High River because of its geographic location; health
services in High River service the rural and remote regions south of Calgary, and because of the
higher proportion of seniors requiring care.

With respect to the creative industries, Canadian Broadcasting Corporation (CBC)’s
drama, Heartland, has been filming in the community since 2007 (and continues to do so), likely
because High River has a rural, small town feel (which is a central aspect of the television
series). When I conducted my empirical research in High River, I soon learned that some of the
establishments in downtown High River were television sets for the Heartland series, rather than
real business establishments. A number of television and movies have been filmed in High River
since the 2013 flood\textsuperscript{292}.

The above information signals that High River is a rural town whose main industries are
related to health, agriculture, and creative arts. Further, this information suggests that the creative
arts industry currently has a strong-hold in the downtown core of High River, where business space is being taken up by fake businesses to support the television and movie industry.

4.3.1.5 Population Health in High River

For a small town of 13,000 people, High River has many health services compared to other towns its size, most of which are governed by Alberta Health Services\textsuperscript{293, 294}. High River is likely well-resourced (compared to other towns the same size) because of its geographic location south of Calgary, where High River health services serve rural and remote towns South of Calgary, and because of the demographics in High River (e.g. large proportion of seniors requiring health services). Further, as noted earlier, High River is one of the fastest growing communities in Alberta, thus, it appears that the town is well-positioned to be a centralized health services hub. Alberta Health Services (AHS) is the Nation’s first, and largest, province-wide health system and the fifth largest employer in Canada\textsuperscript{294}. AHS oversees all health care in the Province including: mental health care, palliative care, primary care, public health, cancer care, and continuing care\textsuperscript{294}. AHS services located in High River include: a hospital, a mental health facility, approximately nine family physician offices, eight pharmacies, three supportive living facilities, one long term care facility, one medical laboratory, and two diagnostic imaging centers\textsuperscript{295}. Over the past few years, the Alberta Health Services (AHS) have prepared Community Health Profiles for health regions in Alberta. AHS divides the province into five large health services Zones. These Zones are then divided into geographic areas called Local Geographic Areas (LGA)\textsuperscript{293}. There are approximately 132 LGAs in Alberta\textsuperscript{293}.

High River belongs to the Calgary Zone and the High River LGA is a broader geographic zone than the geographic area defined by Census Canada\textsuperscript{293}. For example, LGA of High River includes the municipalities of Blackie to the East, Stanley to the South, and Longview to the
West. The population of the LGA of High River in 2016 was 24,028 (compared to the census population of 13,000) because it includes the aforementioned surrounding communities. To date, AHS has conducted three community profiles for the LGA of High River: the first was published in February 2013, the second in March 2015, and the third in March 2017. Data Sources for the Community Profiles come from: the Primary Health Care Branch, Health Analytics Branch, Surveillance and Assessment Branch in Alberta Health, along with Statistics Canada and Alberta Health Services. Based on the most recent community profile (2017), the percentage of obese people in the Calgary Zone (19.8) is lower than the provincial average (22.8% for Alberta). Further, there is a lower level of inactive people in the Calgary Zone (39.4%) compared to the provincial average (43.1%). Hypertension has the highest prevalence rate amongst LGA High River residents, and this rate is 1.1 times higher than the provincial average (21.3 in High River versus 20.2 in Alberta). The birth rate in the LGA of High River is lower than the provincial average (21.3 High River versus 25.7 in Alberta), and the all-cause mortality rate in the Calgary Zone is similar to the province (615.7 compared to 634.7 in Alberta). In 2015-2016, the most frequent cause of death was disease related to the circulatory system.

Overall mental health disorders and deaths have increased from 2010 to 2016 (as per AHS community profile reports from 2013-2017) in High River. According to the 2013 AHS Community Profile:

- mental and behavioural health disorders accounted for 4.2% of deaths over 10 years (2001 to 2010)
- In 2010, emergency department visits were similar to the province: 357.6 High River LGA vs 465.8 Alberta (per 100,000 population)
Emergency department visits for mood disorders were similar to province: 447 High River LGA vs 469.8 Alberta (per 100,000 population)

Inpatient discharge rate was lower than Alberta (51.3 High River LGA vs 107.2 Alberta)

According to the 2015 AHS Community Profile:

- mental and behavioural health disorders accounted for 4.6% of deaths between 2004-2013 (slightly higher than 2010)
- Emergency department visits for mental and behavioural disorders was lower than Alberta but higher than report from 2010 (472.3 High River LGA vs 633.3 Alberta)
- Inpatient discharge rate associated with behavioural disorders was comparable to province but higher than 2013 (88 High River LGA vs 120 Alberta) per 100,000 population

According to the 2017 AHS Community Profile:

- During 2006 to 2014, mental and behavioural disorders accounted for 5.1% of all deaths in the High River LGA.
- Emergency department visits for mental and behavioural disorders were higher than those reported in the 2013 and 2015 community health profile reports (522.6 High River LGA vs 676 Alberta)
- Emergency department visits for anxiety and mood disorders was higher than Alberta average (High River LGA: 1,661.5 compared to Alberta: 1,167.8) (See table 10.1 below). The rise in emergency department visits is noted as possibly
due to a lack of access to mental health care and lack of mental health care facilities (see Alberta Government, 2017).

- The inpatient discharge rate associated with mental and behavioural disorders was comparable to Alberta's discharge rate per 100,000 population (101.3 High River LGA vs. 136.70 Alberta); however, it was higher in High River in the 2017 report compared to the 2013 and 2015 reports.

As will be discussed later in section 5.2, the above highlights that there was an increase in mental and behavioural disorders as the years went on post-flood. For example, the above highlights that deaths related to mental and behavioural disorders increased over time, mental health-related emergency department visits increased over time, and anxiety and mood-related emergency department visits were higher than the Alberta average in the latest 2017 report. While we cannot say with certainty that the increase was as a result of the 2013 flood sequelae, this does prompt us to empirically investigate flood sequela.

The information above provides a high-level overview of the health profile of the LGA of High River based off of reported data from Alberta Health Services. It is important to note that the full burden of ill health (including mental ill health) in High River may not be captured as these profiles would not necessarily capture the health outcomes of temporary foreign workers in the community. Further, the stigma of mental illness may prevent people from reporting symptoms of mental-ill health. A chief aim of my research is to explore the broad range of mental health outcomes that go beyond specific medicalized, diagnostic states. The health profile here is simply meant to provide a broad overview of the health status of the community based on publicly available literature.
4.3.1.6 Political Economic Landscape

As noted earlier it is important to locate the town of High River within the broader provincial and federal context to highlight the Political Economy at multiple scales to better understand governance, decision-making, and economics at the federal, provincial, and municipal levels. As such, this section is a broad overview of the political economic landscape of High River within the Province of Alberta in Canada throughout 2012-2018. Speaking to the political economic landscape, I provide details on who was in power at all levels of government just before the flood up until 2018. I also provide information on the economic landscape in Alberta and High River during this time, approaches towards climate change, and government responses (decision-making, funding, policy approaches) to the 2013 flood. Information in this context section will support section 4.3.2 below where I highlight my rationale for ‘caseing’ High River. I begin with an overview of the federal political economic landscape, then the provincial economic landscape, and then the municipal economic landscape.

4.3.1.6.1 The Federal Landscape

At the federal level, Stephen Harper, was in power between 2006-2015, he was the longest-serving Conservative prime minister since Sir John A. McDonald. Before a role in politics, Harper worked in Calgary for Imperial Oil. In his early political career, he was the founding member of the right-wing, populist, Reform party. In 2006, Harper’s Conservatives won a minority government; it was the first time since Joe Clark’s election in 1979 that a westerner (from Alberta) was elected prime minister.

Exemplifying a neoliberal capitalist approach to leadership (by way of reducing the size of government, reducing taxes, and limiting government spending), Harper reduced the federal cabinet from 33 to 27 ministers; cut the Goods and Services Tax (GST) from five to seven
percent; and, motioned to suspend public servants from striking and also to end the public
funding of political parties\textsuperscript{298}.

Looking at the Political Economy and ecology under the Harper government tenure,
global oil prices declined in 2014 and 2015, which resulted in a declining Canadian dollar and
job losses (primarily in Alberta)\textsuperscript{298}. The economic downturn between 2014 and 2015 led to
criticism by many Canadians about “Harper’s focus on resource extraction [that] had put all of
Canada’s eggs in one basket” \textsuperscript{298}. Further, Harper was “also criticized for an anemic effort to
address climate change and for failing to meet prior targets to lower greenhouse gas emissions,
most notably by withdrawing Canada from the Kyoto Protocol”\textsuperscript{298}. After losing the 2015 election
to a majority Liberal Government led by Justin Trudeau, Harper resigned from the Conservative
party\textsuperscript{299}. While Prime Minister Trudeau has introduced a national carbon tax strategy and signed
on to the Paris Climate accord in an attempt to act on climate change, these commitments are
also set against a backdrop of fiscal and legislative commitments to expand exports from the oil
sands in Alberta\textsuperscript{299}.

4.3.1.6.2 The Provincial Landscape

At the Provincial level, Progressive Conservative, Alison Redford was in power between
2012-2014. In general, her response to the 2013 flood was lauded by community member and
health professionals\textsuperscript{222}. Under her leadership, the Province committed $50m to support mental
health interventions post-2013 flood for both immediate and future mental health needs\textsuperscript{222}. Notably, however, media reports have criticized the Provincial Tory government for ignoring “its
own report from the 2005 flood to limit developments in flood plains” and for not taking “the
threat of climate change seriously”\textsuperscript{300}. Premier Redford’s tenure ended when she resigned in
March 2014 following controversy “revolving around her use of public funds for personal and
partisan uses during a period of cutbacks to public services”. Progressive Conservative (PC), Jim Prentice briefly took leadership of Alberta between 2014 to 2015 and then resigned when the Progressive Conservatives lost to the New Democratic Party (NDP), led by Rachel Notley.

Premier Notley was premier in Alberta from 2015-2019. While she maintained the need to name the climate change problem, her platform continued to advocate for growth in markets and the economy through pipeline expansion in Alberta at the sake of signing on to a Federal carbon plan to act on climate change. Her government held-out on signing the national carbon plan until she received federal cabinet approval to expand the Kinder Morgan Trans Mountain pipeline. Notably, however, the Kinder Morgan Trans Mountain pipeline project faced opposition from Indigenous and environmental groups as well as NDP political leaders outside of Alberta leading to Kinder Morgan threatening to cancel the project in Alberta. Premier Notley, however, “persuaded the federal government to buy Trans Mountain for $4.5 billion in 2018”, putting the Federal Government, and Canadian tax payers, in possession of the controversial pipeline. If the expansion of this pipeline goes ahead — which it is likely to do as the Trudeau cabinet recently approved the project — it is unlikely that Canada will be able to keep its Paris Accord emissions reduction commitments to mitigate the current and future impacts from climate change on Canadians; further, ecosystems will be disrupted and Indigenous rights will continue to be ignored.

4.3.1.6.3 The Municipal Landscape

At the time of the flood, Emile Blockland was mayor or High River. There is a lack of publicly available information available about Blockland, however there are some media reports that Blockland conceded that the town was simply unprepared to deal with the scale of the 2013
flood disaster and there are some reports suggesting that the community was dissatisfied and
frustrated over Blockland’s response to the flood.\textsuperscript{305,306}

Soon after the 2013 flood struck in June, Emile Blockland stepped down as mayor, a
mayoral election took place, and the race was won by Craig Snodgrass in October 2013.\textsuperscript{307}
Snodgrass has been described in a media report as :“a lifelong resident, a local businessman and
one of the thousands of townsfolk hard hit when the banks of the Highwood River released a
cascade of water on June 20, 2013.”\textsuperscript{308} Snodgrass ran with the intent of supporting High River
through its flood recovery. Throughout 2013-2018, Snodgrass has remained in power as the
mayor and saw the town through the past five-years of rebuilding and flood mitigation, which
has cost upwards of $200million dollars.\textsuperscript{308,309} While flood mitigation has taken shape in the
community, with over 90\% of the flood mitigation complete as of August 2018, there are still
community concerns about impending flood risks; noting this, Mayor Snodgrass, has expressed
eagerness to see updated flood maps from the Province of Alberta, which as of yet have not been
released.\textsuperscript{310}

After the flood, the local economy took some time to recuperate from flood losses and
damages. Further affecting the local economy was the economic downturn in Alberta between
2014-2015 (due to the decline in oil prices) that trickled down to the municipal level in High
River.\textsuperscript{311} Since 2015, the municipal council has attempted to attract new business developments
and operations in the community to increase the economic vitality and enhance the livelihood of
community members.\textsuperscript{309}
4.3.1.7 Summary

The above information provides a cursory overview of geographic, ecological, demographic, and political economic landscape of High River that helped to contextualize my rationale for ‘casing’ High River, which I explore in section 4.3.2 below.

4.3.2 Rationale for ‘Casing’ High River

The rationale for ‘casing’ my study in a geographic area that has experienced frequent flooding is two-fold. Firstly, empirical research reveals that flooding has become the most common form of disaster globally, and flooding is predicted to become more frequent and intense due to the impacts of climate change — thus, there is an established link between climate change and flooding\(^1,30,114\). In this research I am not suggesting that the 2013 Southern Alberta flood occurred as a direct result of climate change; however, climate science tells us that climate change increases the risk, frequency, intensity, and complexity of extreme weather events, like flooding\(^1\). As noted in section 4.3.1.2, the town of High River has experienced a number of flooding events over the last 25 years, including the destructive 2013 flood. The town is located in an active floodway putting the town, and its people, at risk for future flooding events. Thus, High River was an ideal location for empirical inquiry on outcomes linked with climate-related hazards\(^195,284,286\). There is also an established body of literature linking flood risks and impacts to psychosocial outcomes (see\(^30,62,119,111,114,132\)). As noted earlier, most people affected by extreme weather emergencies will experience psychological distress, which for most will improve over time\(^5,38\). In Canada there have been a few notable empirical studies documenting the mental health implications of flooding. For example, in the aftermath of the 2017 spring flooding in southern Quebec, Montreal Public Health conducted a survey with residents impacted by the flood and found that 74% of people who evacuated experienced some form of
mental health problem, including: sleep disorders, problems concentrating, or anxiety. Further, in a recent literature review of the mental health implications of flooding in Canada, Burton et al. (2016) find a whole host of mental health impacts, including:

- reduced sense of security,
- stress over living in floodplains;
- propensity for symptoms often linked to PTSD;
- poor birth outcomes due to antenatal stress/anxiety, and
- cognitive impairments due to water contamination with metals.

Most relevant to my research was a 2016 publication describing the psychosocial impacts and public health responses to the 2013 Southern Alberta flooding, including a 1.64-fold increase in new prescriptions for anti-anxiety medications for females and 2.34-fold increase in new prescription of sleep aids. This study also found an increase in sexual assaults following the flooding. There has also been a recent study documenting fears and feelings of helplessness in the town of High River after the 2013 flood, and a study documenting the impact of future flooding in Southern Alberta. Noting that High River has been exposed to flood events and it is projected to experience future flooding, and that there is evidence of psychosocial impacts in this area, this location was fitting for a study on the psychosocial consequences of climate-related events.

From a psychosocial adaptation perspective, the psychosocial response to both the 2013 floods and the 2016 wildfires has, in general, been praised by public health professionals. As noted earlier, Premier Redford committed $50m to support mental health interventions post 2013 flood for both immediate and future mental health needs. Then in 2017, the Alberta budget set aside an additional $15m for mental health, and the Province of Alberta has also recently
received $586m (over 10 years) from the Federal government for mental health interventions. It is important to note that these financial commitments to mental health care are set against a backdrop of sustained provincial and federal investments in pipeline expansion and fossil fuel extraction (as noted in section 4.3.1.4). These commitments to the fossil fuel industry, and financial commitments to mental health care post-extreme event, signal a reactive approach to mental health care post-event and a fundamental disconnect of how extreme events, like the 2013 flood or 2016 wildfires, are connected to anthropogenic climate change. The ‘caseing’ of High River allowed me to explore how multi-scalar political economies (at the federal and provincial levels) impacted community-level mental health care in a changing climate at the municipal level.

I chose to ‘case’ High River, Alberta as the location for this research because it is located in Alberta, which is home to the Canada’s oil sands. The oil sands are major contributors to Greenhouse gas (GHG) emissions and, thus, contribute to runaway climate change. The oil sands are a stark reminder of the anthropogenic causes of climate change and the impetus for economic growth at the sake of planetary and public health. Locating this research in Alberta, with the entrenched economic interests of the oil and gas industry, I was able to critically analyze (from the lens of Political Ecology) the influence of Political Economy on public health responses to climate change-related extreme weather.

By ‘caseing’ the town of High River, I was able to explore aspects that are relatively unique to High River when combined, like for example, the town is prone to flooding; there are documented incidents of psychosocial risks and impacts from flooding; and, the Province has made investments in population-level mental health interventions to support the wellbeing of community members after a significant flooding event, including the aforementioned $50m to
support mental health via the deployment of additional mental health experts to High River; hiring of youth mental health specialists; creation and distribution of mental health promotion resources; and, training in psychosocial first aid for first responders.\textsuperscript{222}

Compared to many other rural towns of its size in Canada, High River also appears to have been well equipped with health services before and after the flood that may have enhanced psychosocial adaptation. By selecting High River, I was also able to explore if and how enduring mental health issues were addressed or overlooked in a town that was well-equipped with health services. If I were to find that the mental health care needs of community members were not met (in the well-resourced town of High River), I could surmise that mental health care needs in other towns exposed to climate-related extreme weather would be even further from being met.

By ‘caseing’ High River I was also able to explore things about this case that are transferable to other communities in Canada. Like, for example, lessons-learned about long-term psychosocial adaptation after an extreme event that can be transferred to other communities across Canada that have experienced climate hazards (like, for example flooding and wildfires). These lessons-learned may be particularly transferable in Canadian municipalities with similar political economic, demographic, and geographic landscapes as noted in section 4.3.1.

More broadly, ‘caseing’ High River allowed me to problematize what the existing literature says about risks and impacts to mental health from a changing climate by looking closely at a range of potential mental health outcomes (including mental illness, mental problems, and mental wellbeing), as well as adaptation interventions (or lack thereof), and the impact of sociopolitical conditions on psychosocial responses to a changing climate.

In summary, High River is a case of a rural community in Canada wherein community members experienced a climate-related hazard that had psychosocial effects. Treating High River
as a case, allowed me to conduct an initial exploration of the psychosocial consequences of a changing climate and psychosocial adaptation in a Canadian community located in a province whose political economic landscape is centered upon a major anthropogenic contributor (the oil sands) to climate change. Noting the political economic landscape of High River, Alberta, I was able to analyze this case through the lens of Political Ecology where I could critically inquire about sociopolitical conditions that shape climate change and mental health outcomes, inequities, and response interventions. Below, I explore my mixed methods methodological approach and highlight the fundamental tensions in conducting mixed methods research.

4.4 Methodological Approach

Aligned with the foundations of PE, my methodological approach is guided by the problem at hand, which is the problem of: inequitable risks and impacts of climate change on marginalized groups; the lack of empirical research looking at the long-term sequelae of climate change on those most marginalized; the lack of empirical research on responses to the long-term sequelae of climate change; and, a lack of theoretically guided inquiry into the roots of marginalization related to climate change and psychosocial health. I have designed my study based on three key factors: firstly, my aim was to address the aforementioned problem areas; secondly, my aim was to align with the PE theoretical commitments noted above (i.e. commitment to social theory, commitment to methodological rigor, and a commitment to emancipatory social justice); and, thirdly I considered the feasibility of conducting an empirical investigation, including my skills as a qualitative researcher, my budget to conduct field work, and ethical considerations (i.e. considering the well-being of my intended research participants). Noting the breadth of my research questions and my skills as a researcher, I determined that my study would be a mixed methods study, predominantly using qualitative research methods.
Below, I provide an overview of my study design and methods. Before doing so, it is prudent to recapitulate, my research questions, which are as follows:

- What are the long-term psychosocial consequences of the 2013 Southern Alberta flood in High River, Alberta? And, what implications does an exploration of the long-term psychosocial consequences of the 2013 flood have for the field of climate change and health?
- What is the health and social service response to the long-term mental health consequences of the 2013 flood in High River, Alberta? And, how can an understanding of this response support community-level psychosocial adaptation to a changing climate?
- How can the application of social theory to the study of climate change and mental health elucidate the sociopolitical conditions that shape climate change and mental health outcomes, inequities, and response interventions?

Noting the above research questions, I established that my study would be both descriptive and exploratory and that I would take a mixed methods methodological approach to my study. I determined that the best way to answer my research questions was to conduct a case study using a combination of quantitative and qualitative methods. Similar to Mason (2006), I took a “qualitatively-driven” approach to mixed methods which “offers enormous potential for generating new ways of understanding the complexities and contexts of social experience, and for enhancing our capacities for social explanation and generalization” (p. 10). A “qualitatively-driven” approach simply refers to the fact that I gave priority to qualitative methods in my research. I gave priority to qualitative methods to help me answer the above

***** Response refers to the response interventions undertaken by public sector institutions and community-based organizations.
research questions because of my skills as a qualitative researcher. Also, the nature of my research questions lent themselves well to (predominantly) qualitative methods where I could explore social phenomena through interviews and focus group sessions in an effort to better understand perceptions and understandings of climate change and mental health from my participants.

As I aimed to understand the long-term psychosocial consequences of climate change, I read through the literature on climate change and health and came to the realization that most studies that focused on this topic area use climate change and health assessment tools, which typically rely upon a combination of quantitative and qualitative methods, to assess the burden of illness associated with climate change. As such, the quantitative component to my research methods was the collection of quantitative data on climate change and mental health in High River through a climate change and health vulnerability and adaptation assessment. I explore my methods in detail later in the methods section of this dissertation. Here, I provide an overview of why I have chosen a mixed methods research methodology, inherent tensions in mixed methods research, and my mixed methods research design.

I chose a mixed methods research methodology for three key reasons. Firstly, mixed methods methodology aligns well with Political Ecology (as noted earlier and exemplified in Doolittle’s research). Secondly, the problem at hand, and my subsequent research questions, can best be answered through a combination of both quantitative and qualitative data sources.

It is important to highlight here that conducting mixed methods research is not without its challenges. There are fundamental epistemological and ontological tensions operating at the core of mixed methods research that ought to be considered when conducting mixed methods
research. Like for example tensions between interpretive and positivist methodologies that are imbued with fundamentally different ways of understanding the nature of reality and how we know what we know. I attempted to address these fundamental tensions by noting my epistemological and ontological research stance as guided by my theoretical orientation of critical Political Ecology. As discussed earlier, I take a critical PE approach to my research wherein I take an ontologically realist approach and an epistemological skeptical approach to my understanding of climate change and mental health research. Thus, inherent in my research approach is that there are real and knowable truths, such as the science of climate change and climate change impacts on mental health. My epistemological skepticism comes forward in my inherent belief that there are multiple ways of knowing about the science of climate change and its effects on mental health that need to be critically examined. Mixed methods research is fitting for my research because it “encourages the use of multiple worldviews, or paradigms”, “rather than the typical association of certain paradigms within quantitative research and others for qualitative research” 319 (p. 749). Thus, mixed methods allowed me to navigate my epistemological and ontological orientation.

Further, challenges in conducting mixed methods research that ought to be acknowledge include: the skills of the researcher in both quantitative and qualitative data collection and analysis, the time it takes to conduct the research, and navigating extensive amounts of data collection and analysis319. With respect to the first challenge noted here, I acknowledged my skills and training as a (predominantly) qualitative researcher and the nature of my research questions that encouraged my research to be qualitatively-driven. Noting the time it takes to conduct the research, I attempted to address this by building in a lengthy data collection timeframe, which appeared to work as I was able to collect the data I needed within this
timeframe. With respect to navigating the amount of time it takes to conduct analysis, I struggled with this as analysis of large amounts of data felt like it was never-ending. I worked closely with my thesis committee to help me retain focus during my analysis. I explore and explain my data analysis in detail in section 4.6 below.

4.4.1 Mixed Methods Research Design

The seminal text, *Designing and Conducting Mixed Methods Research*, by Creswell and Plano Clark (2011), highlights that there are four key elements to a mixed methods study design. They include: “(1) the level of interaction between strands, (2) the relative priority of strands, (3) the timing of the strands, and (4) the procedures for mixing the strands” (p. 1695). A strand refers here to the component of the study that is either qualitative or quantitative research; for a study to be a mixed method study there must be at least one qualitative strand and one quantitative strand. As noted above, the quantitative strand of my study was the data I gathered for the climate change vulnerability and adaptation, which included a suite of statistical information about the community of High River (including demographics and health status) and climate projections about the community. This information helped me to understand the climate change and mental health risks, impacts, and adaptation opportunities in the community. The qualitative strands of my data included: key informant interviews with leaders in health and social services in High River; interviews with community members who self-identified as marginalized (based on socio-economic status, gender, age, pre-existing health concerns, and race); and focus group sessions with front-line health and social services workers.

Noting the key elements listed above, I decided that the strands would interact. What I mean by this is that the information gleaned from the climate change and health assessment would help to inform the qualitative methods. I also decided that the qualitative strands would
take priority because the qualitative strands allowed me to more deeply explore experiences and perceptions related to the psychosocial consequences of a changing climate in High River. In terms of timing of the strands, I conducted two distinct phases of data collection that will be explored in detail below in section 4.5. In phase one, I began by conducting the climate change and health assessment to better orient myself with the community of High River and to gather information on potential participants for the qualitative strands of my research. Also in phase one was the key informant interviews (which I conducted over the phone). Before conducting my field work in High River, I felt it prudent to conduct the key informant interviews over the phone to firstly establish relationships with leaders in the community who could potentially provide me with entry into the community. This was important to me, as I was an outsider to High River, and I was entering a community that had previously experienced a number of outsiders coming into the community to respond to the disaster and to conduct research about the flood. I did not want to enter into the community blindly, nor did I want to offend community members by conducting this research, thus, I felt it was appropriate to firstly establish relationships with key informants first. Further, I conducted this first phase of research because I wanted to be able to conduct initial analysis of the climate change and health assessment and key informant interviews before conducting my field work to see if I ought to re-evaluate my approach to the focus group and interviews with marginalized community members (e.g. the types of questions I asked, who and how I recruited participants, appropriate times to travel to the community to conduct research, etc.). The second phase of research included the focus group sessions and interviews with marginalized community members. Details on these methods are provide in-depth below in section 4.5.
4.4.1.1 Analysis Design

In terms of mixing the strands of my data, I conducted preliminary analysis of each data set, which I explain in section 4.5. In section 4.5, I also explore the specifics on how each piece of data was collected. I conducted a fulsome analysis of all of the data together (once all of the data was gathered, and after I had conducted the aforementioned initial analysis). Creswell and Plano (2011) refer to this type of timing for mixed methods studies as ‘multiphase combination timing’, wherein strands of data are collected and analysed both concurrently and sequentially. By conducting the fulsome data analysis, I was better able to explore how the data spoke to each other and what the full set of data could reveal to me in terms of uncovering the hidden or obscured sociopolitical conditions that shaped inequities, responses, and perceptions about the psychosocial consequences of climate change in High River.

Speaking to my analysis, I did not analyze statistical data from my quantitative strands. Something that I speak to later in section 4.5.3.1. I did, however, conduct a descriptive narrative analysis of this statistical data that I also speak to in section 4.5.3.1. I analyzed all of my strands of data using thematic analysis.

Broadly, thematic analysis is described as an analysis method “for identifying, analysing and reporting patterns (themes) within data. It minimally organizes and describes your data set in (rich) detail. However, frequently if goes further than this, and interprets various aspects of the research topic” (p.79). Thematic analysis has been framed as a “foundational method for qualitative analysis” that is flexible; it has also been framed as being “compatible with essentialist and constructionist paradigms” (p. 78). While thematic analysis is considered flexible and unbound by ontological or epistemological paradigms, there is also a risk that it can be seen as an “anything-goes” approach to qualitative data analysis (p. 78). Noting this, Braun
and Clark (2006) provide a demarcation of what thematic analysis is, how it can be used, and how it can retain its rigour in light of its flexibility and unboundedness to demonstrate “that is theoretically and methodologically sound” (p. 78). For this reason, I rely upon Braun and Clark’s (2006) approach to thematic analysis, which includes: familiarizing oneself with the data; generating initial codes; searching for themes; reviewing themes; defining and naming themes; and, producing the report. I explore and explain how my approach is aligned with Braun and Clark’s (2006) approach later in section 4.6. Before exploring this alignment, it is important to note some of the challenges of conducting thematic analysis and to highlight how I attempted to navigate these challenges. Below I also explore how thematic analysis aligns with my theoretical orientation.

Braun and Clark (2006) note some of the fundamental challenges of thematic analysis. These challenges include: understanding what ‘counts’ as a theme; navigating the type of analysis that is needed (e.g. thick description or detailed account); identifying themes through inductive versus theoretical thematic analysis; epistemological tensions; and, how to make sense of the multitude of questions within qualitative research and within the analysis process.

Noting the first challenge, I understood a theme to ‘count’ in my data if a pattern emerged a number of times from a number of voices. I would also stand back from my data, after noting reoccurring patterns and ask myself: what is this all about? What are the unsaid, or silenced, themes that I also ought to consider? Thus, themes were ‘counted’ not only based on prevalence but also upon a broader reflection of what appeared to be missing or hidden in my data based on my theoretical understanding of PE and my broader understanding of the climate change and mental health literature. I would step away from the data and then go back into the data numerous times to see if I was (at least somewhat) accurately capturing prevalent themes.
This stepping away and coming back into the data also allowed me to pay closer attention to
nuances and silences within the data. I would also meet with my committee to discuss my
questions or challenges about how I was capturing themes. Noting the second challenge
highlighted by Braun and Clark (2006), I determined that the type of analysis that I was
undertaking was a rich description analysis, for the most part, whereby I reviewed my entire data
set to explore predominant themes, I then crafted my empirical manuscripts based-off of these
predominant themes (as will be demonstrated in manuscripts: 5.1, 5.2, and 5.3).

With respect to the identifying themes, I conducted both inductive and theoretical
thematic analysis. What is meant by this is that I identified themes through a ‘bottom-up’
approach where I identified themes based on the data itself and what my participants were telling
me, and I also conducted theoretical thematic analysis by conducting a critical interpretive
analysis of the data based on my understanding of critical Political Ecology and by
contextualizing the case of High River. Below, I explain in detail how I identified themes
through a descriptive qualitative lens and a critical interpretive lens.

Noting the epistemological tensions of conducting thematic analysis, including the
tensions between realist/essentialist and constructivist analysis, I provide details below on how I
navigated these tensions when I explore and explain how a thematic approach aligns with my
critical PE epistemological and ontological stance.

With regard to the final challenge noted by Braun and Clark (2006) regarding clarity
around the multitude of questions in qualitative research (e.g. navigating and clarifying the
differences amongst the three types of questions: research questions, questions posed to
participants, and questions that guide coding and analysis). These authors note that it is
“important to be clear about the relationship between these different questions”, further, they
note that “there is no necessary relationship between these three, and indeed, it is often desirable that there is a disjuncture between them”\textsuperscript{320} (p. 85). Moreover, they suggest that “some of the worst examples of ‘thematic’ analysis we have read have simply used the questions put to participants as the ‘themes’ identified in the ‘analysis’\textsuperscript{320} (p. 85). In my research I have attempted to make clear distinctions amongst my research questions (see section 1.3), questions posed to participants (see appendix: D,F,H), and questions that guide my coding and analysis (see section 4.6). Further, my thematic analysis is guided by a distinct set of questions to explore descriptive themes, and a distinct set of questions to explore critical theoretical themes, as will be noted in section 4.6.

Linking back to how I attempted to navigate the epistemological tensions of conducting thematic analysis, I understood thematic analysis as an approach that offered me the flexibility to explore both my theoretical and methodological orientation. As highlighted, my theoretical orientation is influenced by critical PE where I take an ontologically realist and epistemologically skeptical position to my research. As noted earlier, I approach my research from a realist ontology and epistemological skepticism, wherein I believe that there are knowable truths about the human-nature relationship (thus, I began my analysis with a descriptive qualitative approach); and at the same time I believe that there are multiple ways of knowing these truths that ought to be critically examined (thus, I conducted a critical interpretive analysis of my data). Thematic analysis is fitting then, as Braun and Clark’s (2006) note, because thematic analysis: “can be an essentialist or realist method, which reports experiences, meanings and the reality of participants, or it can be a constructionist method, which examines the ways in which events, realities, meanings, experiences and so on are the effects of a range of discourses operating within society”\textsuperscript{320} (p. 81). In the thematic analysis of my data, I began my analysis by
taking a descriptive qualitative approach, whereby I analyzed all of my data through descriptive
narratives based on trends or themes that I was seeing in my data. Trends, as Braun and Clark
(2006) note, capture “something important about the data in relation to the research question, and
represents some level of patterned response or meaning within the data set” (p. 82). A
descriptive qualitative approach to this analysis is an approach that produces “a low-inference
description of phenomenon” (p. 40). While some form of interpretation is required, the aim of
qualitative description is to minimize inferences and stay close to the original data, while
acknowledging that any interpretation of experiences is “mediated by researcher interpretations”
(p. 40). A description of this process is outlined in section 4.6 below. This descriptive
qualitative approach aligns with critical PE because it allows for participant voices —
particularly the voices of those most marginalized who are often absent or hidden in empirical
research and knowledge production — to emerge from the data so that these voices can describe
(in their own words), their experiences and their knowledges and that these experiences and
knowledges can be fully represented in the research analysis. As aforementioned, a descriptive
qualitative approach still includes some form of interpretation that is mediated by the researcher.
I acknowledge that I, as the researcher, will hear and experience participant voices in my own
way and I come to this research with an explicit ontological and epistemological understanding
(underpinned by critical Political Ecology) that will influence my interpretation of what and how
something has been said and heard. I discuss this in more detail in my analysis section below and
in the findings in chapter 5.

I then analyzed my data through a critical interpretive lens which I describe later in
section 4.6. Briefly, a critical interpretive lens refers, herein, to the process of making sense of
the data within the context under study, while noting that there are multiple ways of making
sense of the data that are bound by positionality (e.g. social location and theoretical orientation). This critical interpretive lens aligned well with my critical PE approach because it offered me an opportunity to look beyond the words and experiences of what my participants were telling me, to hear the silences in the data, and to explore the data within my contextual understanding of High River (e.g. based on my understanding of the ‘case’ of High River, which I explore above), and to make sense of the data based on my critical PE theoretical orientation. Further, this critical interpretive lens allowed me to be more reflexive to look at how my positionality influenced my data collection and analysis and how the positionality of my research participants influenced perceptions of the topic area under study. This was key, especially when we consider that engaged critical qualitative scholarship is predicated on the understanding that the process of knowledge generation is affected by positionality. I explore this more deeply in section 5.1.

I began this section by highlighting that my aim was to describe and explore phenomenon related to climate change and psychosocial health. In summary, what makes my study descriptive is three-fold: firstly, I intended to describe the long term psychosocial consequences of the 2013 Southern Alberta flood in the town of High River; secondly, I intended to describe populations most at risk of these psychosocial consequences; and, finally, I intended to describe interventions that address the long-term psychosocial consequences of the flood, with a particular focus on interventions that support psychosocial health for marginalized peoples. What makes my study exploratory, is that I applied a critical lens to my data to explore how sociopolitical conditions shape climate change and mental health outcomes, inequities, and response interventions through a reflection on positionality and context related to my data. Specific details on my study design, and methods can be found in the section 4.5 below.
4.5 Methods

4.5.1 Methods Overview

This study was designed as a mixed methods study wherein each method addressed a different dimension of the research questions and each method was complimentary in helping to address the research questions in a fulsome manner\textsuperscript{324}. This mixed methods study occurred in two distinct phases. Below, I briefly describe each of these phases, and later I provide details on each method. Table 2 provides an overview of all of the research phases and methods used in this study.

This study is referred to as a mixed-methods study, as I used multiple methods, predominantly qualitative methods (interviews and focus groups), with some combined qualitative and quantitative literature gathered for the vulnerability and adaptation assessment that will be discussed below\textsuperscript{324}. 


### Phase 1 Methods

| Exploration of: | 1. Climate Change Vulnerability and Adaptation (V&A) Assessment (Rapid Review Assessment)  
|  | 2. Key Informant Interviews  
| Research Type | Secondary Research (V&A) and Primary Research (Key Informant Interviews)  
| Scope/Recruitment | 1. **Secondary research component: V&A**  
|  | **Scope**: Search terms to include: search terms: “High River, Alberta” AND “flood” OR “environment”; OR “climate”; OR “extreme weather”; OR “weather”, OR “temperature”. The psychosocial indicators search terms included: “High River” AND “mental health” OR “wellbeing” OR “health”, OR “psychosocial”.  
|  | **Sources**: Google™ search engine and the following websites: Alberta Government, Health Canada, Environment Climate Change Canada, Prairie Climate Centre, Statistics Canada, Alberta Health Services, and the Canadian Disaster Database  
|  | 2. **Primary research component: Key Informant Interviews**  
|  | **Scope**: Engage with stakeholder group of: public health and social services professionals (public and community-based); emergency management professionals; public safety; environmental ministries; local councillor(s). The objective of the key informant interviews for this research was to gain insights from key informants on any factors they think may have impacted access to resources that support mental health and wellbeing in High River during and after the flood (up until five years after the flood).  
|  | **Sampling**: Purposeful sampling and snowball sampling  
|  | **Participants**: (n = 14)  
|  | **Method**: Key informant telephone interviews (see Appendix D for interview guide)
| Phase 2 Methods | 3. Psychosocial Asset Mapping (Focus Groups)  
4. Semi-structured interviews |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration of:</td>
<td>What is the public health response (undertaken by public and community-based organizations) that supports the psychosocial health of marginalized community members before, during, and after climate change-related extreme weather in High River? What are the long-term psychosocial impacts of the 2013 flood?</td>
</tr>
<tr>
<td>Research Type</td>
<td>Primary Research</td>
</tr>
</tbody>
</table>
| Scope/Recruitment | 3. **Primary research component: Psychosocial Asset Mapping (Focus Groups)**  
**Scope:** Engage with front-line health and social services workers to discuss what types of psychosocial services and responses (e.g. donations, altruistic endeavors, community supports, etc.) were available to High River community members before, during, and after (up until five years after) the 2013 flood.  
**Sampling:** (non-probabilistic) voluntary sampling (recruitment via posters)  
**Participants:** four focus group sessions with (n = 14)  
**Method:** Focus group (see Appendix F for the focus group guide) |
|                 | 4. **Primary research component: Face-to-Face Interviews with Marginalized Community Members**  
**Scope:** High River residents who self-identify with any one or more of the following: someone who is from a low socio-economic status, female, youth, elderly, someone with pre-existing health concerns, non-white and who experienced the 2013 flood in High River. The objective of conducting interviews with marginalized community members of High River was to better understand experiences of navigating the psychosocial consequences of the 2013 flood with groups of people who tend to be most at risk to climate hazards  
**Sampling:** (non-probabilistic) voluntary sampling (recruitment via posters) and snowball sampling  
**Participants:** (n = 18)  
**Method:** Semi-Structured Interviews (see Appendix H for the interview guide) |
Phase 1 research methods included a climate change vulnerability and adaptation assessment and key informant interviews. This climate change vulnerability and adaptation assessment was a rapid review assessment that relied upon two key tools/documents to conduct this assessment: the WHO, 2013 Vulnerability and Adaptation Assessment guidelines, and the Ontario Climate Change and Health Toolkit. Ontario Climate Change and Health Toolkit can be used at any scale and within any other context — there is nothing that requires its explicit use in Ontario, this is just the first provincially developed toolkit based off of the WHO Vulnerability and Adaptation (V&A) guidelines. Typically, a full climate change and health vulnerability and adaptation assessment includes five steps: (1) Frame and scope the assessment; (2) Assess: vulnerabilities, future impacts, and adaptation (3) Manage and monitor risks, (4) Develop a communication plan; (5) Monitor and evaluate. I conducted a rapid assessment, conducting steps one and two. The rationale for this was that the rapid, desktop climate change and health vulnerability and adaptation assessment was intended to provide an overview of climate-related risks and impacts to psychosocial health in the community of High River, and an overview of current and future vulnerabilities, impacts, and adaptation opportunities. A further objective of this rapid assessment was to identify and locate key informants for the key informant interviews with public health and social services professionals. The second part of phase one included telephone interviews with a sample of public health and social services professionals, details on of which are discussed below.

The second phase of the research included field work in the town of High River, including psychosocial asset mapping with front-line public health and social service workers via focus groups; and face-to-face, semi-structured interviews with community members who self-identified as marginalized and who had experienced the 2013 flood.
Each data set was analyzed separately and then once all of the data sets were gathered; an overarching analysis was performed (see section 4.6).

4.5.2 Ethical Considerations

This research was approved by the University of Toronto Ethics Board, the University of Alberta Ethics Board, and Alberta Health Services ethics. Note, I had to go through the University of Alberta Ethics Board to get Alberta Health Services ethical approval, therefore the Alberta Health Services ethics approval letter incorporates the University of Alberta Ethics board approval; all ethics approvals can be found in Appendix B and C.

All participants signed electronic or hardcopies of consent forms before I conducted the interviews or focus groups. All participants were also asked verbally if they consented to the interviews. As my research addresses psychosocial responses following extreme weather events, I provided crisis resource information in the consent forms and went over these resources with participants verbally at the beginning and end of the focus group or interview sessions. I also reminded participants that they could request to skip questions and terminate the interview or focus group at any time.

Participants were made aware that their names or exact roles would not be used in this study, participants were notified that the organizations to which they belong would not be named and that organizations would only be referred to by type (e.g. health institution, faith-based organization, etc.). I also highlighted the potential benefits of this research to participants, which I noted may include improved community-level psychosocial resources.

Acknowledging power differentials between researcher and participant, I highlighted to participants that I was conducting research to learn from their experiences and seek their guidance as I considered them the experts in helping me to understand their experiences.
To protect participant anonymity, participants were referred to within my publications by research method (to which they participated) and number (for example key informant interview 1, semi-structured interview 1). No known ethical issues arose during this study and none of my participants requested to withdraw from the study.

4.5.3 Climate Change and Health Vulnerability and Adaptation Assessment

As per the climate change and health vulnerability and adaptation tools noted above, I completed the following steps in the rapid vulnerability and adaptation between January and May 2018: (1) Frame and scope the assessment; (2) Assess: vulnerabilities, future impacts, and adaptation. In the framing and scoping stage, I framed the assessment as an assessment that would review the current and future climate hazards in the town of High River as well as psychosocial health outcomes related to these hazards. I also framed the assessment to incorporate current and future adaptation opportunities in the community. The objective of this rapid desktop assessment was to identify current and future climate change related risks and impacts in High River, with a particular focus on risks and impacts to marginalized community members, and adaptation opportunities to enhance or support psychosocial health.

The search methodology that guided this framing was as an Internet-based search for literature that explored climate change and psychosocial health in High River, Alberta. I used the Google™ search engine and conducted two separate searches, one for environmental indicators and one for psychosocial indicators. The environmental indicators search included the following search terms: “High River, Alberta” AND “flood” OR “environment”; OR “climate”; OR “extreme weather”; OR “weather”, OR “temperature”. The psychosocial indicators search terms included: “High River” AND “mental health” OR “wellbeing” OR “health”, OR “psychosocial”. I also reviewed specific websites and databases, including the following: Alberta Government,
Health Canada, Environment Climate Change Canada, Prairie Climate Centre, Statistics Canada, Alberta Health Services, and the Canadian Disaster Database. Inclusion criteria for this search strategy included all English content (from Canadian Government websites, news outlets, municipal websites – for High River or Calgary†††††††) that explained or explored climate change or extreme weather in High River Alberta and/or explained and explored mental health in High River. Exclusion criteria included any of the following forms of content: Blogs, Social Media, content in languages other than English.

All relevant web-pages were scanned to see if they contained content on climate change or extreme weather in High River Alberta and/or explained and explored mental health in High River. If available, data sources and methods for web-content was scanned and filed. Approximately 116 data sources were used in this assessment.

4.5.3.1 Analysis of Climate Change and Health Vulnerability and Adaptation Assessment

As noted earlier, I did not conduct the statistical analysis of the quantitative data gathered in the climate change and health vulnerability and adaptation assessment. I sourced and gathered statistical data that had already been analyzed. In particular, demographic statistical data came from (and was analyzed by) Statistics Canada287; and, health data was gathered from (and analyzed by) Alberta Health Services, with data sourced from: the Primary Health Care Branch, Health Analytics Branch, Surveillance and Assessment Branch in Alberta Health, along with Statistics Canada and Alberta Health Services. Climate projection data came from Prairie Climate Consortium Climate Atlas Climate Model Data, which is: “statistically downscaled data (Bias Corrected Spatial Disaggregation; BCSD) derived from 12 CMIP5 global climate models (GCMs: ACCESS1.0, CanESM2, CCSM4, CNRM-CM5, CSIRO-Mk3-6.0,

††††††† I included Calgary as much of the news about the Southern Alberta flooding focused on Calgary, the most populated city, and made mention of surrounding areas, like High River.
GFDM-ESM2G, HadGEM2-CC, HadGEM2-LR, INM-CM4, MPI-ESM-LR, MRI-CGCM3, MIROC5), for two emissions scenarios (RCP4.5 and RCP8.5)\textsuperscript{326}. I did, however, conduct a narrative analysis of this statistical data, which is described below.

A stand-alone analysis of the desktop assessment centered upon a review of information that explored climate change-related health hazards in High River (past, current, and predicted), with a specific focus on psychosocial health outcomes and inequitable exposures based on geography and socially determined factors. I conducted a review of all of the literature gathered in this assessment, highlighted trends and distributions in the data, and then conducted a descriptive narrative analysis under the following categories.

- Defining the eco-region of High River, Alberta
- Defining the socioecological region of High River, Alberta
- Demographics of High River
- Population health in High River
- Climate change predictions in High River
- Climate change and health hazards in High River
- Adaptation and mitigation options: mental health interventions in High River
- Adaptation and mitigation options: environmental interventions in High River

In my review of the literature I also captured information pertaining to potential key informant participants for the key informant interviews. For this, I extended my targeted website search to include, the following sites: Highriver.ca; Albertahealthservices.ca; High River Emergency Management(hrready.ca). Inclusion criteria for this search included: health and social services leaders (including professionals from: emergency management, public health, mental health, social services, and community groups) who appeared to be involved during and
post 2013 flood. More details on sampling methods for the key informant interviews can be found below in section 5.5.4.

Details on how the data from this rapid assessment was incorporated into the overall analysis of this research can be found later in section 4.6.

4.5.4 Key Informant Interviews

The objective of the key informant interviews was to gain insights from key informants on any factors they think may have impacted access to resources that support mental health and wellbeing in High River during and after the flood (up until five years after the flood). Key informants were selected based on their professional roles and knowledge of the community before, during, and after the 2013 flood. Key informants included people from the following professions: public health professionals (public and community-based); emergency management professionals; public safety; environmental ministries; local councillor(s). Respondents were purposefully identified from the desktop assessment and their contact information was sourced from publicly available material. I conducted group characteristic sampling, with key informants where I purposefully sampled people from organizations with a depth of knowledge about the community of High River before, during, and after the 2013 flood. Additional respondents were recruited via snowball sampling methods, whereby potential respondents were referred to me by key informants that participated in the study.

---

Group characteristic sampling is a purposeful sampling strategy, whereby researchers “select cases to create a specific information-rich group that can reveal and illuminate important group patterns” (p. 268)
A total of 14 key informant interviews were conducted. Key Informants included representatives from:

- Municipal government (n = 2)
- High River community services (n = 1)
- Provincial health authority (n = 3)
  - 2 from school-based mental health care
- Non-profit mental health care (n = 3)
- Faith-based institution (n = 1)
- School-based mental health care contractor (n = 1)
- Local physician (n = 1)
- Private mental health provider (n = 1)
- Municipal Employee – Economic Development (n = 1)

All consent forms were sent to participants via email, participants were asked to review, sign, and send ethics consent forms before the interviews. All participants signed and returned consent forms before interviews took place. All interviews took place using Zoom™ audio recording, if Zoom technologies were cutting out or if participants did not have access to Zoom, I would call participants by phone and record using a handheld recorder and with Zoom audio recording. All recorded audio files were saved on my personal computer and all files were encrypted, using Boxcryptor™ software, and password protected. All audio files were then transcribed by me, and these files were stored using the same Boxcryptor™ encrypted software and were password protected.

Key informant interviews took place between March and July 2018 and each interview averaged 60 minutes in duration. A full interview guide can be found in Appendix D, the key topic areas that respondents were asked about included:

---

Participants were seen (by me the researcher and by their organization) as representing their institutions/organization if they were in some form of leadership role and had knowledge and experience with the community of High River, before, during, and after the 2013 flood.
• Organizational structure and background
• Role of interviewee in their organization/institution (e.g. professional role)
• Organization’s approach to mental health and well-being
• Other known organizations that support mental health and well-being
• Interactions between organization of the interviewee and other organizations in High River
• Impact of 2013 flooding and the number and types of mental health supports
• Impact of 2013 flooding on people accessing mental health services
• Organization’s approach to climate change and mental health
• Perception of interviewee about link between climate change and mental health

Hand-written notes were taken during each interview and reviewed after each interview. These hand-written files were stored in a secure, locked location.

5.5.1.1 Analysis of Key Informant Interviews

After all interviews were complete, I reviewed all of the transcriptions and hand-written notes and noted emerging themes that spread across all interviews (see section 4.5.6.1 for details on noting emergent themes). After the 10th interview, I noted that I may be reaching a point where no new information would be gleaned; I then conducted four additional interviews and reviewed my notes again; at this point I felt that no new information would be gleaned from conducting additional key informant interviews because I had reached a point of informational redundancy that demonstrated I had reached saturation in my data collection. I also felt confident about reaching data saturation in this phase of the research because I reached a point where I kept getting referred to the same participants I had already interviewed, thus signaling I had reached a point of sampling saturation.

All interviews were transcribed using speech dictation software and any participant identifying information was removed. Interview transcripts were reviewed three times and memo-notes were taken. An initial code book was developed based-off of the transcript review and memo-notes. This initial code book had broad themes and a number of parent codes. After
review by my thesis committee, we discussed a more succinct, descriptive approach wherein I based my updated code book on the following key questions: What is this an example of? What are the terms participants are using? What words/terms do they use to describe their experiences? An updated codebook (see Appendix E) was prepared and reviewed by my committee and it was agreed that we had reached a point where the code book aptly described the emergent themes from the interviews. The interview transcripts were then coded using Dedoose software, all files were encrypted, and password protected. After reviewing the coding, I then captured all excerpts for each code in an effort to find exemplary quotes for each code. I then also provided a brief synopsis of each excerpt to further analyze themes in each code.

5.5.5 Psychosocial Asset Mapping Via Focus Groups

A psychosocial asset mapping phase was undertaken to better understand, from the perspective of front-line health and social services workers, what types of psychosocial services and responses (e.g. donations, altruistic endeavors, community supports, etc.) were available to High River community members before, during, and after (up until five years after) the 2013 flood. See Appendix F, the Focus Group Guide, for details on the psychosocial asset mapping process.

Participants were recruited through posters posted in local areas throughout High River (including: the library, grocery stores; the museum, and local businesses). Posters were also targeted in health and wellness facilities/institutions (including: faith-based institutions, Alberta Health Services facilities, the Salvation Army, Foothills Community Services, etc.). These posters asked participants to self-identify as anyone who supported the health and well-being of High River residents during or after the 2013 flood. Emails were also sent to public health and
wellness institutions seeking participants, emails were sent to publicly available email addresses. Participants were provided with food and beverages during the session.

Four focus group sessions took place between June 2018 to July 2018 at the local library in High River with a total of 14 participants. Below lists the participant by type and the session to which they attended.

Focus group 1 participants included:

- 1 police officer
- 1 clinical lead – children’s outreach
- 1 teacher at a youth outreach school
- 1 settlement worker for immigration services

Focus group 2 participants included:

- 1 health manager – child and youth mental health
- 2 victim services representatives
- 1 Facilitator at a faith-based institution

Focus group 3 participants included:

- 1 healing touch practitioner
- 1 practitioner from a children’s wellness and rehabilitation center

Focus group 4 participants to include:

- 1 Fetal alcohol specialist
- 1 grief counsellor
- 1 public health and primary care representative
- 1 flood recovery advocate

The focus group sessions took approximately 3-4 hours each and each session was audio recorded using a hand-held device. During these sessions, participants were asked to identify community, psychosocial assets (i.e. any form of social or psychological care practitioner, organization, facility, or person that were available before, during, and after the flood, up until July 2018). Participants were also asked to reflect upon any barriers to entry to these assets and to highlight any particularly notable assets. Further, participants were also asked to identify
resources that were available that address psychosocial health related to climate change. The focus group guide can be found in Appendix F. I took detailed notes on poster-board while participants addressed these questions. All notes and audio recordings were uploaded to my personal computer and were encrypted and password protected.

4.5.5.1 Analysis of Focus Group Sessions

After reviewing the notes from the focus group session three times, I drafted a codebook based on the emergent themes. Identical to the process for the key informant interview analysis, I asked myself the following questions to compile the codebook: What is this an example of? What are the terms participants are using? What words/terms do they use to describe their experiences? There were similar codes to the codes that emerged from the key informant interviews (see Appendix G). I took all of the notes and placed them in the appropriate code categories.

4.5.6 Interviews with Marginalized Community Members

The objective of conducting interviews with marginalized community members of High River was to better understand experiences of navigating the psychosocial consequences of the 2013 flood with groups of people who tend to be most at risk to climate hazards. Participants were recruited through posters that were posted throughout the community and the community of Okotoks, Alberta (a neighbouring community where many displaced High River residents relocated). These posters asked people to self-identify with any one or more of the following: someone who is from a low socio-economic status, female, youth, elderly, someone with pre-existing health concerns, non-white. Participants were offered twenty dollars of compensation for their time, or twenty-dollars-worth of food and beverages. Participants were also recruited via snowball sampling methods, whereby potential participants were referred to me by existing
research participants, I would ask the existing research participant to pass along my contact information to potential participants and have the potential participant contact me directly. Snowball sampling methods are one way of attracting research participants, who have a trusted relationship with existing research participants, and who otherwise may not participate in the research if it were not for the trusted relationship and referral\textsuperscript{327}. Inclusion criteria for participating in the interviews was to self-identify as marginalized, as noted above, and to have experienced the 2013 flood or the aftermath of the flood as a community member. A total of 18 people participated in the interviews.

Face-to-face interviews were conducted in a public place of the participants choosing, or interviews could take place while walking around the community. Each interview took approximately 60 minutes and all interviews were recorded using a hand-held device, I wrote-detailed memo-notes after each interview. After approximately 12 of the interviews had been conducted, I reviewed the recordings and memo-notes to review if any new information would be gleaned from conducting additional interviews. After reflecting on the current data, I conducted another 6 interviews and reviewed the data again to come to the conclusion that there was limited new information that would be gleaned from any additional interviews, and thus diminishing returns on conducting additional interviews.

Interviews were conversational in nature. I introduced myself as the researcher and then explained my research aims and then I would ask one or two key questions from the topic list in Appendix H to get the conversation started. The types of questions on this topic list included questions about: living in High River, the environment in High River, how High River has changed since the flood. When there was a lull in the conversation, I would then review my topic checklist and ask questions based on outstanding topic areas that we had not yet covered. Topic
areas that were asked of all my participants included: the type of resources (including places, programs, or people) available to support the social, emotional, and mental wellbeing of High River community members before, during, and after the 2013 flood (up until July 2018). Participants were asked how any of the resources could be improved. Participants were also asked about their perceptions of climate change and their perceptions about how climate change may affect mental health and wellbeing. Participants would typically start talking and respond to a number of topics from my checklist, which allowed the interviews to be more conversational in nature, rather than a set list of questions followed by specific responses to each question.

All interviews were transcribed by a third-party transcription company. This transcription company signed University of Toronto non-disclosure agreements before conducting transcriptions. All audio and transcription files were uploaded to my personal computer, these files were encrypted, and password protected.

4.5.6.1 Analysis of Interviews with Marginalized Community Members

An initial codebook (see Appendix I) was developed using an identical process to the codebook for the key-informant interviews and focus group sessions, wherein I asked the following questions before crafting emerging theme codes: What is this an example of? What are the terms participants are using? What words/terms do they use to describe their experiences? There were similar themes to the key-informant interviews and focus group sessions, however, there were many new themes that emerged from the semi-structured interview data. The code book was reviewed and agreed upon by all committee members. All transcriptions were uploaded to Dedoose and coded using the codebook.

4.6 Cross-Method Analytical Strategy
The secondary data collected for this research from the climate change and health assessment included: approximately 116 data sources that was distilled into an 84-page climate change and health assessment analysis document. The primary data collected (via interviews and focus group sessions) included a total of 46 participants, with over 50 hours of audio files, 100 pages of memo notes (that were reviewed a minimum of three times), and, 690 pages of transcriptions (review a minimum of 3 times). As noted above, I conducted an initial analysis of each data set before combining all of the data together to conduct an overarching thematic analysis. All of the coded data from the interviews and focus groups, as well as the data from the desktop climate change and health vulnerability and adaptation assessments, were reviewed together (and read three times in their entirety in an attempt not to miss any key themes or details from the data) and memo-notes were taken to establish overarching themes based on the same questions asked in the initial descriptive qualitative analysis of each data set.

My committee reviewed a sample of each data set and we discussed my coding strategy. After I had conducted initial coding of the data into overarching thematic categories, my committee and I met to discuss a more in-depth thematic analysis that included both a descriptive, qualitative analysis as well as a critical interpretive analysis. Details on these two forms of thematic analysis will be discussed later in the section below.

I reviewed all of the data and established initial code books for each data set. I reached a point in my coding where no new codes appeared. I then worked with my committee to solidify each code book and coded all of the data after we had agreed that I had reached a point of conceptual depth in my coding. My committee then reviewed a sample of the coding, approved the sample, and I then proceeded with reviewing and revising the coding based on the approved codebooks and sample data reviewed by my committee members.
The questions that guided my coding included: What is this an example of? What are the terms participants are using? What words/terms do they use to describe their experiences? It is important to note here that my committee reviewed a sample of my raw transcripts from all sets of the data and provided input on my coding scheme.

Additional questions guiding this overarching descriptive qualitative analysis included: How does the data address the aforementioned research questions? Specifically, what are participants telling me about the long-term psychosocial consequences of the 2013 flood? How does what they are telling me relate to the field of climate change and health? What are participants telling me about the types of resources available before, during, and after the 2013 flood? What are participants telling me about responses to the long-term psychosocial consequences of the flood? How does this information shed light on psychosocial adaptation in a changing climate? What is novel or new that participants are telling me based on my understanding of the field of study on climate change and mental health?

The above questions guided my descriptive qualitative approach to analytic coding. My goal was to develop concepts from the data that closely aligned to what participants were saying during interviews and focus group sessions. Therefore, I reviewed each data set and asked myself the aforementioned questions to help me reflect on categories and themes in the data. I would consider each question (noted above) and then take notes and highlight key quotes from respondents that exemplified responses to these key questions. I then noted emerging categories and themes, highlighting common threads throughout the data, trying as much as possible to stick closely to the words participants were using to describe their experiences. As Richards and Morse (2013) suggest in their qualitative methods text, I would then step away from the data and
my notes on emergent themes and ask: “What is this all about?” (p. 151). After reflecting on this question, I developed a set of analytic codes and coded all of the data.

This descriptive qualitative approach to analytic coding offered me the opportunity to describe phenomenon, often using the words of my participants, to guide the interpretation of my findings. The benefit of this qualitative descriptive approach to analytic coding was that it allowed me to interpret findings without relying heavily on making inferences of the data. A descriptive qualitative approach to analytic coding also allowed me to reflect on the emergent themes from the data as well as my research question categories.

Noting my theoretical orientation of Political Ecology, I also sought to interpret the data with an interest in exploring how sociopolitical conditions shaped participants’ experiences with the flood. For example, I would pay close attention if and how my participants talked about the Political Economy in High River and/or Alberta relative to their psychosocial experiences (and understandings) of the flood and/or response interventions. Importantly, I recognize that the Political Economy would remain opaque, hidden, or obscured for many of my participants, thus, I would need to go beyond what my participants were saying to see the socio-political context that may or may not influence psychosocial experiences of the flood and/or response interventions.

Throughout the critical interpretive analysis of my data, I would ask myself: How do I make sense of what my participants are telling me and how do I understand this in context (based on the existing literature about climate change and mental health, and on the existing Political Ecology literature)? Further, I would also pay close attention to the silences on these issues and posed the following questions in my critical interpretation of the data: why is there an absence of discussion about how the Political Economy influences experiences with the flood and/or
experiences with responses to the flood? Who is being silent on these issues, why might this be?

What do I continue to grapple with and what is unanswered by the data? How does the social location of my participants, and my own social location, impact what is being said and heard through the research process? These questions supported the theoretical thematic analysis of my data. After reflecting on the above questions and noting the emergent themes, I began to sketch outlines of manuscripts that helped me respond to my research questions. Sketching these outlines, and the subsequent writing that ensued, allowed me to tell succinct stories about my findings and thus, supported my analysis through writing\textsuperscript{324}. Themes from my critical interpretive thematic analysis can be found in the results and findings sections of manuscript 5.1, 5.2, and 5.3.

4.6.1 Analytical Rigour

I aimed for methodological rigour by enacting on the twelve ways to “ensure a strong foundation for qualitative analysis” as suggested by Patton (1990) in the seminal guidance textbook, *Qualitative Research and Evaluation Methods*\textsuperscript{327} (p. 522). These twelve ways to enhance analytical rigour include: beginning analysis during fieldwork; conducting an inventory and organizing data; fill in data gaps; protect data; express appreciation; reaffirm the purpose of inquiry; review exemplar studies for inspiration and guidance; make qualitative analysis software decisions; schedule dedicated time for intense analysis; clarify and determine initial analysis strategy; be reflective and reflexive; and keep an analysis journal\textsuperscript{327}.

Here I explore how I attempted to achieve analytical rigor based on these twelve components. Specifically, I began to note emerging patterns during my fieldwork in High River, Alberta. I kept these initial analysis notes in an analysis journal that I used throughout the entirety of my data gathering and analysis process. I made sure to review all of the data I had
collected (both paper and digital) and made sure that I had electronic copies stored and saved in encrypted and password protected folders. I also made sure to store any paperwork in a central and secure location. I protected my data by backing it up in secure digital locations. I also made analytical software decisions based on my skill-set with the software, my data analysis needs, and advice from peers and committee members.

In an effort to fill any data gaps, I would review my memo-notes, and analysis journal and make note of needs for additional interviews or focus group sessions. After each interview or focus group session, I would provide a follow-up thank-you note to my participants.

In terms of reaffirming the purpose of my inquiry, periodically, I would refer back to my thesis research proposal, my research questions, and the data I was collecting to “revisit and reengage” with my questions and approach and to ensure alignment with how my study design would guide my analysis (p. 2). During analysis, I set aside dedicated time and a realistic schedule to conduct initial analysis of each phase of data collection and the full analysis of the entire data set. At any point where the analysis seemed to be getting away from me, I would coordinate a committee meeting to discuss any issues to help me clarify my analysis strategy.

In terms of being reflective and reflexive, I would write a journal entry after every interview or focus group session to reflect on my role as the researcher, critically exploring how my perceptions, biases, fears, or time constraints were affecting the research process. Further, as my research was, at times, emotionally heavy, I made time to step-back, practice self-care, and re-group before planning any additional interview or focus group sessions.
4.7 Limitations

Importantly, there are limitations of my study that I would like to reflect upon here. Firstly, my research findings are specific to the community of High River, which (like any community) has its own unique culture, local knowledges, ways of being, and experiences. In other words, the particular findings of my research are context-bound. Thus, this is important to be aware of when considering transferability\(^{****}\) of these research findings to other communities.

A further limitation is that because my study took place five-years post-flood, there was a potential for participants to forget or overlook key details of their experiences directly after the flood because they may have been overwhelmed by the experience and focused on ensuring their basic needs (shelter, food, family reunification) rather than on their overall psychosocial wellbeing. Another limitation related to bias is that I recruited my semi-structured interview participants through posters in the community and asked participants to participate in a research study that would discuss experiences related to the 2013 flood. My semi-structured interviews, thus, may have been affected by self-selection bias wherein people who wanted to discuss their experiences with the flood came forward and others who may have been uncomfortable or, who may have felt, psychologically unprepared or unsafe to discuss their experiences would not have participated. Another limitation if my recruitment strategies was that I was unable to get a key informant interview with a large, disaster relief agency that played a role in the High River flood response. I attempted a number of times to recruit a participant from this agency, however, a representative from this agency respectfully declined any agency participation. The decline to participate may have been related to some community backlash against this agency over

\(^{****}\) Transferability refers to ‘fittingness’ or similarity in other contexts\(^{327}\).
concerns of donations to the agency not coming to the community, a concern noted by many of my respondents. A further recruitment challenge was that I was unable to reach High River flood affected community members who had subsequently relocated outside of High River after the flood, for the semi-structured interviews. Notably, however, I was able to recruit two semi-structured interview participants from the neighbouring community of Okotoks.

4.8 Summary

Now that I have explored my theoretical and methodological orientation and detailed my study design, I will now provide detailed findings in Chapter 5 below.
Chapter 5: Empirical Investigation

This section consists of three manuscripts, prepared for publication, that detail my empirical investigation in High River, Alberta. This section begins with a theory-focused manuscript entitled, *Towards a Critical Political Ecology of Climate Change and Mental Health*. In this paper, I investigate the sociopolitical conditions that shape health inequities and adaptation opportunities (or lack thereof) in a changing climate in High River, Alberta. A second manuscript focuses on the long-term psychosocial effects of the 2013 flood. This manuscript is entitled, *The Psychosocial Sequelae of a Changing Climate: An Exploration of the Lingering Mental Health Consequences of the 2013 High River Flood and Implications for the Field of Climate Change and Health*. This second manuscript explores the long-term psychosocial effect of the 2013 High River flood and suggests that long-term psychosocial sequelae related to climate change requires more attention and critical reflection in the field of climate change and health. A third is entitled, *Psychosocial Adaptation to Climate Change in High River, Alberta: Implications for Policy and Practice*. In this paper I explore psychosocial adaptation in High River and suggest potential implications for public health policy and practice. It should be noted here, that each of these three manuscripts has been written in such a way as to align with the flow and context of this dissertation. I refer to prior chapters (of this dissertation) in each manuscript to provide the reader with more context about theory and methodology. Notably, the manuscripts are longer in word count than they would be for journal submissions. Prior to journal submission, I will revise each manuscript so that each manuscript is crafted as a stand-alone document that meets the word requirements and focus for the intended journals. The concluding chapter (chapter 6), provides an integrated synthesis of the findings from all of the aforementioned
manuscripts (i.e. including the three papers from the scoping review in chapter 3) and an overarching discussion on key themes and research opportunities.
5.1 Towards a Critical Political Ecology of Climate Change and Mental Health

N.B. This paper has not yet been submitted to an academic journal. I plan to submit it as a chapter for Canadian Scholar’s Health and Environment, or to one of the three journals listed here: Environmental Justice, Critical Public Health, or the Journal of Health and Social Behaviour. Contributing authors include: Dr. Blake Poland, Dr. Donald Cole, and Dr. Branka Agic

5.1.1 Abstract

There is growing concern about the mental health consequences of climate change amongst public health audiences in Canada, including the inequitable impacts on marginalized groups. While there is an emerging base of literature identifying the risks and impacts of climate change to the mental health of those most marginalized, much of this literature lacks a substantive theoretical base. Application of social theories can enhance inquiry into the phenomena of health inequities — which are often absent or obscured in the climate change and mental health literature — and allow for a deeper analysis of the nature-human relationship. This type of inquiry is important because it allows us to ask critical questions about the nature of health inequities in an effort to more fully understand and act upon these health inequities. Based on mixed methods data from a case study in High River, Alberta, we take a critical look at how health inequities related to climate change and mental health are shaped by sociopolitical conditions, and also how sociopolitical conditions shape societal-level response interventions to address the mental health consequences of climate. Our critical interpretive analysis is influenced by Political Ecology, a theoretical approach that supports analysis of sociopolitical conditions that shape human-environmental interactions. Our findings suggest that power relationships
between governments and business-interest groups can enhance socioeconomic disparities and contribute to mental health inequities related to climate change. Our findings also suggest that the lack of sustained governance and funding for mental health care in High River impedes psychosocial adaptation and contributes to maladaptation to climate change. We critically interpret these findings, problematizing what the environment means and to whom. Further we also problematizing what adaptation means and to whom. The paper aims to provide public health audiences with: an initial exploration of the macro-level factors that can contribute to mental health inequities and maladaptation within a changing climate; and, an initial problematization of the nature society-relationship related to climate change and mental health.

**Key Words:** Climate Change, Psychosocial Health, Mental Health, Political Ecology, Adaptation
5.1.2 Introduction

Environmental health inequity is particularly resonant in the emerging study of climate change and mental health where there are mounting concerns about the inequitable mental health consequences of climate change amongst public health audiences. These include concerns about: the growing burden of mental illness and mental problems associated with climate change; the disproportionate risk and impact of this growing burden on marginalized groups; and; how to respond to this growing burden of mental illness and mental problems to support psychosocial adaptation and health equity. Briefly, adaptation to climate change refers to actions that emphasize coping and thriving within a changing climate. Psychosocial adaptation refers to measures that enhance, or support, the psychological and social health and wellbeing of people and communities so that people and communities can cope and thrive in a changing climate. Throughout this paper, we problematize these understandings and practices of adaptation.

5.1.3 Background

The public health significance of climate change is large and looming, especially in regard to the complex, non-linear, and often unpredictable impacts of climate change on human health and wellbeing. Some of the physical health consequences of climate change include: a rise in vector-borne diseases, malnutrition, respiratory illness, impaired fetal development, heat stroke, heat related deaths, and morbidity and mortality due to extreme weather events. Research also demonstrates that climate change affects mental health. We conceptualize mental health as existing on a continuum between mental illness and wellbeing and includes states of

"According to the American Public Health Association, health equity refers to the fair and just opportunities for all people to be healthy."
mental wellbeing, experiencing mental problems (like worry, grief, stress)\textsuperscript{17}, and mental illness (like psychosis, depression, and Post-Traumatic Stress Disorder)\textsuperscript{12,19}.

At an individual level, the literature suggests that acute climate disasters (like floods, wildfires, and hurricanes) can trigger Post-Traumatic Stress Disorder (PTSD), Major Depressive Disorder (MDD), anxiety, depression, complicated grief, and suicidal ideation\textsuperscript{36,43,184}. The literature suggests that subacute climatic changes, like rising heat levels and episodic droughts, present threats that can amplify the perceived risk of environmental change and influence feelings of impending doom, hopelessness, and fatalism which can also act as a catalyst for substance misuse\textsuperscript{36,43}. On a community-wide scale, social ties may weaken as increased stress levels, aggression, and violence can occur as resources (food, water, shelter) become scarce due to impacts of droughts and flooding\textsuperscript{34,43,92}. Importantly too, it is not about pathologizing mental problems related to climate change disasters, but also recognizing that the trauma and distress experienced by people in response to climate change-related disasters are normal responses to our climate in crisis. Thus, an exploration of the mental health consequences of climate change includes an exploration of the range of thoughts, feelings, and behaviors related to a climate in crisis — going beyond a discussion of specific medicalized, diagnostic states. Further, it is important to highlight that the mental health consequences of climate change disproportionately affect those most marginalized in society\textsuperscript{43,184}. As stated in Chapter 1, populations most affected by changing climatic circumstances and poor health tend to be marginalized peoples (racialized people, people with disabilities, people with low socioeconomic status, women, children, elderly), who tend to have poorer health than non-marginalized groups due to a variety of social determinants like inadequate housing, lack of access to basic resources and education,
underemployment, racialization and discrimination, and low-social capital\textsuperscript{44, 45, 43}. Importantly marginalized statuses can intersect, thus compounding the threats and impacts of climate change.

While the field of study on climate change and mental health has grown over the past decade (see\textsuperscript{7, 33, 34, 35, 36, 43, 46, 49, 130, 160, 184, 197, 331, 332}) there remains a lack of literature that critically explores the nature of climate change and mental health inequities. In particular, there is a lack of focus on how sociopolitical conditions shape climate change and mental health outcomes, inequities, and response interventions. Briefly herein, sociopolitical conditions refer to political, human, economic, and environmental factors that shape lived experiences\textsuperscript{333}. Response interventions refer to policies, practices, approaches or behaviours aimed at enhancing psychosocial health, these response interventions are often framed as adaptations\textsuperscript{‡‡‡‡‡‡‡}. For the context of this paper, response interventions refer to those interventions undertaken to address the mental health effects of climate change. Addressing health inequities is a fundamental component of the field of public health\textsuperscript{11}, a theoretically-influenced approach that critically explores sociopolitical conditions related to the topic area of climate change and mental health is important, then, for public health audiences because it can reveal the often-hidden or obscured macro-level forces that can contribute to mental health inequities and maladaptation within a changing climate\textsuperscript{67}.

5.1.4 Research Aims and Objectives

Addressing the aforementioned research gap, we take a critical look at societal-level conditions, like economics and politics, that contribute to mental health inequities related to climate change. We also critically investigate societal-level conditions that affect responses to

\textsuperscript{‡‡‡‡‡‡‡} Psycosocial health is a broader term that describes the interplay between social and psychological conditions that shape wellbeing\textsuperscript{13}. Mental health includes psychological and social well-being, which encompasses the states of being mentally healthy, experiencing mental problems, and mental illness\textsuperscript{14, 395}.
the mental health effects of climate change and contribute to adaptation\textsuperscript{§§§§§} or maladaptation\textsuperscript{*******}. Further we explore how sociopolitical conditions shape perceptions of the mental health effects of climate change. This critical perspective is guided by the theoretical approach of Political Ecology (PE). Broadly, the theoretical foundations of PE include a critique of human-to-nature relationships with a specific focus on the role of politics and economics as forces that shape environmental change, social interactions\textsuperscript{26, 236} and also health outcomes\textsuperscript{259, 260, 261, 262}.

This paper starts with a brief background of Political Ecology and a review of how Political Ecology can influence our understanding of health inequities related to climate change and mental health adaptation and maladaptation in a changing climate. We then explore how a critical Political Ecology approach informed our case study of climate change and mental health in High River, Alberta, Canada. The paper concludes with a critical analysis of our findings through the lens of Political Ecology and a discussion of the relevance of our analyses for public health audiences.

The aim of our research was to conduct a critical exploration of the mental health consequences of the 2013 High River flood and relate this to the overarching topic of climate change and mental health. Our research was informed by the following research question: How do sociopolitical conditions shape climate change-related mental health outcomes, including disproportionate risks and impacts on those most marginalized, as well as actions and perceptions to address the mental health consequences of climate change?

\textsuperscript{§§§§§} Adaptation refers to coping and/or thriving in the face of adversity\textsuperscript{21}.
\textsuperscript{*******} Maladaptation refers to poor or inadequate adaptation\textsuperscript{21}.
5.1.5 An Overview of Political Ecology

Political Ecology (PE) is a subset of Political Economy\(^{††††††††}\) wherein environmental issues and environmental changes (like climate change) are studied by looking at the relationships amongst social, economic, and political factors that shape human and ecological outcomes\(^{26,237}\). For some political ecologists, Political Ecology and Political Economy are treated as inseparable concepts (see for example, \(^{266}\)). Political Economy, has been described as an approach to studying the relationship between people and society, and the influence of markets, trades, and the state on this relationship; and, Political Ecology as an approach that studies human-nature relationship and sociopolitical and economic conditions that influence this relationship\(^{237}\). Political ecologists explore the inequitable distribution of environmental degradation by looking at the differences in political, economic, and social locations amongst groups, and, how environmental conditions affect and are affected by political, economic, and social life\(^{334,335}\). Political Ecology also provides a lens from which to explore multi-scalar\(^{‡‡‡‡‡‡‡‡}\) political economies and their influence on the nature-society relationship\(^{335}\). As noted in Chapter 4, specific areas that tend to be explored within PE theoretical approach to research are: relationships of power (i.e. how does power operate within human-human and human-nature relationships?); governance and economics (i.e. what types of, and how do, social structures\(^§§§§§§§§\) and economic systems govern interactions between people and nature?); justice and equity (i.e. what are the unequal costs and benefits of environmental degradation?); and scale (i.e. how the larger geopolitical context impacts nature-environment relationships?)\(^{27,236}\). As

\(^{††††††††}\) Political Economy is an approach to understanding the intersection between economics and politics in social life\(^{238}\).

\(^{‡‡‡‡‡‡‡‡}\) Multi-scalar refers to multiple scales of political economies (e.g. at difference scales of geographic governance, like municipal, provincial, federal or territorial scales of governance)\(^{335}\).

\(^§§§§§§§§\) Social structures refer to: “market relations, property systems, state bureaucracies, legal systems, scientific paradigms, even state violence”\(^{236}\) (p. 102).
stated earlier in section 4.1, central to investigating these questions is a focus on exploring the materiality of ecology and politics. Based on our understandings of the PE literature, we understand materiality to be the contextualizing of phenomena related to ecology and politics that includes the situating of phenomena in a number of ways (e.g. physically, viscerally, temporally, and culturally). We explore the materiality of our case study in-depth later in the discussion section.

The Anthropocene, and climate change more specifically, have become a central point of inquiry for many political ecologists who study the human-environment entanglement and critically explore how neoliberal capitalist growth fuels runaway climate change. As noted in section 4.1.1 of this dissertation, neoliberalism refers not only to a form of capitalism — whereby state interventions set up the rules for the capitalist market economy to flourish — but also to an overarching ideology that guides economic growth and consumption. Political Ecology is a theoretical approach that attends to the workings of neoliberalism as a hegemonic force that governs institutions, political systems, individual and collective behaviours, and ways of knowing about the world, and that also shapes the social construction of discourses of resilience and adaptation.

5.1.5.1 Critical Political Ecology

In particular, our research is influenced by critical Political Ecology. In a review of Tim Forsyth’s, Critical Political Ecology text, Fontaini (2003) describes how critical PE differs from other forms of PE stating: “it [critical PE] seeks to make the political framing of science more transparent and takes a critical approach to the unquestioned use of science as a neutral backdrop to politics” (p. 145). Rooted in social constructivism, critical political ecologists problematize...
positivist interpretations of environmental degradation and climate science for only providing “partial insights into complex biophysical processes” when in fact there are other sociopolitical forces and understandings of climate science and ecological degradation that are often overlooked or underrepresented because “interests of social groups [are] not included in the science process”\(^{267}\) (p. 1). This is not to say that underrepresented, social groups “provide accurate insights of a biophysical reality”\(^{267}\) (p. 2), nor is this to say that biophysical realities of environmental degradation or climate change science are not accurate, but rather that we cannot fully understand phenomenon related to ecology and politics without an understanding of the interconnectedness of politics and ecology and without recognizing that reality is both “partial and socially constructed”\(^{267}\) (p. 2). Thus, critical Political Ecology sheds light on the nature of knowledge related to the topic area of climate change and mental health and signals the need to explore knowledge about climate change and mental health from the voices of marginalized people on the front lines of climate risks and impacts. Further, a critical Political Ecology approach helps us to evaluate the relationship of science and politics more transparently within the topic area of climate change and mental health in an effort to enhance equity-focused psychosocial adaptation policy and practice for public health audiences.

\section{Engaging with Political Ecology Scholarship}

As noted in section 4.2, much of the PE literature is focused at the conceptual and theoretical levels, and empirical applications of PE are relatively few in number. In section 4.3, we highlight notable theoretical applications of PE related to the topic are of climate change, like for example Taylor (2015)\(^{57}\) Fletcher (2010)\(^{254}\) and Swyngedouw (2015)\(^{28}\); however, we reiterate that much of their published material remains conceptual and theoretical. Authors of the Routledge Handbook of Political Ecology (2015) note that, “most critical research on climate is
not self-identified as Political Ecology and often overlooks the spatiality, materiality, and embodiment of climate change causes and consequences” (p. 303). Therefore, it appears important to be explicit about our PE-influenced approach to the topic area of climate change consequences and to provide, at least, an initial exploration of materiality in our case study.

As noted in section 4.1.4, there have been notable theoretical and conceptual discussions through a Political Ecologies of Health lens, see for example Baer and Singer (2009), King (2010), Porto (2017) up Aggarwal et al. (2012). This work, however, does not provide empirical guidance for a Political Ecology of health related to the topic of climate change. There are a few exceptions, however, that support us in our PE-influenced empirical analysis of climate change and mental health in High River that we note here briefly.

Firstly, we draw upon Jennings’ (2011) PE influenced work related to the topic of climate change adaptation. Jennings’ (2011) provides a critical exploration of climate change adaptation in the flood-prone community of Boscastle Harbour in North Cornwall, England, problematizing what adaptation means and to whom through an exploration of how the concept of adaptation is conceptualized and materialised “within the apparatus of the neoliberal state” (p. 238). Jennings (2011) contends that adaptation has traditionally been taken for granted as an “appropriate bottom-up strategy for coping with anthropogenic climate change” only to fundamentally ignore the political and economic contexts within which adaptation is spoken about and acted upon that may “subvert vulnerable communities it intends to benefit” (p. 238). We reflect on Jennings’ (2011) critical evaluation of adaptation in our findings and discussion section, highlighting similarities to our findings in High River.

Next, we look towards Mulligan et al.’s (2012) PE-informed work to support our critical analysis of discourse (the way things are written or spoken about as a social practice) related to
climate change and mental health in High River. Mulligan et. al.’s (2012) Political Ecology of health research “critically analyzed the operationalization and materialization of globally hegemonic dengue fever discourse at the local level in the city of Putrajaya, Malaysia” (p. 407). We interpret operationalization to mean the process of understanding how discourse operates, and we understand materialization to mean the identification of contextual conditions (including the Political Economy and physical environments) that shape the operationalization of discourse. Through textual analysis of a seminal World Health Organization report on dengue fever, and key informant interviews with experts in public health, development, and governance, Mulligan et al. (2012) found “that discursive links between dengue and poverty contributed to the inappropriate transfer of globally dominant dengue control strategies to Putrajaya’s non-poor local environment” (p. 407). Political Ecology allowed these researchers to see the inherent contradictions between operationalization and materialization of dengue fever in Putrajaya; dengue was operationalized by public health institutions as a disease of the poor despite the transfer, and unsuccessful prevention of, dengue fever in the non-poor community of Putrajaya. Mulligan and colleagues’ (2012) research provides an empirical example of engaging with the theoretical orientation of PE to explore the influence of operationalization and materialization of public health policy and practice. This research provides guidance to us as we conduct an initial exploration of the operationalization and materialization of mental health care in a changing climate in High River. In our discussion section, we explore the materiality of High River (by way of an initial overview of the physical landscape and sociopolitical conditions), and how the materiality of High River influences mental health outcomes and responses in a changing climate in the community. It is important to note here that we are not substantively taking up an analysis of operationalization and materialization of discourse related
to climate change and mental health in High River, but rather it is prudent for us in our PE-influenced analysis to acknowledge, understand, and explore some of the basic tenets of materiality in our research, as materiality is a key feature of Political Ecology research.

Finally, we also draw upon the scholarship of political ecologists Brisbois and Almeida (2017) in our research. These authors attend to researcher and participant positionality in their fieldwork in Latin America and examine how positionality influences perceptions. This is important to our work as one of the overarching goals of our research was to explore how sociopolitical conditions shape perceptions of the mental health effects of climate change.

Brisbois and Almeida (2017), like most researchers engaged with critical qualitative scholarship, approach their work from the premise that “the process of generating knowledge through fieldwork is inevitably affected by the social location of the researcher in question: his or her gender, age, ability, discipline, profession, class, race, and national identity” (p. 194). Brisbois and Almeida (2017) each describe their social location respective to their fieldwork experiences and discuss these experiences, their perceptions, and positionality as political ecologists in their fieldwork on health in Latin America. We engage with Brisbois and Almeida’s (2017) critical qualitative scholarship by noting our social location (as researchers) and the social locations of our participants. Our reliance on their work comes less from their PE scholarship and more from their integrated critical qualitative scholarship that they apply in their PE research. In our work we explore how our perceptions pertaining to the 2013 flood in High River, Alberta, and the perceptions of our participants, speak to each other and/or create tensions in our overarching understanding of a critical Political Ecology of mental health.

Importantly, we are not evoking the depth of Jennings (2011), Mulligan et al. (2012) or Brisbois and Almeida’s (2017) work, or the in-depth PE literature on adaptation, materiality, and
critical scholarship, but rather we draw upon each of these authors’ scholarship because they help to support our PE-influenced empirical analysis as we demonstrate in the discussion section of this paper.

5.1.5.3 Rationale for a Political Ecology of Mental Health and Climate Change

A Political Ecology approach to the problem area of climate change and mental health is important for public health audiences because it illuminates the macro-level, sociopolitical conditions that shape the problem area, and this approach guides critical inquiry into the nature of inequities emerging from the human-nature relationship. As noted earlier, inquiry and action on health inequities is foundational to public health.

Our research is influenced by Political Ecology for three key reasons. Firstly, inquiry into marginalization and inequity are at the heart of Political Ecology research. Secondly, Political Ecology helps us to see how political and economic conditions shape human-nature relationships; thus, Political Ecology can help us to contextualize the mental health consequences of climate change in the broader political and economic context and an understanding of this can better support public health actions that address these factors. Thirdly, a critical orientation to Political Ecology (otherwise referred to as critical Political Ecology), helps us to see how knowledge and actions related to climate change and mental health are simultaneously shaped by both politics and ecology. Which is to say that our understandings of mental health and climate change is shape by lived experiences within the broader sociopolitical context (politics) and biophysical realities (ecology), and that it is from this understanding of the coevolution of politics and ecology that we can deeply explore the human-nature relationship related to the topic of climate change and mental health.
5.1.6 A Critical Political Ecology of Climate Change and Mental health in High River, Alberta

In a mixed-methods case study, we explore sociopolitical conditions that shape mental health inequities and psychosocial adaptation in the town of High River, Alberta. An in-depth discussion on our methodological approach can be found in section 4.4 of this dissertation. To our knowledge, this is the first theoretically-informed investigation that sheds light on some of the sociopolitical conditions shaping the psychosocial consequences of flooding and relates these consequences to mental health in our changing climate. As this research is influenced by critical Political Ecology, we acknowledge that multiple realities associated with the mental health consequences of climate change exist, and that these realities are influenced by biophysical and sociopolitical conditions. We present our interpretation of the realities of climate change and mental health as told to us by our research participants in the community of High River. As noted in the introduction, we asked the following research question: How do sociopolitical conditions shape: climate change-related mental health outcomes, including disproportionate risks and impacts on those most marginalized; and, actions to address the mental health consequences of climate change?

5.1.6.1 Case Study Background

In this case study, we explored the long-term mental health consequences of the 2013 Southern Alberta flood in High River, Alberta, with a particular focus on psychosocial risks and impacts to marginalized groups. We provide an in-depth overview of our case study approach and context setting in High River in section 4.3 of this dissertation. By way of a brief overview, High River is a town of 13,000 people, predominantly made up of seniors and youths. The main industries in High River (in order of predominance) include: health care, agriculture, and creative industries (including film and television). For a small town, High River is well
resourced in terms of health care facilities. This may be accounted for by its geographic proximity to Calgary, where High River health services serve rural and remote towns south of Calgary, and because of the demographics in High River (e.g. large proportion of seniors).

Further, High River is one of the fastest growing communities in Alberta, thus, it appears that the town is well-positioned to be a centralized health services hub. As noted in section, 4.3.1.3.1, health resources in the town include: a hospital, a mental health facility, approximately nine family physician offices, eight pharmacies, three supportive living facilities, one long term care facility, one medical laboratory, and two diagnostic imaging centers. We were particularly interested in exploring the mental health effects of the 2013 flood in High River because we wanted to understand if and how a well-resourced town could address the long-term psychosocial consequences of a climate-related extreme weather event.

Looking at physical materiality of the town (as it relates to the main industries in High River), it is a town that is surrounded by farm-land, which supports the second main industry (agriculture). The aesthetic of the farm-land also supports the third largest industry (creative industries); many country-and-western film and television series are filmed in and around High River because it has a characteristically, rural, country-and-western, ‘down-home’ aesthetic.

Also, as noted in section 4.2.1.3.1, many of the physical establishments in downtown High River are empty buildings that act as movie and television sets. An exploration of the main industries in High River was important to us as we critically engage with PE to better understand any tensions between the materiality of these industries (and the broader community context) and operationalization of psychosocial responses to a changing climate. This contextualization will be explored further in the discussion section of this paper.
In terms of geographical and ecological context, High River is located in the foothills of the Rocky Mountains in an active flood area\textsuperscript{282, 284}. High River residents were exposed to severe flooding in June 2013\textsuperscript{195, 285}. The entire town was displaced and four people died\textsuperscript{195}. While the 2013 flood, was the most significant flood the community experienced in recent history, the town was also flooded in the recent past, including flooding in: 2011, 2008, 2005, and 1995\textsuperscript{285}. While no single event can be pinned conclusively on climate change, we know that climate change increases the intensity, frequency, and complexity of extreme weather hazards and that these events are more likely to occur in our changing climate\textsuperscript{1}. Further, a number of studies document the anticipated impact of future flooding in Southern Alberta\textsuperscript{340}. Thus, an empirical investigation of the mental health outcomes related to extreme weather hazards (also referred to herein as a climate-related hazards), like for example the 2013 flood, provides an ideal site to explore psychosocial risks and impacts related to climate change. Further, this study investigated how social and health services responded to these risks and impacts to better understand psychosocial response interventions related to climate change.

Noting the multi-scalar lens of Political Ecology that prompts us to look at the Political Economy at different geographic governance scales, we think it prudent to highlight that High River is located in Alberta, which is home to the Canada’s oil sands. As noted earlier in section 4.3.1.4, the Federal Government and Provincial Government of Alberta (despite changes in political party governance over the years) have sustained their commitment to resource extraction (oil sands extraction) in Alberta and investments in resource transportation (including the Federal purchase of the Kinder Morgan Trans Mountain pipeline)\textsuperscript{298, 299, 302}. The oil sands are major contributors to Greenhouse gas (GHG) emissions globally\textsuperscript{341}; thus, contributing to runaway climate change. The oil sands are a stark reminder of the anthropogenic causes of
climate change and the impetus for economic growth at the sake of planetary and public health. Importantly too, Alberta has experienced two of the most significant climate change-related extreme weather events in Canadian history: the 2013 floods (that cost 2.2b) and the Fort McMurray wildfires that have been heralded as the costliest Canadian disaster of all time (projected to cost nearly 9b). Locating this research in Alberta, with entrenched economic interests of the oil and gas industry (as well as the entrenched interests of the logging industry, and developers), enhances an analysis of multi-scalar economics and politics that can influence psychosocial outcomes, and adaptation or maladaptation, related to climate change in the case of High River.

5.1.7 Methods

As highlighted earlier in section 4.4, we approach our research from ontological realism and epistemological skepticism. Thus, inherent in our research approach is that there are real and knowable truths, such as the science of climate change and climate change impacts on mental health. Our epistemological skepticism comes forward in our inherent beliefs that there are multiple ways of knowing about the science of climate change and its effects on mental health that need to be critically examined. Noting our ontological and epistemological orientations, mixed methods research is fitting for our research because it “encourages the use of multiple worldviews, or paradigms”, “rather than the typical association of certain paradigms within quantitative research and others for qualitative research” (p. 749). We also chose a mixed methods research methodology because it aligns well with Political Ecology (as noted earlier and exemplified in Doolittle and Birkenhotlz’s research).

This mixed-methods case study included a climate change and health vulnerability and adaptation assessment of High River to understand current and future risks, impacts, and
adaptation opportunities. This assessment provided quantitative information about community demographics, current and projected climate change risks and impacts to health, and adaptation opportunities. The qualitative methods included: key informant telephone interviews, focus groups, and face-to-face interviews with community members. The key informant telephone interviews (n = 14) were conducted with health and social services leaders, and the focus group sessions (n = 4) were conducted with front-line health and social services workers (n = 14). The objectives of the key informant interviews and focus group session were to:

- understand, from the perspective of both social and health service leaders and front-line workers, who is considered to be the most vulnerable to the psychosocial risks and impacts of climate change-related extreme weather in High River, Alberta;
  - probe why these groups were most impacted; and,
- understand how health and social services respond to the mental health outcomes related to the flood, and more broadly, to climate change.

This study concluded with semi-structured interviews with a sample of community-members who self-identified as marginalized community members (based on age, gender, socioeconomic status, ability, and race) to understand their perceptions of psychosocial supports before, during, and after the flood. Further details on our research methods can be found in section 4.5 of this dissertation.

In terms of analysis of our data, we conducted preliminary analysis of each data set prior to our combined analysis, which was explained earlier in section 4.4 in detail. We conducted a fulsome thematic analysis of all of the data together that we described in detail in section 4.4.1 and 4.6. Briefly, our analytic approach was guided by Braun and Clark’s (2006) interpretation of thematic analysis, which is a flexible approach to qualitative analysis that supports both realist
and constructivist analysis processes\textsuperscript{320}. As stated earlier, our thematic analysis include both descriptive qualitative analysis and a critical analysis of our data (details on this analytic strategy can be found in section 4.6). The reason we conducted both a descriptive qualitative analysis and a critical interpretive analysis is that this analytical process appeared to lend itself well to our aforementioned critical PE ontological and epistemological orientations. The descriptive qualitative analysis allowed us to stay close to our original data and to hear the voices of our participants, whose voices are often hidden and obscured in the broader climate change and health literature. This allowed us to hear our participants truths and experiences related to the mental health consequences of the 2013 flood. Our critical interpretive analysis offered us the opportunity to critically examine our own, and our participants’, social locations and how these social locations can contribute to our understanding of imagined geographies related to climate change and mental health in High River. In other words, our critical interpretive analysis engaged our epistemological skepticism by pressing us to explore and critique multiple ways of knowing and how these multiple ways of knowing influence perceptions and actions related to the topic of mental health in a changing climate. The above, will be discussed in greater detail in the discussion section.

In our results section below, we provide direct quotes from our participants; these are intended to highlight the experiences and thoughts of our participants as told to us. Importantly, we understand these voices and experiences to come to us from participants who are: predominantly Caucasian, adults who are geographically located in a rural town South of Alberta, who explain and explore their experiences within the Political Economy of Alberta, Canada — an economy that is predominantly dependent on the oil and gas industry, which is a main key contributor to runway climate change in Canada. We provide critical interpretations of
these thoughts and experiences in our discussion section. It is important to bear in mind that the analysis of the data that we provide is our interpretation of our participants’ realities, and our interpretations come laden with our respective social standings (as white, university-educated, Canadian researchers) and theoretical positionings as critical social sciences researchers in the field of public health. We note that our social location and theoretical positionings influence our perceptions and interpretation of our participants’ experiences. Our aim here is to express that our data was co-created by our participants, our interpretations of our participants voices, and our critical interpretations of the data based off of our understanding of researcher and participant positionality.

5.1.8 Results

We offer two key findings from our analyses. Firstly, sociopolitical factors (namely economic relationships between governments and businesses) appeared to influence the extent of environmental degradation in High River related to the flood, and also appeared to result in disproportionate impacts of environmental degradation for those most economically disadvantaged in the community. Consequently, based on what community members told us, those most marginalized appeared to disproportionately experience the mental health outcomes related to the flood. Secondly, sociopolitical conditions, namely lack of governance and funding for long-term mental health care, appeared to influence the lack of sustained mental health response interventions in High River, thus contributing to psychosocial maladaptation.

* Governance refers herein to authority enacted through decision-making to enhance or increase access (including physical access and financial access) to mental health care.
5.1.8.1 Sociopolitical influences on inequitable environmental and psychosocial outcomes

Below we present our findings from this case study research, in three specific focus areas: 1) sociopolitical influences on environmental outcomes; 2) sociopolitical influences on psychosocial outcomes, and 3) the disproportionate psychosocial impacts on those most marginalized in the community of High River. After a brief discussion of each finding, we interpret these findings within a critical Political Ecology lens by problematizing what these findings can tell us about the nature-society relationship. In these analytic reflections, we pose critical questions that shape our reflections in the discussion section.

5.1.8.1.1 Environmental outcomes

Data from the climate change and health vulnerability and adaptation assessment, as well as interviews with key informants and marginalized community members, suggested that there were specific economic interests and influential relationships between government and businesses that influenced the impact of the 2013 flood. Moreover, an understanding of these interests and relationships, appeared to exacerbate some community members’ concerns over future flooding. For example, many key informant and semi-structured interview participants highlighted that the extent of damage related to the 2013 flood was amplified in the community of High River because developers were responding to population growth in the community and building developments in areas particularly prone to flooding, where there was little to no pre-existing flood mitigation infrastructure in place. Data from our climate change and health vulnerability assessment corroborated that High River was experiencing population growth, we found that the town was considered one of the fastest growing communities in Alberta in 2012."}

339.
After the 2013 flood, many participants highlighted their anger and frustration that land developers had been allowed to build in parts of the town that were particularly susceptible to extensive flooding. As noted earlier, the town of High River is centrally located within an active floodway (see image 1). Exemplifying these sentiments of anger and frustration, one participant (who had moved to High River a few years before the 2013 flood), had initial concerns about buying a home in a town within an active floodway but was reassured by the town engineers:

“when we moved there, we asked the town about it, because we'd heard about floods there, and they said, ‘No, that area is higher……and you'll be fine. It's never flooded there’. We found out later, it's actually below river level” [Semi-structured interview 8]. Another example of frustration comes from one participant on a walk around the community:

“Yeah, it's all green space there. So, there was a whole bunch of houses in there, and also a little bit closer to [the grocery store]; there's another big patch there, and there were townhouses there. And even when they were building them, I'd say to my husband, like, ‘they have no business building houses there!’, because you would see every spring that area would flood. But they went ahead and built condos there. So, whenever it rained a lot, they would get damage, right? But when the flood came, they got wiped out” [Semi-structured interview 4].

This participant was highlighting the devastation in the community of Wallaceville, which was subsequently annexed as uninhabitable land by the Provincial Government of Alberta after the 2013 flood and was set to be restored to its natural state. Other participants were particularly frustrated with how socioeconomic status affected recovery. For example, one participant remarked:
“…especially in High River here. There is the upper-class people that said, ‘Oh, well, we'll just repair everything’. And it's easy for them. Then there's the middle class that [is]damned if you do, damned if you don't”… “And then there's the lower-class people that they helped them out initially, at first, but then they're on their own.” [Semi-structured interview 16].

Corroborating sentiments expressed above about upper-class individuals being able to repair and recover more easily, one participant highlighted that people in Beechwood (the most affluent neighbourhood in the town) were able to bring in their own construction teams to speed up the recovery, she states: “So, they knew people. And they brought their teams in”, they were able to buy new furnaces and bring in large construction teams to expedite recovery efforts [Semi-structured interview 15]. Many members in the community were shocked at the rate of Beechwood’s recovery and, as one of our participants noted, would ask Beechwood residents: “Well, did you guys even get flooded?” [Semi-structured interview 15]. Interestingly, in the months that followed recovery efforts, Beechwood residents were notified their land would be annexed because of the likelihood of future flooding and home-owners in the Beechwood neighbourhood were all offered Government buy-outs for their homes^345.

The vulnerability and adaptation assessment, along with respondent interviews, suggest that the three neighbourhoods that were particularly hardest hit by the flood include two that were considered particularly affluent neighbourhoods (Hamptons and the aforementioned Beechwood neighbourhoods), and one which was considered a middle-class neighbourhood (the aforementioned neighbourhood of Wallaceville). Notably, most of the home-owners in these neighbourhoods, received direct government buyouts that allowed these community members to receive the 2013 assessed values of their homes^345, while all other flood-affected home owners,
business owners, and renters were required to rely upon personal insurance, disaster relief insurance from the Provincial Government, or personal expenses to cover damages and loss. Many of our participants (who were homeowners), highlighted that while they had home insurance (that typically covers flooding related to sewage back-up), most did not have overland flood insurance, which is an additional insurance expense that covers damages from waterflows overland\textsuperscript{346}. Further, some of our participants were renters, and some indicated that they did not have renters insurance to cover their losses. The Government of Alberta instituted the Disaster Relief Program (DRP), a program run by the Alberta Management Agency intended to provide insurance coverage for widespread events that are not often covered by personal or business insurance\textsuperscript{347}. Through our climate change and health vulnerability assessment, we learned that there were approximately 4,602 DRP applications received from the Town of High river with 653 of those withdrawn and 831 ineligible and 3,118 paid-out\textsuperscript{347}. Many of our participants indicated their frustrations and challenges with the process and lack of coverage related to the DRP, something that will be discussed in greater detail in the next section. Many of our participants indicated that they had to rely upon personal expenses to cover damages and losses from the flood.

It is problematic, as political ecologist Jennings (2011) notes, to “allow [the] market-based insurance industry to be the primary resource for people living in flood prone areas”, because the “obvious concern here is how such a system impacts the poorest and most vulnerable segments of society that cannot afford insurance or live in places that do not qualify for coverage because they have been built, with government approval on flood plains”\textsuperscript{56} (p. 245). To this point, it is important to critically reflect on why the onus of risk and recovery is placed on individuals in High River living in flood prone areas and their buying into (or not) the market-based
insurance industry. This is problematic when we consider that there are fundamental issues of neoliberal capitalism operating at core of this issue, wherein relationships of power between governments and land developers allow for the building of homes and the settlement of people in flood prone areas. This is particularly problematic when we consider that neoliberal capitalist interests are able to flourish at the risk of exposing High River community members (particularly community members who are most marginalized) to climate hazards.

——— A further issue is when we consider which individuals and communities are bearing the brunt of psychosocial distress related to flooding. For example, the global literature on the psychosocial implications of flooding tells us that there are serious mental ill-health effects faced by people exposed to flooding, such as trauma, distress, anxiety, PTSD\[^{113, 119, 132, 312, 348}\] and that these effects are often exacerbated due to pre-existing socioeconomic conditions and the added socioeconomic burdens related to recovery and rebuilding\[^{56}\] (see also chapter 5.2 in this dissertation). In High River, research highlights the psychosocial effects of the 2013 flood, which includes displacement, increased use of anti-anxiety medications, increased domestic violence, general trauma, and distress at the individual and community levels, which were most common amongst marginalized community members\[^{110, 313}\] (also see chapter 5.2 of this dissertation). The issue, herein, appears to be that individuals (particularly those most marginalized) and communities bear the greatest burden to their psychosocial wellbeing and that sociopolitical conditions that underpin exposure and effects of flooding in High River, and climate change more broadly, can remain relatively obscured or hidden. This is problematic because this signal that adaptation to our changing climate ought only to occur at the individual and community levels, rather than fundamental changes in industry and government policies and practices to mitigate climate change and its effects on individuals and communities.
5.1.8.1.2 Psychosocial Outcomes

In the case of High River, participants who self-identified as marginalized‡‡‡‡‡‡‡‡‡ highlighted their frustrations and re-traumatization related to dealing with the lack of insurance and insufficient government support, in the form of the Disaster Relief Program. The Disaster Relief Program (DRP), as noted earlier, is a program run by the Alberta Management Agency, intended to provide insurance coverage for widespread events that are not often covered by personal or business insurance347. Participants throughout the interviews referred to the DRP colloquially as, ‘the second disaster’ because coverage was described as frustrating, inconsistent, and often unfair.

One interview participant, for example, described the psychosocial toll of the DRP and the lack of insurance coverage as follows:

“Insurance would not cover us because there was flood water found in the house. DRP would not cover us because there was sewer found in the house. It was a mix of both; I definitely felt what DRP was saying, that insurance should cover this — there was evidence of sewer in this house. But appealing both became emotionally draining, and just about destroyed [our] marriage. We appealed DRP three times, and I appealed insurance three times. By February, March of 2014, we realized the mold was coming back. So, at that point, I called Alberta Health Services, because I didn't know what else to do. So, they came in, they said, ‘Yes, this house is not fit for human habitation’”[semi-structured interview 17].

This is one among many stories we heard of psychosocial trauma related to the flood and subsequent issues dealing with insurance.

‡‡‡‡‡‡‡‡‡ Based on any one or more of the following: age, ethnicity, gender, physical ability, and/or socioeconomic status.
Another key point that participants highlighted in the interviews was their concern over future flooding related to environmental degradation from logging. High River is located in the foothills of the Rocky Mountains (see image 2), and according to some research participants, the Rocky Mountains are a site of unremitting logging and subsequent ecological degradation. As mentioned above, the town of High River is centrally located within an active floodway (see image 1), thus, any additional ecological degradation that occurs in the Rocky Mountains can affect the speed and rate of precipitation coming off of the mountains into the community.

To exemplify community concerns of impending flooding related to logging, one respondent remarked upon her shock to learn about a recent deal between the Alberta and BC governments to allow a BC logging company to clear cut areas within the Rocky Mountains, she commented:

“They're gonna clear cut all of it. So, they're gonna wreck it for the fish that are endangered up there, the wildlife. I mean there's tons of bears and elk. They don't get it. It's all about money for them” [Semi-structured interview 2]. She went on to note:

“They're clear cutting right next to where there was an active flood way…they're clear cutting all the way to the Highwood River basin. So, what took 12 hours for that water to come down will probably take six now because there will be no trees” [Semi-structured interview 2]. She exclaimed: “It makes no sense. None. It's all about money” [Semi-structured interview 2].

Another respondent remarked:

“A lot of people do blame the flood on climate change and the clear cutting that happened in the mountains. You know, lots and lots of clear cutting and people that we know that are ‘more in the know’ in that area, they said the water just rushes down. And so, it's not just climate change to blame, it's human intervention and it's the stupidity. The
government said right after this happened, ‘Okay, we're putting a moratorium on no more housing in Alberta will be built on flood plains’. And have they lived by that? No! Drive by the South Calgary Hospital, look down the hill, Riverstone, houses within yards. They even advertise it, ‘Houses within feet of the river’.” [Semi-structured interview 15].

Some community members appeared to be aware of the overarching sociopolitical conditions shaping their vulnerability to future flooding events and their frustrations related to the 2013 flood. Importantly, too, not all participants highlighted these concerns. Many participants, remained silent on sociopolitical conditions shaping their vulnerability, preferring to overlook issues of anthropogenic climate change and environmental degradation as a way of coping with their concerns about future flooding. Many participants noted that while they did not deny climate change, they did not believe that the flood was about climate change. Often times, these same participants told us that they simply could not go through another flooding event as significant as the 2013 flood, and thus did not want to talk about the flood in the context of climate change because, in so doing, the perceived risks of another flood become greater. For many participants, the focus was on highlighting the flood mitigation efforts that took place in High River that allowed many respondents to feel some semblance of security that these efforts would protect them should another similar flood event occur.

We note that concerns over future flooding events appeared to impact community members’ long-term psychosocial wellbeing. In section 5.2, our research suggests that there is long-term sequelae related to the 2013 flood, including anxiety when it rains, self-reported post-traumatic stress disorder (PTSD), and lingering anxiety, worry, fear, including feeling “on edge” in the spring months when flood risk is increased.
For some respondents, it appeared that relying on flood mitigation efforts and ignoring the overarching issue of climate change, helped people cope with their anxieties and, thus, can be seen as supporting their psychosocial adaptation to the 2013 flood — but not necessarily supporting psychosocial adaptation to climate change. Thus, how participants perceived the 2013 flood, and impending events like future flooding, impacted how some participants coped with the climate hazards. This led us to reflect upon perceptions related to psychosocial adaptation to our changing climate because there appear to be fundamental differences in adapting to a flood event versus adapting to climate change. Namely, what do people think they are being asked to adapt to? If environmental hazards, like frequent flooding, are not perceived to be located in the overarching context of climate change, are people adapting in ways that do not fundamentally require seeing larger issues of climate change that are influenced by neoliberal capitalist conditions based on relationships of power? Adapting to climate change, then, is not coping with a one-off event in a reactive way, but an awareness and acknowledgement of larger sociopolitical forces at play shaping the anthropogenic climate change problem. Conversely, by locating extreme events in the broader issue of anthropogenic climate change are we asking people to adapt beyond their cognitive, behavioural, and emotional capacities? Is it too overwhelming to see sociopolitical conditions at play shaping environmental hazards and subsequent psychosocial outcomes? We explore these questions in detail in our discussion section.
5.1 Image 2. Flood Hazard Map

Source: Government of Alberta, 2016b.

5.1 Image 3. Topographical Map of High River

5.1.8.1.3 Disproportionate Risks and Impacts to Marginalized Community Members

Our third key finding suggests that people at disproportionate risk to the mental health impacts of the 2013 flood in High River included population groups already experiencing socioeconomic disparities based on factors that can intersect and compound risks and impacts. These factors include: pre-existing health conditions, socio-economic status, age, ethnicity, and gender. For example, when key informants and focus group participants were asked which population groups they thought were most affected by the mental health consequences of the flood, or whom they serviced most in their professions as health and social services workers, they responded in the following ways:

- “Definitely the lower income people. Those going through the natural disaster the more money you have available the easier it is” [Key Informant 2].
- “When it comes to mental health services you tend to see more women than men; women especially when it comes to depression and anxiety, have a higher frequency of being affected and…if affected, are much more likely to go for help than men in general. On the flip side, with substance use problems there tends to be more men than women and you do see more men in the addiction services side” [Key Informant 11].
- “there are families with children with disabilities, and that’s a family that’s already struggling and at their max and then you add something like a big weather events and that puts additional stress on a family and that’s the very thing that can create some breakdown in relationships” [Key Informant 6].
- “So, we have a couple of clients we can think here, pre-flood [who] were difficult to house and they needed lots of support, but they were functioning and since the flood have never regained that footing. So [they] still bounce around from house to house, so these
are people we would maybe have concurrent disorders, so there might be some addiction issues, definitely some mental health...who just, who can’t, who haven’t re-found their footing” [Key informant 1].

- “our students are still experiencing high anxiety and higher than our neighbouring communities – to the point we’ve added another two therapists” [Key informant 1].
- “I feel like there’s a lot of seniors worrying but I believe it’s the underprivileged, I believe it’s the low-income people that need it [mental health care] the most” [Key informant 14].

Interestingly, some immigrant community members felt like there were overwhelming resources to support them after the flood, in comparison to what they had experienced in their countries of origin. Three of our participants, who self-identify as immigrants, highlighted that they felt it was easier for them to adapt compared to non-immigrants of High River because they had a history of exposure to traumatic events in their home countries (including: violence, threats of violence, and environmental hazards), and they had recovered in ways that made them feel more resilient in the face of the 2013 flood. Importantly, this information comes from only three of our participants, and thus sweeping generalizations about their experiences cannot be made; this is also not to suggest that these voices ought to be discounted, but rather it is prudent to reflect on participant positionality and what data was captured in this research and what this data can say about the experiences of immigrant community members (more broadly) in High River.

The majority of front-line workers from the focus group sessions noted that immigrant needs were overlooked in the response to the flood, particularly because there was a lack of translation services; lack of culturally appropriate interventions, and the loss of identification (like passports and work visas) in the flood that affected access to services. Importantly,
however, these perceptions and those earlier by key informants come from non-self-identified marginalized voices, so their perceptions also need to be qualified, in that they are making presumptions based on the experiences of others. these findings led us to wonder: What does risk, adaptation, and vulnerability mean and to whom? How does positionality (social location) affect understandings of adaptation and vulnerability? We take a closer look at this question in the discussion section below.

5.1.8.1.4 Sociopolitical Influence on Mental Health Care Responses

Another key finding of our research is in regard to the sociopolitical influences on mental health care responses in High River. Through research gathered in the vulnerability and adaptation assessment we learned that the Provincial Government of Alberta responded to the 2013 flood with $50million dollars for mental health care and appointed the first, ever, Chief Mental Health officer in the province\(^\text{222}\). This investment allowed for 15 mental health experts to be deployed to the community in the aftermath of the flood; 28 additional mental health experts from British Columbia to support evacuees; clinical staff visits to displaced areas; training for first responders in psychological first aid; and, digital mental health care resources\(^\text{222,347}\).

When key informant and focus group participants were asked about how health and social services responded to the mental health outcomes related to the flood, the vast majority highlighted how response interventions were parachuted-in for a few weeks, months, or years and then as funding ran dried up (typically 2-3 years post-flood), these interventions left without building the community capacity to cope (see section 5.3). One respondent commented:

“We were blessed with a lot of resources that came in to our community…. some of those were short-term and that can set up the community for some disappointment; or leave us holding a basket that we can’t fill’ [Key Informant 1].
This respondent went on to note that when the free mental health care services (which were funded by the Provincial Government) left High River after three years, the demand for care was still there and the community scrambled to find an interim solution that necessitated a patchwork of funding agreements between the municipality and a private donor so that they could offer mental health services to community members on a sliding fee scale.

Another important thing to note was that a news article published in 2015 revealed that the position of Chief Mental Health officer, noted above, was not renewed beyond 2015. This article quoted the Provincial government’s minister of health at the time, Sarah Hoffman, who stated that the position was created to support people affected by the floods and “as that work is largely complete, the position is being wound down” (para. 5). While many key informants and focus group participants in our research did suggest that the mental health care needs related to the flood had, indeed, reduced to some extent a few years post-flood. These same respondents also highlighted that there were lingering sequelae related to the flood 5 years later, including PTSD, anxiety, trauma, and fear of an impending flood (see section 5.2). Further, the majority of our key informant and focus group respondents highlighted that regardless of the flood, the mental health care resources in High River were underserviced and underfunded to begin with. One respondent stated:

“I would say the psychosocial needs in the Province, generally speaking, and in High River more specifically are always underfunded and understaffed, under-resourced. And I would say that is a political issue, I would say it’s a huge social issue, in Alberta generally speaking” [Key informant 5].

Further, when semi-structured interview participants were asked about their perceptions of resources and services to support their psychosocial wellbeing after the flood, the majority of
marginalized respondents from the semi-structured interviews expressed that they did not feel there were (or are) any key resources available to support their psychosocial wellbeing during or after the flood. Respondents indicated that this could be because: they felt they did not have a strong sense of community to begin with; that their abilities affected access; and that there was a lack of focus on their demographic (see section 5.2). These findings suggest that participants perceived there to be a lack of long-term funding and mental health care governance (including decision making to enhance or increase access and funding to mental health care), which influenced the lack of sustained mental health care actions in High River.

This perceived lack of sustained mental health care appears to be a concern amongst our participants, further this lack of care appears to contribute to maladaptation in our changing climate. This begs the question: what does a reactive approach to mental health care resourcing in High River, post-flood, tell us about the sociopolitical conditions that shape mental health care in a changing climate? Something we explore more deeply in the discussion section.

Further, when we reflect on the question: “adaptation for whom?” have efforts solely focused on downstream adaptation at the individual and community levels, rather than upstream adaptation of neoliberal capitalist growth and competition enacted through relationships of power between governments and businesses? Upstream adaptation would require a fundamental transformation of the neoliberal ethos of growth, competition, and resource depletion (that fuels the climate change problem) towards divestment in the fossil fuel industry, aggressive climate change mitigation commitments, and a focus on degrowth and collective wellbeing. Is this type of transformation tenable in a town like High River that is nested within a province entrenched with interests and economic benefits from the oil sands industry? We reflect on these questions later in our discussion section.
5.1.9 Discussion: Towards a Critical Political Ecology of Climate Change and Mental Health

The issue of climate change impacting mental health is an issue that appears to operate at the nexus between politics and ecology. Some of the broad reflections on this Political Ecology nexus that we highlighted in our interpretation of our findings section, include: problematizing what the environment means and to whom, and more specifically, what adaptation to a changing climate means and to whom. We also provided critical reflections about adaptation, asking: is adaptation enough when we are looking at upstream drivers? In this discussion section, we take a deeper look at how adaptation has been problematized in the PE literature and how our findings corroborate the existing literature. We then discuss the collective myopia related to upstream drivers of climate change and question whether some sort of transformational resilience to climate change is even possible in the town of High River. We navigate this discussion by looking at some of the inherent inconsistencies related to the materiality of the community. We conclude this discussion section with a closer look at positionality and how positionality affects understandings of climate change and mental health adaptation and vulnerability in High River.

5.1.9.1 Problematizing Adaptation

Notably, there are a few political ecologists that have taken up many of the questions we posed above. As noted in section, 4.1.2 of this dissertation, Jennings (2011), for example, argues that a belief in climate change adaptation as inherently ‘good’, overlooks the broader socio-political system about which adaptation is shaped and acted upon to serve the dominant political interests. Jennings asks us to critically examine whose version of adaptation is being considered and why. She contends: “By taking this Political Economy for granted, the most socially and politically marginalized people will be ignored even when their practices qualify as adaptation and the policy goal is resilience. At the same time, marginalized groups will have
little investment in maintaining the resilience of systems that merely reproduce the status quo power of elites”\textsuperscript{56} (p. 241). She contends that understanding the broader political and economic processes that shape mitigation and adaptation responses can support researchers in “finding equitable solutions to human ecological problems”\textsuperscript{56} (p. 238). She is, however, not suggesting that mitigation and adaptation are merely “politicized endeavors” but rather to explore “what kinds of politics might be occurring” and how responses, like adaptation, “support political agendas”\textsuperscript{56} (p. 239). Jennings also prompts critical reflection of the influence of market-based insurance industries in flood-prone. She notes that it is problematic to “allow [the] market-based insurance industry to be the primary resource for people living in flood prone areas”, because the “obvious concern here is how such a system impacts the poorest and most vulnerable segments of society that cannot afford insurance or live in places that do not qualify for coverage because they have been built, with government approval on flood plains”\textsuperscript{56} (p. 245). To this point, it is important to critically reflect on why the onus of risk and recovery is placed on individuals in High River living in flood-prone areas and their buying into (or not) the market-based insurance industry. This is problematic when we consider that there are fundamental issues of neoliberal capitalism operating at core of this issue, wherein relationships of power between governments and land-developers allow for the building of homes and the settlement of people in flood prone areas. This is particularly problematic when we consider that neo-liberal capitalist interests are able to flourish at the risk of exposing High River community members (particularly community members who are most marginalized) to climate hazards.

A further issue is when we consider which individuals and communities are bearing the brunt of psychosocial distress related to flooding. For example, the global literature on the psychosocial implications of flooding tells us that there are serious mental ill-health effects faced
by people exposed to flooding, such as trauma, distress, anxiety, PTSD\textsuperscript{113, 119, 132, 312, 348} and that these effects are often exacerbated due to pre-existing socioeconomic conditions and the added socioeconomic burdens related to recovery and rebuilding\textsuperscript{56} (see also chapter 5.2 in this dissertation). In High River, research highlights the psychosocial effects of the 2013 flood, which includes displacement, increased use of anti-anxiety medications, increased domestic violence, general trauma, and distress at the individual and community-levels, which were most common amongst marginalized community members\textsuperscript{110, 313} (also see chapter 5.2 of this dissertation). The issue, herein, appears to be that individuals (particularly those most marginalized) and communities bear the greatest burden to their psychosocial wellbeing and that sociopolitical conditions that underpin exposure and effects of flooding in High River, and climate change more broadly, can remain relatively obscured or hidden. This is problematic because this signal that adaptation to our changing climate ought only to occur at the individual and community-levels, rather than fundamental changes in industry and government policies and practices to mitigate climate change and its effects on individuals and communities. Thus, Jennings (2011) work propelled us to critically reflect upon the conceptualization and practice of adaptation in High River related to climatic changes.

Swyngedouw (2015) also problematizes adaptation to climate change in his PE theoretically-oriented work that explores the fundamental tensions of a depoliticized understanding of adaptation that seeks behaviour change without acknowledging the broader changes that need to take place in the neoliberal capitalist societies\textsuperscript{28}. He suggests that adaptation to climate change is often framed as behaviour change that occurs “within the contours of the existing situation… so that nothing really has to change!”\textsuperscript{28} (p. 132 & 137). Thus, suggesting that an uncritical understanding and practice of adaptation continues to feed the
neoliberal capitalist agenda so that economic growth and consumption can remain intact, hidden and obscured. Our reflections on adaptation appear to align with the PE-led critical investigations by Jennings (2011) and Swyngedouw (2015). This type of critical inquiry can support public health audiences as they reflect upon climate change and health adaptation and can prompt them to question: ‘what does adaptation mean and for whom? And also: ‘is adaptation enough?’.

5.1.9.2 Navigating the Inconsistencies

In our research, we noted the collective myopia related to upstream drivers of climate change despite the increasing evidence to the contrary — something that Kari Norgaard (2011) has explored in-depth in her research that explores the fundamental disconnect between knowledge of climate change and actions to mitigate or adapt to climate change. Noting the issue of collective myopia, this prompted us to ask: is transformational change even plausible in a town like High River? Transformational change is a term that we conceptualize to be located within the broader conceptualization of transformational resilience. Transformational resilience is not simply a bouncing back from climate disruptions but a ‘bouncing forward’ that requires a reckoning with sociopolitical conditions that shape social, environmental, and climate injustices in order to move towards environmental health equity. We postulate that transformational change in High River is impeded by a number of inherent inconsistencies related to the materiality of the community. Briefly, below we highlight the inconsistencies related to the materiality of the community.

High River, as noted earlier, is a rural town located in an active floodway. Dominant industries in the community include: health care, agriculture, and the creative industries. The dominant industries of agriculture and creative industries rely upon a fertile, and aesthetically pleasing ecology. These main industries, and the health and wellbeing of the entire community,
however, is at the mercy of past flooding events (e.g. the 2013 flood) and anticipated or looming threats brought forth by environmental degradation (e.g. related to logging) and climate change. The town is also located in the Nation’s home of resource extraction. Politically, past and present, provincial and federal governments continue to invest (financially and via decision-making on policies and practices) in the oil and gas industry, which contributes to runaway climate change. These same governments are also making short-term investments in emergency mental health response to address short-term impacts from extreme weather events. Despite being a relatively well-resourced community in terms of health care, and despite receiving emergency mental health response to address the mental health effects of the 2013 flood, mental health sequelae continue to be an issue in the community and climate change continues to be a topic area that appears to be received with relative skepticism and/or disavowal at the community, provincial, and federal levels. The discourse on climate change and mental health appears to be ignored and, as such, reactive emergency response to extreme weather ensues, which allows for the broader issue of climate change to be unacknowledged and unaddressed. Further, the operation of market-based industries (like insurance, real estate development, and logging industries) appear to be prioritized over the operation of mental health services to address the mental health and wellbeing of High River community members experiencing the inequitable economic and health impacts of climate change.

Another paradox is that within the broader mental health and climate change research, psychosocial adaptation and resilience appear to positively influenced by a sense of community (see manuscript 3.3 in this dissertation); while the discourse of community connections was highlighted by many of our participants (see manuscript 5.2), this discourse appeared to be incongruent with the materiality of the spaces in High River; in particular when we consider that
much of the downtown core of the town is made up of fake television sets that take way from community space.

All of this is to say, we understand High River to be a town where policies and practices related to health and the economy (at all levels of government) are rife with contradictions that ultimately influence the inequitable psychosocial consequences of climate change and impede transformational change.

5.1.9.3 Reflections on Positionality

Reflecting on the work of Brisbois and Almeida (2017), we are prompted to critically reflect on how positionality affects understandings of climate change and mental health adaptation and vulnerability in High River. Looking at the positionality of our research participants, many of our key informant and focus group participants (who worked in some form of leadership or front-line health and social services roles) positioned marginalized community members as those who were most vulnerable to the mental health effects of climate change. While this has indeed been demonstrated in the research on climate change and health (as noted earlier), what was overlooked was marginalized groups’ sense of fortitude in coping with the challenges brought on by a changing climate, something that our immigrant respondents’ highlighted. This is not meant as an overgeneralization, or a ‘romanticizing’ of marginalized groups, but rather a point to be highlighted. Thus, it appears important to gain perspectives from a multitude of voices to understand how positionality affects perceptions and health outcomes.

Another area we wanted to make sense of through critical reflection on positionality was the incongruent perceptions of climate change and mental health adaptation versus perceptions of extreme weather events and mental health adaptation (as discussed in section 5.1.8.1.2). How does researcher positionality and participant positionality affect the way we see adaptation to
climate change versus how (some) of our participants see adaptation to extreme weather events? As researchers studying climate change and mental health, looking at the community of High River post-flood, we are positioned to see the links between the 2013 flood and climate change. We are also positioned to see the urgency of the climate change problem and could be tempted to forego a critical reflection of our positionality in an effort to ‘do something about the problem’; something that Brisbois and Almeida (2017) caution against in their work that explores the need for critically reflective scholarship in the field of global public health\textsuperscript{323}. It appears important, then, to reflect that we have not been exposed to the 2013 flood, nor had to explore our trauma and distress related to this event, nor been called upon to adapt to the 2013 flood. This lack of lived experiences, in combination with our awareness and knowledges of the climate change and mental health problem area, shapes our understanding and analysis of our participants’ experiences. From our participants perspectives, we may be drawing conclusions that seem motivated by our social locations and our sense of urgency based on our experiences and knowledges; these motivation may seem devoid of the lived experience and context. On the other hand it is important to critically reflect on our participants’ social locations. It appears that many of our participants may have overlooked the role of climate change (in the context of the 2013 flood) because they may be ideologically motivated based on their social and geographic locations to ignore the climate change problem because of the entrenched role the Political Economy of the Alberta oil sands has on Albertans.

As noted earlier, we are approaching our research from the ontological realist understanding that the science of climate change is real and that there are real mental health effects from climate change. We also approach our research from the understanding that the 2013 flood may have been made more frequent, complex, or intense because of climate change.
Also, we approach our research from an epistemologically skeptical understanding noting that many voices are often overlooked in the research on climate change and mental health and that there is a need to hear from these voices to better understand their knowledges and experiences to more fulsomely see the problem area of climate change and mental health. These reflections are not meant to draw any particular conclusions, but rather to highlight the importance of critically acknowledging positionality in a critical Political Ecology analysis of climate change and mental health.

5.1.10 Conclusion

A critical Political Ecology approach to the topic area (of climate change and mental health) is important for public health audiences because it illuminates macro-level factors that can contribute to inequities and inaction. Further a critical Political Ecology approach can also help us to understand, and critically reflect upon how materiality and positionality shapes the discourse and practice related to climate change and mental health adaptation.

The current base of climate change and mental health studies describe the risks and impacts of climate change on marginalized groups\textsuperscript{36, 40, 42, 48, 179, 331, 351}. While this information is helpful to public health audiences, there is no apparent exploration or critical reflection of marginalization and vulnerability and what adaptation to our changing climate means and to whom. It is worth investigating how sociopolitical conditions influence disproportionate risks and impacts of climate change, and also how they influence our understanding and practice of adaptation, so that we, as public health professionals, can name and address these conditions in our efforts to support population health in a changing climate. For this reason, a critical Political Ecology of climate change and mental health is needed for public health audiences.
As noted earlier, specific areas that tend to be explored through a PE lens center around: relationships of power; scale; governance and economics; and, justice and equity\textsuperscript{27,236}. Noting this, our PE-influenced approach to the topic area of climate change and mental health aimed to investigate relationships of power between governments and businesses and how these relationships influenced exposures to flooding and subsequent mental health effects. Further, we conducted an initial exploration of multi-scalar governance and economics (in Alberta, and High River) to examine how economics and politics at different scales contributed to psychosocial adaptation, or maladaptation, to the 2013 High River flood. In particular, we problematized government contributions to mental health care post-flood within a neoliberal capitalist paradigm that fuels the climate change problem, and subsequently strains existing mental health infrastructure. Finally, we provided an initial exploration and problematization of what the environment means and to whom, including a reflection on our own positionality and the positionality of our research participants.

A critical Political Ecology approach to the case study of High River, Alberta marks the first known theoretically-influenced investigation into the root causes of inequitable risks and impacts of climate change on mental health, while also exploring sociopolitical conditions that shape perceptions, and actions (or rather inactions), related to psychosocial adaptation to climate change. Importantly, there is a need for further inquiry — by other researchers in the field of climate change and health — into the sociopolitical conditions that can shape health inequities and actions related to climate change and mental health to better enhance an understanding of policy and practice in this domain.
5.2 The Psychosocial Sequelae of a Changing Climate: An Exploration of the Lingering Mental Health Consequences of the 2013 High River Flood and Implications for the Field of Climate Change and Health

N.B. This paper has not yet been submitted to an academic journal at the time of submission; however, this paper will be submitted to the journal, Climate Change, by summer 2019.

Contributing authors include: Dr. Blake Poland, Dr. Donald Cole, and Dr. Branka Agic

5.2.1 Abstract

Increasingly, health professionals are concerned about the mental health consequences of climate-related hazards. This paper responds to these concerns through an empirical investigation of the lingering psychosocial consequences of the 2013 Southern Alberta flood in High River, Alberta. Through a mixed methods approach, the authors explore the psychosocial consequences of the 2013 flood and implications for the field of climate change and health. Methods included: (i) a desktop climate change and mental health vulnerability and adaptation assessment of High River, Alberta; (ii) key informant interviews (n = 14) with health and social services leaders; and, (iii) semi-structured interviews with a sample of community-members (n = 18). This empirical investigation suggests that: there are a range of psychosocial outcomes related to the 2013 flood; the 2013 flood continues to affect the psychosocial health and wellbeing of High River community members five years after the flood; and, these impacts disproportionately affect those most marginalized in the community, however, those most marginalized appeared to demonstrate more psychosocial resiliency than non-marginalized community members. These findings suggest that long-term psychosocial sequelae related to extreme weather events requires more attention and critical reflection in the field of climate change and health.
Keywords: Climate Change, Psychosocial, Mental Health, Sequelae, Inequity, Mixed Methods, Qualitative Research

5.2.2 Introduction

In 2009, the Lancet published a report stating that climate change is the most pressing global health issue of the 21st century\textsuperscript{44}. Scientists from the Intergovernmental Panel on Climate Change (IPCC) continue to echo this statement noting that even a 1.5-degree Celsius increase in global average temperatures brings forth amplified risks and impacts from vector-borne illness, food and water insecurity, displacement, and morbidity and mortality related to extreme weather events and extreme temperatures\textsuperscript{59}. An emerging area of concern is the psychosocial implications of climate change\textsuperscript{329, 352, 353}. The psychosocial implications of climate change include outcomes that affect social as well as psychological wellbeing\textsuperscript{13}. For example, climate change hazards such as extreme weather events can interrupt a community’s food supply, damage infrastructure and homes, and result in trauma, injury, or death\textsuperscript{197}. Psychosocial outcomes related to these events may include: community-level strain as resources become scarce leading to conflict or violence; shelter and safety may be uncertain triggering emotions of worry, fear, and feelings of impending doom; and, exposure to these climate hazards may result in a myriad of other mental health outcomes\textsuperscript{184}. We take this opportunity to also underscore, at this juncture, that mental health includes states of mental wellness as well as mental illness\textsuperscript{197}. Mental health outcomes related to climate change can include outcomes such as post-traumatic stress disorder (PTSD), anxiety, depression, survivor guilt, vicarious trauma, grief, sadness, and hopelessness, as well as affirmative outcomes, such as post-traumatic growth (often referred to as a sense of meaning in one’s life), feelings of compassion, altruism, and hope occasioned by the experience of
community members rallying to each other’s aid, and the sense of feeling more alive and present, etc. [34, 52, 130, 184, 197].

The health outcomes of climate change are particularly salient in Canada, where rising temperatures are projected to increase two-fold compared to the global average [354]. Precipitation and snowfall has increased in most parts of Canada since 1948, and a warmer climate in Canada is projected to make weather extremes, and precipitation event and inland flooding, more frequent and intense [354]. Noting these climate impacts and risks in Canada, there have been recent concerns from health professionals about the health effects of climate change, in particular there has been a recent uptick in desire to understand and highlight the mental health effects of climate change in a Canadian context [328, 352, 353].

The objective of the research presented here is to respond to these concerns by providing an initial empirical investigation of the lingering psychosocial consequences of the 2013 Southern Alberta flood in High River, Alberta and the potential implications of these findings for the field of climate change and health. Importantly, authors are not suggesting that the 2013 flood was a direct outcome of climate change, but rather that climate science definitively states that there is an enhanced likelihood that the frequency and intensity of extreme weather events, like flooding, is elevated under current and projected climate scenarios [1]. This appears particularly resonant in the town of High River which was flooded in 1995, 2005, 2008, 2011, and 2013 [285], and there are existing studies documenting the anticipated impact of future flooding in Southern Alberta [340].

Through a mixed methods empirical investigation, we asked: what are the long-term psychosocial consequences of the 2013 Southern Alberta flood in High River, Alberta? And, what implications does an exploration of the long-term psychosocial consequences of the 2013
flood have on the field of climate change and health? Below, we provide an overview of empirical research in this field of study in Canada before outlining the research methods, results, discussion, limitations, and conclusion.

5.2.3 Background

To our knowledge, there has been only one previous empirical investigation in Canada that explicitly explores the mental health consequences of climate change. Authors of this multi-year, qualitative study researched the mental health outcomes amongst the Inuit in Nunatsiavut, Labrador as a result of climate-related melting sea-ice. Drawing upon 67 interviews with community residents, community-based health workers, and Nunatsiavut Government health professionals, authors found that melting sea ice affects community-members sense of place, inciting grief and lament for the loss of land, as well as affecting cultural practices and livelihoods, leaving many idle, anxious, and some coping via substance misuse.

There have been other empirical studies in Canada that broadly investigate the health outcomes of climate change hazards including some mention of mental health outcomes. For instance, there have been two recent studies that capture the mental health consequences of extreme heat. One quantitative study conducted in Toronto, Ontario investigated the relative risk of emergency room visits for people with pre-existing mental illness who were exposed to periods of high ambient temperatures. The authors found an increase in hospital admission for mood and behavioural disorders for people with pre-existing mental illness who were exposed to mean temperatures of 28 degrees Celsius over 1-4 days of exposure. The other study, conducted in Quebec, reported on heat-health impacts, including mental health impacts, in nine low socioeconomic neighbourhoods via survey methods. This study found a
17.8% prevalence of self-reported mental health problems related to experiences of “very hot and humid summer” temperatures (p. 11031)\textsuperscript{355}. There has also been one recent study investigating the mental health effects of the 2016 wildfire in Fort McMurray, Alberta. This study revealed that in comparison to youth in Red Deer, Alberta (who were not exposed to the wildfire), youth in Fort McMurray had increased depression, suicidal thinking, and increased tobacco use\textsuperscript{356}.

With regard to long-term mental health sequelae related to climate hazards, there have been few, if any, known Canadian empirical studies published on this topic area. Notably, however, there is a significant base of global literature highlighting the mental health consequences of environmental disasters (see for example see \textsuperscript{115, 116, 117}). Some research even addresses the long-term sequelae related to these events\textsuperscript{96, 357}. For example, Schwartz et al. (2017) explored the longitudinal mental health effects of Hurricane Sandy one-year after the event via questionnaires with (n = 130) Long Island and New York residents who had been exposed to that hurricane\textsuperscript{357}. Importantly, these authors found long-term PTSD was reported amongst people who experienced damage to their person and property\textsuperscript{357}. Another notable finding was that people with pre-existing mental health issues, like anxiety, depression, or PTSD, were more likely to report persistent anxiety, depression, and PTSD post-event\textsuperscript{357}. This study concluded that under a changing climate the frequency of hurricanes becomes more likely, thus, extreme event recovery efforts ought to consider the role of climate change on long-term mental health outcomes, like PTSD. The study presented here investigated the lingering mental health consequences of the 2013 High River flood within the context of a changing climate in an effort to enhance an understanding of the long-term psychosocial consequences of climate change.
5.2.4 Research Context

High River is a town of approximately 13,000 people, located 67.7KM south of Calgary. On June 19th, 2013, heavy rain hit Southern Alberta for approximately 18 hours. Thirty local states of emergency were declared in Southern Alberta, including a declared states of emergency in High River. High River was particularly impacted by the flood because of its geographic location. The town is located in the foothills of the Rocky Mountains, with the Highwood River starting at the base of the Rocky mountains and running approximately 31 kilometers through town. Importantly, the speed of the Highwood River on June 19th, 2013 was estimated to be faster than the speed of Niagara Falls. The entire town was ordered to evacuate and there were four reported deaths resulting from the flood. Noting how impacted the town was by the 2013 flood, and that flooding exacerbated by climate change is projected to be more frequent, intense, and complex, we sought to investigate long-term psychosocial sequelae related to the flood in order to contribute to the empirical knowledge base on climate change and mental health effects.

The rationale for locating this research in High River, Alberta was four-fold. Firstly, High River has experienced at least three major flooding events since 2005 — most notably the 2013 flood. Further, High River is located in the Province of Alberta, which has experienced some of the worst environmental disasters in Canadian history, including the costliest disaster in Canadian history: the 2016 Fort McMurray wildfires that resulted in 2 fatalities, 90,000 evacuations and an estimated $4B in damages. Secondly, flooding has become the most frequent form of disaster globally, and incidents of flooding are predicted to increase due to climate change. In Southern Alberta, for example, researchers project more frequent and severe storms throughout the summer months in 2050 and 2080 posing a risk of future
flooding. Thirdly, there is an existing body of literature citing the risks and impacts of flooding on mental health. Most notably, Sahni et al. (2016) found increased sexual violence and new prescription medications for anxiety and sleep issues in post-flood Southern Alberta. Noting that High River has been exposed to flooding, and is projected to be exposed to future flooding, and that there is evidence of psychosocial impacts from prior flooding in this area, this location seemed fitting to explore the long-term psychosocial sequelae of a changing climate. Psychosocial sequela refers to the lingering mental health effects related to an acute trauma; in the case of High River, this refers to any mental health effects related to the 2013 flood. Fourthly, there are long-term socioeconomic impacts from flooding that can affect psychosocial wellbeing. The cost of the damage from the Southern Alberta flood to the Government was estimated at 2.7 billion dollars, the second costliest disaster in reported Canadian history, second only to the damage from the Fort McMurray wildfire in 2016. Importantly, overland flooding, is often not covered in basic home insurance packages, as a result, homeowners are expected to pay for out-of-pocket for flood damage, which can have lingering socioeconomic and psychosocial impacts. To address some of this financial burden, the Government of Alberta set-up the Disaster Recovery Program (DRP), which is administered by the Alberta Emergency Management Agency. The DRP provides insurance coverage for extraordinary, widespread events that are often not covered in personal and business property insurance. Indeed, many flood-damaged High River residents and business owners were not covered by private or DRP insurance, which posed lengthy and burdensome socioeconomic challenges for families and businesses in the community. These challenges can contribute to psychological stress and increase the use of mental health care services, and this psychological stress can also impose economic burdens on families, employers, healthcare
systems, and governments. For these reasons, High River provided an ideal case study to explore mental health and climate change in Canada.

5.2.5 Methods

This study adopted a mixed methods approach to understand the psychosocial consequences of the 2013 flood and implications for the field of climate change and health. Details on our methodological approach can be found in section 4.4. Similar to the rationale provided by researchers in the aforementioned multi-year study in Nunatsiavut, Labrador, an exploratory case study was chosen for this research because it provided a frame to deeply analyze community-level psychosocial risks, impacts, and adaptations related to climate change. Briefly, adaptation is defined herein as any practice, intervention, or behaviour change that supports coping with climate change and climate change related mental health outcomes.

Methods included: (i) a desktop climate change and mental health vulnerability and adaptation assessment of High River, Alberta to assess the risks, impacts, and adaptation opportunities related to climate change; (ii) key informant interviews (n = 14) with health and social services leaders; and, (iii) semi-structured interviews with a sample of community-members (n = 18) to explore their experiences related to the 2013 flood and any concerns about climate change. This research was approved by the University of Toronto Ethics Board, the University of Alberta Ethics Board, and Alberta Health Services ethics.

5.2.5.1 Desktop Climate Change and Mental Health Vulnerability and Adaptation Assessment

We used the World Health Organization (WHO) Vulnerability and Adaptation Assessment guidelines and the Ontario Climate Change and Health Toolkit to guide the desktop climate change and mental health vulnerability and adaptation assessment. This desktop assessment, including data collection and analysis, was conducted between January and May.
2018. Data included in this assessment was sourced from publicly available, English material for all dates up until May 2018 addressing climate change and health in High River, Alberta, including material that highlighted climate change and health risks, impacts, vulnerabilities and adaptation opportunities. This assessment captured material that provided information on psychosocial health, including mental health, of High River residents.

Two Google™ searches were also undertaken. The first search focused on climate change in High River and the second search focused on psychosocial health in High River. This search was augmented with a review of specific websites and databases for material pertaining to climate change and/or psychosocial health that was relevant to High River, Alberta. The following databases were searched: Alberta Government, Health Canada, Environment Climate Change Canada, Canadian Disaster Database, Prairie Climate Centre, Statistics Canada, Alberta Health Services. A snowball search based off of the Google™ structured search and the purposeful websites and database search was also conducted.

All relevant web-pages and materials were scanned for content on climate change or extreme weather in High River Alberta and/or explained and explored mental health in High River. If available, data sources and methods for web-content was scanned and filed. Approximately 116 data sources were used in this assessment. Additional details on this method can be found in section 4.5.3 of this dissertation.

5.2.5.2 Key Informant Interviews

A second phase of this research involved telephone interviews (n = 14) with key informant stakeholders from High River, Alberta who were involved in mental health service provision to High River residents during and after the 2013 flood. Key informants include people from the following professions: public health professionals (public and community-based);
emergency management professionals; public safety; environmental ministries; local
councillor(s). Respondents were purposefully identified from the desktop assessment and their
contact information was sourced from publicly available material. From there, additional
respondents were recruited via snowball sampling methods. Key informant (KI) interviews took
place between March and July 2018 and each interview averaged 60 minutes in duration.

The interviewer followed an interview guide for each interview. All respondents were
asked about their role in their organization; the impact of the 2013 flood on the mental health of
High River residents; the demographics of those most in need of psychosocial support after the
flood; the types of psychosocial services available before, during, and after the 2013 flood;
perceived barriers for people needing to access such services; perceptions of climate change and
its impacts on mental health; and, their organization’s approach (if any) to the psychosocial
outcomes related to a changing climate. Additional details on this method can be found in section
4.5.4 of this dissertation.

5.2.5.3 Semi-Structured Interviews

A subsequent phase of data collection included semi-structured interviews with a sample
of marginalized community members (n = 18) to explore their experiences with psychosocial
response interventions. Community members were sought who self-identified as belonging to
any one or more of the following groups: female, youth, elderly, someone from a low socio-
economic status, under-educated, someone with pre-existing health concerns. Participants were
recruited through a combination of poster set-up throughout the community in High River and in
Okotoks and snowballing process. Interviews averaged 60 minutes and took place between June
and July 2018.
As these were semi-structured interviews, the interviews were more conversational in nature, informed by an interview guide. During these conversational interviews, we discussed the kinds of resources (people, places, policies, etc.) available in High River to support the wellbeing and mental health of people living in High River before, during, and after the flood. These discussions also included participants’ reflections on whether and how the physical environment changed in the community in the past 5-10 years. Further, we also explored participants’ perceptions of climate change. Given the research focus on resources to support residents, participants were not directly asked or probed about their own psychosocial experiences of the flood. However, most respondents volunteered this information and requested the space to tell their story. Additional details on this method can be found in section 4.5.6 of this dissertation.

5.2.6 Analysis

Analysis of the desktop assessment centered upon a review of information that explored climate change-related health hazards in High River (past, current, and predicted), with a specific focus on psychosocial health outcomes and inequitable exposures based on geography and socially determined factors. A detailed overview of this analysis can be found in section 4.5.3.1 of this dissertation. All interviews were recorded using an audio recording device and transcribed verbatim. Transcripts were reviewed three times and memo-notes were taken. Initial codebooks for the key informant and semi-structured interviews were developed by the research team based off of the transcript review, descriptive memo-notes, and comparison of each interview.

After all phases of the data collection were complete and analyzed separately, the data was analyzed together using a descriptive qualitative approach to thematic analysis to address the aforementioned research questions. A detailed description of this approach can be found in section 4.6 of this dissertation. The descriptive qualitative approach used to analyze the empirical
data from this research, was a process wherein researchers reviewed interview transcripts (key informant and semi-structured interviews), crafted memos from the data, sorted the memos, and established a code book based off of emergent themes from the full set of data and then coded all of the data based on these themes. Both codebooks for the key informant and semi-structured interviews included emergent themes from interview data that responded to the following analysis probes: what is this an example of? What are the terms participants are using? With what words/terms do they describe their experiences? The emergent descriptive themes were checked against the initial key informant and semi-structured interview coding. The descriptive qualitative approach to analysis of the data offered researchers the opportunity to fully describe phenomenon, often using research participants own words.

5.2.7 Findings

This empirical investigation suggested that: (1) there are a range of psychosocial outcomes related to the 2013 flood; (2) the 2013 flood continues to affect the psychosocial health and wellbeing of High River community members five years after the flood; and, (3) there are disproportionate psychosocial effects on those most marginalized in the community and yet these groups tend to be more resilient and efficacious in seeking psychosocial supports compared to people in positions of social privilege. These findings are explored in detail below.

It is important here to note that findings from the key informant and semi-structured interviews were based on self-report psychosocial outcomes and not necessarily diagnosed by a medical professional. This is important to consider as the disaster mental health literature highlights that there may be a tendency for people to self-report trauma when they are experiencing normal reactions to abnormal events. With that said, however, there may also be a tendency for people to under-report trauma because of lingering mental health stigma.
Further, people can experience compound trauma and the 2013 flood may be one amongst many stressors in a person’s life. In our findings below, we incorporate key quotes from our research participants to exemplify the three emergent themes we highlighted above, these key quotes are intended to provide a snapshot of what we found in our data. In our discussion section, we provide a deeper analysis of all of this data and ask critical questions about what participants told us and what we continue to grapple with based on our understanding of the literature on climate change and psychosocial health.

5.2.7.1 Range of Psychosocial Outcomes

As noted in the introduction, there are a range of psychosocial outcomes related to climate hazards. Findings from the desktop assessment and both sets of interviews appear to corroborate those in the literature with respect to the type and range of psychosocial outcomes experienced by High River respondents exposed to the 2013 flood. We firstly describe our findings from the desktop assessment and follow this with an overview of findings from the interviews.

The desktop assessment incorporated publicly available material from the Alberta Health Services community profiles. Briefly, Alberta Health Services (AHS) is the governing health body in the Province of Alberta, and the AHS prepares community health profiles every few years based on data from: the Federal Census (2011); National Household Survey (2011); and Alberta Health data including Postal Code Translator, Alberta Healthcare Insurance Plan, and Annual Population Registry Files. AHS divides the province into 5 large health services zones that are divided into 132 Local Geographic Areas (LGAs); High River sits within the Calgary zone and the High River LGA includes towns and First Nations communities, to the south, east, and west of the town of High River. Notably, the catchment for the High River LGA is larger
than the catchment for the empirical investigation reported in this study, therefore, the AHS findings are related to a broader geographic area than the city limits, most of which were also flood-affected.

The 2017 AHS Community Profile findings for the LGA of High River reveal that:

- emergency department visits for mental and behavioural disorders were higher than those reported in the 2013 and 2015 community health profile reports;
- emergency department visits for anxiety and mood disorders was higher than the Alberta average (High River LGA: 1,661.5 per 100,000 population compared to Alberta: 1,167.8 per 100,000 population); and,
- the inpatient discharge rate associated with mental and behavioural disorders was comparable to Alberta's discharge rate per 100,000 population (101.3 High River LGA vs. 136.70 Alberta); however, it was higher than 2013 and 2015 reports.

These findings highlight an increase in mental and behavioural disorders as the years went on post-flood. While one cannot say with certainty based off of these findings that the increase was as a result of the flood sequelae, the empirical investigation from the key informant and semi-structured interview data supports this postulation. When speaking about the ongoing psychological struggles of youth related to the flood, one key informant stated:

“it is the only common denominator, why not the other communities?....it is our high school students, junior high school students, elementary school students that talk [about] huge issues with stress and anxiety. And that is worrisome.” [KI Interview 1].

Findings from the desktop assessment suggest that there appears to be enduring psychosocial effects related to the flood.
In the interviews, key informants tended to highlight increases in PTSD, anxiety, worry, fear, and general trauma related to the flood. We heard this from one medical professional in the community:

“Most of the things we saw were PTSD, sort of situational crisis, adjustment disorder type of thing, anxiety disorders — so a lot of people, you know kids with trouble sleeping and anxiety nightmares, which you could argue is PTSD probably. I think it all kind of fits into that, more or less the PTSD kind of thing” [KI Interview 8].

This same respondent commented: “some days it felt like everybody was suffering from mental health issues, every single person we would see in the day” [KI Interview 8]. Some of the most harmful psychosocial effects noted by key informants were related to violence and suicide post-flood. For example, one key informant noted: “You know immediately after the flood, it was determined that a lot of people were having a lot of trouble… we had a number of suicides and that number was never really released”. [Key Informant 3]. This key informant went on to remark upon something that he heard from one of the funeral directors in town, who reportedly said: ‘you know, if we really knew how many suicides, it would just be really shocking’ because, you know, it was definitely in the double digits”. Other key informants commented on the increase in patient/client stress and trauma related to the flood, including vicarious trauma and distress. One key informant stated:

“We didn’t just see people [from] High River and floodways calling in, we saw people who had loved ones who were directly impacted, and they were being impacted by their loved ones’ suffering…”, “while they themselves were not physically affected at all. They were at times experiencing distress and wanting to support.” [KI Interview 7]
Another key informant in a public health role spoke about vicarious trauma among people in the caring professions: “I worked with people directly but also the majority of it was just managing our team, and our team’s wellness. And they, you know, they were going through secondary trauma and all of that sort of stuff.” [KI Interview 13]. Many key informants in particular highlighted the rise in compassion fatigue amongst people in the caring profession. Key informants also discussed the issue of compound trauma:

“So there are, I think, a smaller number of people who are left with very specific trauma related to the flood, what we are more likely to see [is] that one substantial factor feeds into depression and anxiety and substance misuse and family violence. So, I think it just becomes one of the things. For some people that may be an important piece, for many that’s one of a number of factors” [KI Interview 11].

It was also noted in some of the interviews that the compound trauma related to the flood had a particularly dire effect on seniors in the community. One medical professional, for example, stated:

“So, in the immediate, two-three weeks, we lost quite a few seniors that were displaced, they actually passed away. From one traumatic event to another, I don’t know if that’s ever been reported, I think in my practice I lost 4 or 5, all [in] the space of 3-4 weeks, maybe 6 weeks.” [KI Interview 8]

Notably too, most of the key informants and participants in the semi-structured interviews also noticed some of the affirmative psychosocial outcomes, in particular, a sense of community, resiliency, and altruism. One semi-structured participant comments: “as hard as it is when you go through something like that, it does in that moment, it brings people together in a
different way than you can ever imagine” [Semi-structured interview 17]. Another semi-structured interview respondent noted:

“I do think that the sense of community has stayed, even if, you know, not everyone's aware of, you know, we aren't thinking all the time about, "Oh, we're like this because of the flood." I do think that underneath, subconsciously, that we are mostly.” [Semi-structured interview 18].

A key informant commented that this sense of community is something that the community wants to instill going forward, he stated: “I think people don’t want to lose that piece of what came up in the flood”… “and the importance of being connected” [KI Interview 2]. Not only was the sense of community captivating, other respondents noted the overwhelming generosity and altruism they experienced, often from strangers. Speaking to this, one key informant, described:

“a guy came around the side gate off the front street, and he was…I’ve never seen such a strong, young, muscled guy – he was amazing to me! I’m not a very big guy, and he said my name is (and I can’t remember) let’s just say, Mark, “I’m a plumber and a steam fitter, would you like me to take your hot water heater out for you?”. I’m going, ‘well yeah’….’cause all that stuff had to come out of the basement, the furnace, everything, everything…so he trundles down and I turn around and he’s coming back up with this 40 gallon hot water heater on his back! He walks it down the steps, around the side of the house, and plunks it on the heap of the stuff outside for the refuse folks to take away, and then he disappeared. And that’s what he was doing, going house to house taking water heaters out. You know a van, just a regular van, was going down the street and it was full
of Tim Hortons donuts and coffee and sandwiches….so those were examples, and these were repeated hundreds and hundreds of times around the town” [KI Interview 5].

Another key informant stated:

“immediately after the flood we had, you know, thousands of volunteers. People from town who weren’t flooded were helping those who were flooded. There were volunteers coming in from all over Canada, there financial donations being made… I considered that a very positive thing when people step forward either physically or financially or, you know spiritually with prayers” [KI Interview 3].

Interestingly, many semi-structured interview respondents also discussed some of the challenges of receiving aid. One respondent aptly stated: “[it’s] easier to be the giver than the receiver” [Semi-structured interview 7]. Others highlighted the challenges of receiving ‘hand-outs’ feeling a range of complicated emotions like feeling humbled, frustrated, and not wanting to feel ungrateful if the aid was not necessarily commensurate with the need or loss.

The above suggests that there are a range of psychosocial outcomes related to the 2013 flood (including affirmative outcomes), and that these outcomes can co-occur and also compound pre-existing stressors. It is important to bear in mind that this information only provides a snapshot of the psychosocial responses as told to us by our participants. It is important to reflect upon our earlier comments that people may over or under-report this information.

Next, we explore the enduring psychosocial effects of the flood.

5.2.7.2 Enduring Psychosocial Effects

The timing of psychosocial outcomes related to exposure to climatic hazards can vary widely, psychosocial outcomes may emerge days, weeks, months, or years after exposure to a climate hazard. As noted earlier in the study of people exposed to Hurricane Sandy, long-
term PTSD was significant one year after exposure. It has also been reported that as of 2018 physicians continue to treat psychological trauma related to exposure to Hurricane Katrina, which struck New Orleans in 2005, and many clinicians continue to experience long-term anxiety related to that event. Findings from this case study corroborate the above and suggest that there are ongoing psychosocial effects of the 2013 flood. We focus here in particular on what emerged from the interviews, these findings will be explored in the following categories: ongoing grief and loss; trauma related to infrastructure rebuilding efforts; re-traumatization related to mold and lack of insurance coverage; and the looming threat of climatic hazards.

5.2.7.2.1 Grief and Loss

As noted earlier, interview participants were not specifically asked about their psychosocial experiences with the flood; however, the vast majority of respondents from the semi-structured interviews (all but one of the 18 interviews), requested space to tell their story of their experiences the day of the flood; further, most participants went on to highlight their lingering psychosocial experiences post-flood.

The long-term trauma that many participants reflected on in interviews pertained to their ongoing processing of grief and loss related to personal or property damage caused by the flood. Notably, flood-loss was related not only to damaged property but also to items that were flood-affected and needed to be thrown away due to concerns about mold. One respondent from the key informant interviews, who works in a psychosocial counselling capacity, noted the timing of psychosocial triggers related to the flood:

“it’s those constant reminders of ‘oh yeah, I don’t have that anymore, I had to throw that out’; that again is tough on mental health because it’s not when you are expecting it. It’s not, you know… it could be school photos. I mean, I know so many people who say: ‘I
ran downstairs to look for that and then realized that it wasn’t there’...it’s that unexpected sadness or grief that kind of hits you when you are just kind a going about your day – it’s tough.” [KI Interview 1]

Another key informant interviewee described how the recognition of lost mementos from the flood would often propel people back to the trauma experienced on the day of the flood:

“...there’s a lot of the memories that people have in [the] form of photos and keepsakes, whether it’s furniture, or whatever kind of items. Unfortunately, that kind of stuff, at least it used to, gets stored in the basements here in High River and so... the basements, of course, are what got hit the hardest and so peoples’ lives, they lost their memories, their physical reminders, their physical mementos that were such a rich part of their memories and their heritage and, you know, plus the actual trauma involved of fleeing from the flood waters and in some cases getting caught up in the flood waters; swimming through flood waters and having vehicles die in the middle of flood waters and having to be rescued or be rescued from the tops of buildings and tops of houses and by helicopters, so people were very...very traumatized and I think there is still, there’s still many people — many people are still suffering the effects of the ...you know post-traumatic stress” [KI Interview 3].

For many respondents who shared their stories of the flood during the interview, tears were shed as they recounted their experiences. For many, these tears caught them off guard. One respondent remarked:

“I’m not usually that emotional about it. It's really weird, but it does that. That's also something. We really noticed that there are certain times when it just goes ‘whoom’,
whether it's… it can be something so simple and stupid, like just something triggering a
loss or something’ [Semi-structured interview 12].

Another participant remarked upon insights he gleaned from a member of a disaster aid agency
who talked about the nature of long-term trauma, stating:

“it’s going to be 5-7 years at least, and I’ll say this, and it won’t be done until the last
story has been told. And that, that is true. That is, I can say that is the absolute truth.
There’re still stories so we are not done, and we are only five years out — this is going to
be at least seven years” [KI Interview 5].

Throughout both key informant and semi-structured interviews, respondents stressed the ongoing
effects of the flood and the need for awareness about these ongoing effects. One key informant,
who has been a life-long resident of the community, frankly stated:

“the important thing when I’m talking about the mental health aspects after this disaster,
that’s really important for other communities to know, this doesn’t go away within 6
months or a year. … it actually never goes away; there’s going to be people dealing with
PTSD pieces of that for the rest of their lives for sure. I know I’m probably one of them
so… when your home, your business… your family, your life is put in danger like that… I
guess some people can do it and just block it out, but in a community of 13,000 people
your delirious to think that it’s all going to go away after 4 years even.” [KI Interview 2]

Another key informant also reflects on the need for other communities struck by disaster to be
aware of the long-term psychosocial effects. She stated:

“it’s the length of time that it takes but it’s yeah, it’s tough on people so… and that’s what
I think when I mentioned seeing the news in other communities, that’s the piece that we
know that others might not — that this is just the beginning for them. That the real heartache is coming” [KI Interview 1].

In some cases, the trauma of loss related to the flood emerged well after the destruction took its toll. The majority of key informant respondents noted that the lingering psychosocial trauma related to the flood can be best understood by looking at seminal psychologist, Abraham Maslow’s, hierarchy of needs, wherein once needs related to safety, shelter, and food are secured, psychological needs become more pressing\textsuperscript{366}. One key informant described it as:

“…you drop back very quickly to Maslow’s hierarchy of needs, so it’s: safe housing, food, and clothing… that really takes over. What’s always interesting [is] how in the first days to week or two you see very little, very little of an emotional demand for emotional care-giving. Because people really go into survival mode and the emotions really catch up to you when you start to slow down a little bit” [KI Interview 11].

For some, this slowing down, has only occurred years after the flood-event when a sense of physical safety and security in the community has been restored. Notably, however, rebuilding of the community has taken upwards of five years and throughout the rebuilding many of our participants noted that they experienced stressful triggers that will be explored below.

5.2.7.2.2 Psychosocial Toll of Rebuilding

The psychosocial toll of coming back into the community and rebuilding was expressed in a variety of ways by participants. For many flood-exposed residents of High River, there were sustained physiological triggers, like smell, sight, and sound. One semi-structured interview respondent commented:
“I will never, ever, till the day I die, forget the smell coming back into town or what a war zone it looked like. That is the closest thing to a war zone for me.” [Semi-structured Interview 2]

While another respondent commented on the sound of generators that were needed to restore power in the community. She stated: “People still have PTSD over generators, if they hear a generator starting then they are like ‘Oh my god’ — it takes them right back” [Semi-structured Interview 14].

Much of the self-reported trauma appeared to be related to the ongoing construction in the community during the infrastructure rebuilding phase, which lasted upwards of 4-5 years. Many highlighted fears of feeling unsafe and unprotected from another event. To provide protection in the interim of rebuilding, large sandbags lined the streets of High River. One semi-structured interview respondent noted: “still five years after, you see the sandbags on the street”, she went on to say: “they're falling apart, as you can see, and they've been replaced and a lot of them have been removed. But that's a constant reminder” [Semi-structured interview 3]. Another respondent exclaimed: “look at all this construction! I am so tired of it. They gotta move the sandbags. Get them the heck out of town! They cause stress” [Semi-structured interview 9]. Another key informant interview respondent aptly noted the toll the rebuilding had on the community:

“construction was extremely hard on people because even if you’ve got…ok my house is repaired, I’m back living in my house, but damn every time I go downtown it’s just chaos down there, it’s just full carnage, that was really, really hard…that was a full four years of getting through that” [KI Interview 2]
Rebuilding was also particularly challenging for youth in the community. Two key informants recalled a story of a young student returning to his rebuilt home where his family and friends were having a big celebration:

“They had a big celebration [for a family] who moved back into their home after the flood because everything had been rebuilt and repaired and everyone was excited and they kept saying, ‘aren’t you so excited to be in your new home!’, but it’s like ‘but it’s not my house and everything is different, my room is different, the wall colour is different, we don’t have plates, we don’t have forks, our kitchen decorations are gone’, right. So, the conversation shifts to something completely different” [Key Informant Interview 9 & 10].

The above appears to resonate with recent research on climate change and mental health that describes how some people who have experienced climatic changes that result in an altered physical environments often have feelings of an altered sense of place — to put it more colloquially: feeling homesick when a person is in their home environment. Environmental philosopher, Glen Albrecht coined the term ‘solastalgia’ to articulate this sense of grief, loss, and lament for environments that used to incite feelings of solace and that now incite distress and feelings of nostalgia for an environment that will be forever altered.

5.2.7.2.3 Re-Traumatization

In addition to the lingering trauma related to the flood, many business owners and residents appeared to face lingering psychosocial burdens related to issues of mold and insurance claims related to flood damaged properties. One respondent remarked:

“We had one community in particular where their houses had to be [torn] right down to the studs; the families rebuilt, once they moved back in, they realized that there was still mold and the houses had to come down. So, that’s re-traumatization after re-
traumatization. So, it’s not just the flood itself or even the extreme weather event, it’s the recovery that is harder than the event itself. And that’s what not everybody realizes, so a lot of people say ‘how can you guys still be talking about the floods’; like, well….do you have mold in your home? Or you know…or every time your kid coughs, are you concerned it’s your house making your, you know…making your child sick. So, it’s that. It’s the recovery that I would say has a far larger impact on mental health than the event”.

[KI Interview 1]

Speaking to the sentiment of re-traumatization, many expressed psychosocial strife related to the Government of Alberta Disaster Relief Program (DRP), described earlier. One key informant participant characterized the DRP as “the second disaster” [KI Interview 1]. Similarly, another key informant characterized the mental anguish related to the DRP as follows:

“It was more of a financial program, it certainly added to the mental problems in its first – well, pretty much from 2013 till I would say 2016/2017 it, it exacerbated…that’s not the right word – but you know what I mean – it made a lot of the mental problems a lot worse because of the frustration [people] were having in dealing with the bureaucrats and dealing with the 47 other forms that they had to fill out and getting treated like they were criminals trying to get away with something, rather than people who were just trying to get their lives back in order”…. “And then financially, a lot of the residents did not get anything close to what they needed to”…. “they were required to provide receipts and things like that to show their loss and even when people had receipts…and they filed reports, often those reports, and those receipts would get lost. And they’d have to do the entire thing over again after months [of] no action on their file, they would find out that their file had just been lost and so, but…even when their files were finally being
addressed a lot of them were getting way less than what they needed, which was forcing a lot of them to go into retirement funds, [the] bank of family – the family bank of whatever relatives might be in a position to help them, and that type of thing. So...people are still coming out underneath all of that” [KI Interview 3].

Notably, many respondents highlighted that the lingering socioeconomic stressors related to insurance claims and the DRP was toughest on marginalized community members, in particular, for seniors and people living in low-socioeconomic circumstances, a topic that will be discussed later.

5.2.7.2.4 Looming Climatic Hazards

For many, the long-term effects are exacerbated over concerns of impending climatic hazards in the community. The majority of participants noted the palpable stressors in the community around the flood anniversary (during the spring) and anytime the community experienced precipitation, either in the form of rain or excessive snow. Our desktop assessment showed there is an annual risk of flooding in High River during the spring and early months, from April to July; and these risks pertain to the amount of snowpack in the Rocky Mountains, heavy precipitation, the speed of snow melt, and ground saturation\(^{286}\). During key informant interview data collection in March 2018, interview respondents commented about heavier than normal snowfall in High River and concerns about the amount of snowpack in the Rockies. Residents describe feeling ‘on edge’ about the possibility of another flood. Research participants appeared to be well attuned to the amount of snowpack and chances of heavy precipitation following the 2013 flood. One key informant described:

“I mean our snowfall was almost 3 times what we would normally get in the month of February, so everyone is going: ‘wow, that’s a lot of snow!’, I wonder where it’s all
going to go and what’s the impact of that going to be on our safety as a town. And that’s not including the snowpack up the mountains and it’s not including potential rain events, so when we get warm weather, rain, and snow pack melt all at the same time that’s when we are in trouble. So, the thing is, that…the psychological response to this is alarm – just mention the word snowpack, mention the word climate change, mention the statistics around the amount of snowfall and I would say probably everybody in this town just kind of takes a deep breath, goes ‘oh boy!’ ‘what are we in for?’. I would say that alarm and anxiety are very much connected to the awareness of climate change and its impact more frequent and intense events. And that, I would say, that is community wide. Folks do tend to —and this is a generalization and more intuitive, also what I see is that people are just generally just that little bit more jittery, just that little bit more unsettled, they’ve been, they’ve been wounded by nature and they are, I think there’s always an eye to the sky…you know, I notice that in myself too” [KI Interview 5].

When asked about the issue of climate change and how it affects people, one semi-structured interview respondent stated: “I think you're either in denial to cope, or you're aware”, she went on to note: “I know myself, I've developed anxiety. I've never had anxiety. Never did. But now I have anxiety, and I think that's my body's way of coping” [Semi-structured Interview 17]. While other respondents preferred to remain skeptical about climate change concerns. For example, one respondent stated:

“I don’t think it’s people thinking it’s about climate change, in particular because with the High River floods, it wasn’t about climate change, it was just about the perfect storm of rain and runoff in June, which is when snow melts” [KI Interview 10].
Another respondent, taking a more denialist stance on the issue, suggested that the science on climate change is debatable and that people like, Al Gore (an environmentalist and former politician who currently leads a climate activist organization), have duped people into believing the science of climate change. He stated:

“so, I think you'll find the scientific types in this area don't believe in climate change. They think it's a racket. Mr. Al Gore and his team have pulled off an international wonder, a hoax” [Key Informant 13].

One respondent seemed skeptical of linking flooding in High River to climate change and also skepticism about human-cause (or anthropogenic) climate change. He stated:

“Yeah, I think, you know, when you talk to people in the neighborhood that lived through many floods, it's just another flood. You know? Like, it's been flooding for hundreds of years. And, personally, I think there's climate change, but we've had climate change forever. This year is not the same as last year or the same as next year. And I think… I don't believe it's human caused, per se.” [Key Informant 8].

Some respondents, however, highlighted that environmental degradation in combination with government decision and a changing climate heightened their concerns over looming hazardous events. One participant stated:

“A lot of people do blame the flood on climate change and the clear-cutting that happened in the mountains. You know, lots and lots of clear-cutting, and people that we know that are more ‘in the know’ in that area, they said the water just rushes down. And so, it's not just climate change to blame, it's human intervention and it's the stupidity. The government said right after this happened, "Okay, we're putting a moratorium on housing in Alberta [that] will be built on flood plains.” And have they lived by that? No! Drive by
the South Calgary Hospital, look down the hill, Riverstone, houses within yards. They even advertise it, ‘Houses within feet of the river’." [F2F Interview 15]

The above suggests that experiencing the 2013 flood appeared to exacerbate some participants’ concerns over impeding hazards in the community, with some participants linking these concerns to climate change and environmental degradation, and others skeptical of the notion of climate change affecting the town. Based on a review of the climate change and health equity literature, it is predicted that these hazards will likely affect some groups more than others. The section below provides an overview of the third key finding in this research regarding disproportionate risks and impacts related to the flood.

5.2.7.3 Disproportionate Risks and Impacts

It is well understood that climate change acts as a threat multiplier, disproportionately affecting people who are most marginalized in society based on culture, race, gender, age, ability, socioeconomic status, etc.<sup>1,13,61,66,368</sup>. Importantly, several sources of marginalized status can intersect, meaning that one person can belong to more than one marginalized group. Importantly, these intersections can often compound inequitable risks and impacts related to climate change<sup>197</sup>. In the sections below, we highlight marginalized populations that participants describe as most at risk to the psychosocial impacts of the 2013 flood. We then follow this with participants’ descriptions of populations that seek help to support psychosocial wellbeing.

5.2.7.3.1 Marginalized Populations

Noting the literature on inequitable risks and impacts related to climate change, we purposefully recruited people who self-identify as belonging to any of the following groups: female, senior, a non-white person, a person with a disability, a person who is low income for the semi-structured interviews. We also asked key informants what subgroups they thought were the
demographics in the community that were the most affected by the 2013 flood. The majority of key informants highlighted the disproportionate impact on seniors, youth, people living in low socioeconomic conditions, people with pre-existing health issues, and immigrants. Further, many respondents highlighted that the financial toll of the flood was compounded by the preceding 2008 recession and followed by the 2015 recessions, which hit the oil-producing province of Alberta particularly hard. For example, one key informant stated: “There’s not only [the] flood — going through that — but, you know, an economic recession is still [something we are] digging out of in Alberta” [KI Interview 12]. Another key informant highlighted how the compounding financial toll of the 2015 recession and flood was a likely factor for increased reports of domestic abuse, particularly in and around Calgary. He stated:

“I think that we saw what we expected to see and certainly we know and aware that there’s – in Calgary at least – which is a bigger community, it was pretty clear evidence of increasing family violence, a couple of years after the flood. And of course, that is complicated by [the] economic recession that came really in about 2015 or so [when] we started seeing significant downturn in oil prices and things like that. So that has complicated that picture” [KI Interview 11].

This same key informant also highlighted the compounding toll of the flood on those with pre-existing conditions and the stress to an already struggling mental health systems. He stated: “as usual the people who are most affected by PTSD are often people who have had it before. Had previous trauma that may have been, either they had managed to kind of wrestle that into a culpable level or compensating to some degree and they decompensated further”… “part of the challenge of course was that even before the flood, in general, demand for addiction and mental health services exceeded supply” [KI Interview 11].
Similarly, another key informant respondent noted the compounding effect of the flood on those with pre-existing stressors, she stated:

“it just puts additional stress on people who may already be in precarious situations, so there are families with children with disabilities, and that’s a family that’s already struggling and at their max and then you add something like a big weather events and that puts additional stress on a family and that’s the very thing that can create some breakdown in relationship”. [KI Interview 6].

This participant went on to say people in these situations “are coping at the edge of what they can handle normally.”[KI Interview 6]. These findings suggest that the psychosocial trauma of the flood adds to pre-existing life stressors.

5.2.7.3.2 Help-Seeking Behaviours

Interestingly, our findings also suggest that help-seeking behaviours amongst High River community members are more nuanced, and those who are not generally considered marginalized in society may have more difficulty seeking assistance for psychosocial outcomes related to the flood. For instance, while many key informants highlighted that those most affected by the psychosocial outcomes related to the flood were people living in low-socioeconomic conditions, some respondents suggested that it was not these groups who experienced difficulty seeking help. For example, one key informant elucidates that people in higher income brackets were impacted emotionally and because of the stigma of mental health and an over-reliance on self-efficacious behaviours, were less likely to seek help, he stated:

“You know, I would say though that a lot of the people who sought the help were maybe in the lower income, lower-to-middle”… “people in the higher income brackets, they — a lot of them actually had a really tough time admitting that they were having trouble, you
know, they would…let’s see, they would handle it in different ways, they would drink more and they would…there was a lot of marital strife…more than usual. And it just, because there is a stigma kind of involved of seeking help; you know…and a lot of the people who come from higher income, they — this is a very unscientific comment I am about to make, they’re high achievers, they are people who are successful in business for the most part or whatever their profession is and…for them to be going for help, it’s kind of like admitting that I can’t do this on my own…I’ve always been able to do things on my own and I’m not going to go for help, because there is a stigma involved, you know, people are going to think I’m a loser” [KI Interview 3]

Similarly, another respondent suggested that life experience played a role in help-seeking behaviours. She stated: “If experiencing financial issues, depression for your first time, that was – I think harder – on that demographic. They didn’t know where to go for help, they didn’t know that it was o.k. to ask; they hadn’t experienced that before” [KI Interview 1]. This same respondent went on to suggest that for many in higher socio-economic situations: “They are used to giving and not receiving” [KI Interview 1]. Further, as one key informant respondent noted, people who had otherwise been unaffected by socially determined inequities, had a better understanding of social inequities after experiencing the flood, she stated:

“So as of the end of June 2013, our entire community for at least a couple of days were homeless. And so, we had a community that understood what that meant in a different way”… “kind of an interesting by product of the disaster is you have people who now understand social issues differently because it impacted them. That of course fades over time, but it is really interesting how that happened” [KI Interview 1].
This data signals that some people in the community experienced situations that may have been previously unfamiliar to them because of their privilege; notably, however, this first-hand exposure may have been experienced for only a short period of time before people returned to their lives of privilege.

Another important consideration is that there are a number of immigrants living in High River because there is a large beef processing facility, located 5 minutes outside of High River, that employs approximately 450 temporary foreign workers from the Philippines and Mexico\(^{288}\). Noting this, one respondent described the particular risks and impacts to this population as:

“We have a very large immigrant population in High River as well, primarily Filipinos that do seasonal work and everything. Lots of them part of the temporary foreign worker program, etc., etc., doesn’t matter what program you are from you are involved in a flood and you lost a pile of stuff and kids clothes and everything else, all those things have to be replaced and you know those folks don’t have that kind of money to just go out and head for Calgary and buy new clothes” [KI Interview 2].

Interestingly, however, three respondents who self-describe as immigrants (two of which were associated with the temporary foreign worker program), focused less on their struggles related to the flood and more on their resiliency. Briefly, a common definition of resiliency refers to the capacity or ability to recover from adversity and maintain wellbeing\(^{21}\). Often, these participants suggested that their resiliency to the flood was mitigated by prior traumatic experiences in their home countries. One respondent stated: “As I told you, I’m kind of resilient. I’m kind of used to having these kinds of phenomenon in my life” [semi-structured interview 1]. While another noted: “People like me, that we are coming from a country that you have to fight for everything”… “And when you get it and lost it… it makes you stronger” [Semi-structured
She went on to say: “I'm gonna stand like a phoenix and I'm gonna fly more high now” [Semi-structured interview 6]. This sense of resiliency, one participant, noted may come easier for immigrants than Canadians because Canadians are less exposed to social, economic, or political hardships. She stated:

“I think, especially, Canadians that were protected — that never had to face anything like that, that never learned you know... the disaster was the biggest, most traumatizing thing that ever happened to them in their life... they suffered severely. Whereas people like, people coming from Africa, kids get raped – gang raped – and it doesn’t even make the front-page news. Houses get burned down, my personal house got burned down”... “my neighbours got killed – so all of that you, you know”... “So, it’s just what you are used to, I think people from countries [like] Afghanistan or from other countries that have more crime and there are just more resilient. So, it’s just a flood. This is not war. You know, people don’t get killed, it’s just a flood. You just lose all of your material belongings. That’s not so bad, you can buy them again, just work and buy them again. Whereas other people that never had anything, any loss or any loss any trauma, for them it is a huge shock and difficult to get over it. Right? Because they are not used to. If you cultivated since you were little in difficult situations it makes you resilient to that and you are always on guard. You are always, kind of expect[ing] the worst” [KI Interview 12].

Interestingly, these findings — as told to us by our participants appear — to suggest that social and economic privilege are not necessarily indicators of psychosocial resiliency, but rather lived experience enhances resiliency. It is important, however, to bear in mind that some of the data above comes from only three of our research participants, who self-identify as immigrants; and thus, sweeping statements about psychosocial resiliency amongst immigrants to High River
cannot be made. We felt it prudent to bring these findings forward because they provided a unique perspective on what resiliency means and to whom and we wanted to highlight these voices that are often most marginalized. Figure 2 below provides a summary of the findings based on our analysis of what we heard from our participants from this research.

5.2 Figure 2. Summary of Research Findings

<table>
<thead>
<tr>
<th>Range of psychosocial Outcomes</th>
<th>Enduring Psychosocial Effects</th>
<th>Disproportionate Risks and Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased emergency department visits for mental and behavioural disorders</td>
<td>• Ongoing grief and loss</td>
<td>• Disproportionate risks and impacts to:</td>
</tr>
<tr>
<td>• Self-reported:</td>
<td>• Trauma related to lost mementos</td>
<td>• Seniors</td>
</tr>
<tr>
<td>• PTSD</td>
<td>• Unexpected triggers</td>
<td>• Youth</td>
</tr>
<tr>
<td>• Anxiety</td>
<td>• Hierarchy of needs</td>
<td>• People living in low socioeconomic conditions</td>
</tr>
<tr>
<td>• Worry</td>
<td>• Trauma related to infrastructure rebuilding</td>
<td>• People with pre-existing health issues</td>
</tr>
<tr>
<td>• Fear</td>
<td>• Distress related to sights and sounds of rebuilding</td>
<td>• Immigrants</td>
</tr>
<tr>
<td>• General trauma</td>
<td>• Re-traumatization</td>
<td>• Help-Seeking behaviours impacted by:</td>
</tr>
<tr>
<td>• Distress</td>
<td>• related to mold</td>
<td>• Social, cultural, economic factors</td>
</tr>
<tr>
<td>• Compassion fatigue</td>
<td>• related to the lack of insurance coverage</td>
<td>• Life experiences</td>
</tr>
<tr>
<td>• Sense of community</td>
<td>• Looming threat of climatic hazards</td>
<td>• The stigma of mental illness and mental problems</td>
</tr>
<tr>
<td>• Altruism</td>
<td>• anxiety when it rains, during peak-flooding seasons</td>
<td>• Over reliance on self-efficacious behaviours</td>
</tr>
<tr>
<td>• Resiliency</td>
<td>• Distress related to environmental degradations</td>
<td></td>
</tr>
</tbody>
</table>
5.2.8 Discussion

Corroborating the current disaster mental health and climate change and mental health literature noted in the introduction and background section of this paper (see for example 34, 52, 115, 116, 117, 130, 184, 197, 356), our research suggests that High River residents appeared to be experiencing a range of psychosocial outcomes, including: self-reports of PTSD, anxiety, distress, worry, compassion fatigue, as well as a sense of community, compassion, and resiliency related to the 2013 flood. Further, corroborating the existing literature on climate change and health (see for example 44, 369, 370), we suggest in our study of High River that there appear to be disproportionate impacts to those most marginalized in the community, namely, youth, the elderly, immigrants, people with pre-existing health issues, and people living in low-socioeconomic situations.

Original findings from this research suggest that there are notable challenges in help seeking behaviours amongst groups not generally considered marginalized in society. These challenges were noted by respondents as likely due to the stigma of mental illness and mental problems and an over-reliance on self-efficacious behaviours. Further, based on our findings we suggested that there were lingering psychosocial outcomes related to one of Canada’s largest environmental disasters, and that these lingering outcomes, like grief and loss, trauma of rebuilding, and re-traumatization related to mold and insurance issues, can be exacerbated by looming concerns over future climatic hazards.

Reflecting on our data, it is important to highlight issues that we continue to grapple with, based on what we heard from our participants. Firstly, we grappled with how we make sense of our participants’ responses to the broader issue of climate change when they reflected on looming hazards in the community. Some of our participants felt that their experiences of the flood were connected to our changing climate, while others remained skeptical about the issue.
In looking more deeply at climate skepticism, we reflected upon Anthony Giddens’ postulation in the seminal text, the “Politics of Climate Change”, that (for some), climate change is rooted in time-space distancing\textsuperscript{125}; wherein climate change seems like an obscured issue that will happen in the future, somewhere else to someone else, thus skepticism can ensue. This idea has been corroborated by Clayton et al. (2014) in the climate change and mental health literature, who highlight that it is often challenging for people to see changes in climate because these changes seem distant or abstract and also because climate can get obscured or lost in perceptions about weather and season change\textsuperscript{51}. These authors further suggest that how, and if, people think about climate change is linked to worldviews and ideologies\textsuperscript{51}. Similarly, Gifford (2011) also reflects upon the barriers that constrain actions to mitigate and/or adapt to climate change in his work on the ‘dragons of inaction’, where he too postulates that inaction on climate change is related to ideologies and worldviews\textsuperscript{371}. Going further he suggests that there are other, more nuanced, cognitive and behavioural “dragons of inaction” including (but not limited to): “limited cognition”, “ignorance”, “uncertainty”, “environmental numbness”, “judgemental discounting”, “optimism bias”, and, “financial investments”\textsuperscript{371}. Thinking back to some of the comments made by participants who explored their skepticism about climate change, one participant in particular highlighted that he was not convinced that climate change was human-caused. Reflecting on this, perhaps this skepticism is rooted in not wanting to see the potential human influence on the 2013 flood, or on climate change more broadly, because in so doing this could require fundamental ideological, worldview, and/or behaviour change. Speaking to the latter point, Bertoldo, R. B., & Bousfield (2011) suggest that even for people who are aware of human contributions to climate change, a fundamental barrier in truly seeing and acting upon the anthropogenic climate change problem is that people are not prepared to change their behaviours and ways of life to mitigate
the problem. Another reason some of our participants may have expressed climate skepticism was that they may have been trying to protect their psychosocial wellbeing. In section 5.1 we discussed that many of our participants highlighted that they could not emotionally or physically go through another flood again because it was too traumatic, thus expressions of climate skepticism may have been rooted in protective behaviours. Reflecting on the phenomenon of climate skepticism, this prompts us to ask: to what extent do perceptions about climate change shape psychosocial reactions to climate-related extreme weather events?

Other issues we continued to grapple with in our data centered around the concepts of marginalization and resiliency. As noted earlier, a common definition of resiliency refers to the capacity or ability to recover from adversity and maintain wellbeing. We found it interesting that those who are perceived to be most marginalized in High River (based on factors like: age, socioeconomic status, pre-existing health condition, and immigrant status) and were deemed by some as the most impacted by the flood, were also considered by some health and social services workers — and in a few cases by marginalized community members themselves — as exhibiting resiliency to the flood. Based on input from our key informants and focus group participants, many of those in High River who were seen as less likely to exhibit resiliency, were those who do not identify as marginalized. We think these findings are interesting as they appear to suggest that there is much to learn from marginalized groups about resiliency. This is an important reflection when we consider that in much of the foundational climate change and mental health literature, the focus is on addressing marginalized groups’ vulnerabilities (see for example) rather than focusing on marginalized groups’ abilities to cope and thrive in the face of adversity and what these experiences can teach non-marginalized groups about resiliency. These reflections prompt us to ask: whose knowledges and experiences about responding to the mental
health effects of climate change tend to be overlooked? What can be learned about psychosocial resiliency from those who are most at risk to the impacts of climate change?

A further reflection is on the notion of resiliency itself; resiliency tends to be positioned as the capacity to cope and thrive in the face of adversity, which appears to be synonymous with the concept of adaptation that is generally described within the climate change literature as coping and thriving in the face of climate change threats and impacts\(^1\). What these two terms appear to signal is that the aim of responding to the effects of climate change is to ‘bounce-back’ without recognizing or addressing underlying health inequities that amplify the threats and impacts of climate change. As noted earlier, non-marginalized groups who experienced what it was like to be homeless and/or without for the first time in their lives, were often able to bounce back to their places of privilege, while this is not necessarily the case for those who are marginalized. Those who are marginalized will typically bounce back to the same marginalized status. What, then, does it mean to recognize and address these underlying health inequities and privileges that operate underneath the threat and impact of climate change?

The term ‘transformational resilience’, has recently been used to describe as a ‘bouncing forward’ (rather than ‘bouncing back’) from climate disruptions through a reckoning with sociopolitical conditions that shape social, environmental, and climate injustices towards environmental health equity\(^2\). A question that we continue to reflect upon based off of our findings in High River then is, how do we move from discussion and practices of adaptation and resilience towards transformational resilience to address the psychosocial consequences of climate change? We are left wondering, what would transformational resilience look like in the case of High River? Would it require fundamental reckonings with privilege that can shape
inequities, with ideologies and perceptions that can mask the climate change problem, and with behaviours that contribute to anthropogenic climate change?

While we do not have answers to the reflections above, the findings of this research suggest that there may be opportunities to enhance attention to climate change and mental health in health and social services policy and practice. For example, information from this study may help health and social service professionals better prepare for and respond to the range of outcomes related to subsequent climate hazards and to the long-term psychosocial impacts, thus supporting psychosocial adaptation in our changing climate. By presenting information on those most impacted by the flood, and information on help-seeking behaviours, this information may help to inform targeted health and social services response measures focused on enhancing or building resiliency. Problematizing the concepts of adaptation and resilience, more broadly, may support a radical shift in how we see health inequities related to climate change and shape how we understand and respond through a reckoning with sociopolitical conditions that shape social, environmental, and climate injustices.

It is also important to highlight the limitations of our study, and thus, caveat our findings. Firstly, while our findings may be transferable to other locations that have experienced similar exposures and have similar demographics and resources to High River, it is prudent to note that our empirical findings are context-bound to the community of High River. A further limitation is that participants for the semi-structured interviews may have been impacted by self-selection bias, wherein people who wanted to explore their experiences related to the flood came forward and others who were uncomfortable and/or unaffected psychosocially by the flood did not participate, thus we recognize that we do not have a complete understanding of exposures and responses to the flood. A further limitation of this study is that there is a potential for participants
to not remember or mis-remember their experiences from five years ago. Despite these limitations, many of the findings from this study are aligned with quantitative and qualitative findings from the disaster mental health literature (see for example 30, 111, 167, 357, 373), and the burgeoning study of climate change and mental health (see for example 34, 130, 332) as noted above.

5.2.9 Conclusion

This research suggests that there was a range of psychosocial outcomes related to the 2013 flood and that many of these outcomes can have long-term effects on community members. Further, our findings suggest there were disproportionate impacts of the flood on those most marginalized, and yet, marginalized groups tended to exhibit more resiliency because of their lived experiences. These findings contribute to the broader study of climate change and mental health by providing insights on psychosocial sequela related to climate hazards, including the lingering and looming trauma related to climate hazards, populations most at risk to climate hazards, and populations in most need of recovery interventions. Findings from this study may support health and social service professionals prepare and plan for climate change impacts on psychosocial health. Further, our discussion of perceptions of climate change and concepts of adaptation and resilience may also support a critical reflection of how we respond to our changing climate.
5.3 Psychosocial Adaptation to Climate Change in High River, Alberta: Implications for Policy and Practice

N.B. This paper has not yet been submitted to an academic journal at the time of submission; however, this paper will be submitted to the Community Mental Health Journal by summer 2019. Contributing authors include: Dr. Blake Poland, Dr. Donald Cole, and Dr. Branka Agic

5.3.1 Abstract

Researchers studying the emerging area of mental health and climate change highlight the effects of acute and chronic climatic changes on psychosocial wellbeing. An area that remains understudied, however, is an exploration of psychosocial adaptation interventions. Namely, how are the psychosocial consequences of climate change being addressed via response interventions (e.g. programs, policies, and practices) that enhance, protect, and promote psychosocial health? Through a case study in High River, Alberta, this empirical study explores health and social service responses to the long-term psychosocial impacts of the 2013 Southern Alberta flood in an effort to suggest guidance on psychosocial adaptation opportunities to climate change in Canada. Qualitative research methods include: (i) key informant interviews (n = 14) with health and social services leaders, (ii) focus group sessions (n = 4) with front-line health and social services workers (n = 14); and, (iii) semi-structured interviews with a sample of community-members (n = 18) who experienced the flood. Findings of this study suggest: (1) there is a key difference between response interventions and recovery interventions, in particular the long-term psychosocial impacts of extreme weather and climate change require sustained recovery interventions rooted in local knowledge and interdisciplinary action; (2) there are unintended consequences related to psychosocial interventions that can incite complex emotions and impact psychosocial recovery; and, (3) perceptions of mental health care, by people exposed to climate-
related trauma, can guide climate change and mental health response and recovery interventions. This empirical investigation is intended to be an initial look at psychosocial adaptation in High River, Alberta and the findings presented herein are intended to provide initial understandings of psychosocial adaptation that may support policy and practice amongst social and health care professionals in Canada.

5.3.2 Introduction

The risks and impacts of mental health from acute and chronic climate hazards is increasingly well documented (see for example7, 33, 34, 37, 43, 48, 374). Acute climate hazards are temporary events like floods, heat waves, wildfires, and hurricanes that have become more frequent and complex within a changing climate and are projected to intensify as global average temperatures rise1, 36, 59. Chronic hazards, which include things like prolonged drought, sea-level rise, and melting permafrost, threaten food security and often result in mass displacement1, 36, 41. Acute and chronic climate hazards have been linked to a host of negative mental health outcomes, including: post-traumatic stress disorder (PTSD), depression, anxiety, helplessness, fear, worry, violence (including reports of suicide), aggression, substance misuse, vicarious trauma, and intensified symptoms of pre-existing mental health conditions7, 34, 36,40, 43, 44, 375, 376. Notably too, there are affirmative mental health outcomes related to a changing climate, like a sense of community, altruism, compassion, and a sense of meaning that sometimes flow from experiencing an acute weather event53, 184, 197. We wish to emphasize, therefore, that the term mental health encapsulates states of mental wellbeing as well, and not just levels of distress377.

Psychosocial health encompasses the psychological and social aspects of wellbeing 13. For example, a sense of safety, security, shelter and food security all affect psychosocial health. Psychosocial adaptation to climate change refers to coping behaviour or intervention that
supports people, communities, and institutions as they adapt to the mental health consequences of climate change\textsuperscript{15}. While the study of mental health and climate change is growing, there remains a notable research gap around how the mental health consequences of climate change are being addressed via such response interventions (e.g. programs, policies, and practices) which seek to enhance, protect, and promote psychosocial health and support psychosocial adaptation.

The case study research presented here seeks to address this research gap with an initial exploration of health and social service responses to the long-term mental health impacts of the 2013 Southern Alberta flood in High River, Alberta. Although climate change was only one contributor to the Southern Alberta flood, we know that the likelihood, frequency, and intensity of flooding is on the rise around the globe due to climate change\textsuperscript{1}. High River was chosen for this case study because it was the hardest hit community in Canada’s second costliest disaster in history. The Southern Alberta flood cost the Canadian government approximately 2.7 billion dollars, second only to the Fort McMurray wildfires in 2016 that cost the Canadian government approximately $4 billion\textsuperscript{195}. Over-land flood damage is typically not covered by most private insurance companies, therefore, there are added economic burdens faced by flood survivors, which can lead to financial and emotional distress\textsuperscript{361,362}. On June 19\textsuperscript{th}, 2013 the entire town of High River, which consisted of approximately 13,000 people, was ordered to evacuate because of the severity and duration of the flood waters\textsuperscript{285,286}. As a result of the flood, there were 4 reported deaths, five years of intensive infrastructure rebuilding, and reports of lingering mental health trauma\textsuperscript{110,195,313}. Section 4.3 of this dissertation provides a more robust overview of why High River was chosen as the site of this case study research.
In this study, we sought to understand the health and social service response to the long-term consequences of the 2013 flood in High River, Alberta; and how an understanding of this response could provide initial suggestions to health and social service providers (in other contexts) on psychosocial adaptation opportunities to climate change-related disasters in Canada.

5.3.3 Methods

We used qualitative methods to conduct this research, including: (i) key informant telephone interviews (n = 14) with health and social services leaders; (i) focus group sessions (n = 4) with front-line health and social services workers (n = 14); and, (iii) semi-structured interviews with a sample of community-members (n = 18). An in-depth overview of research methods can be found in section 4.5 of this dissertation.

5.3.3.1 Key Informant Interviews

Health and social services leaders who supported the psychosocial wellbeing of High River community members before, and/or during, and/or after the 2013 flood (up until July 2018 when the research was conducted), comprised our key informant sample. Participants included members from core community services (i.e. health and social services focused on community care that existed in High River before, during, and after the flood), and response agencies (from outside of High River that provided health and social services support for a short period of time during and after the flood). These key informants included: public health professionals, government officials, emergency management professionals, public safety professionals, and faith-based representatives who were in leadership roles. The majority (n = 12) were purposefully sampled based on preliminary Internet research; contact information was sourced.

Response refers to the response interventions undertaken by public sector institutions and community-based organizations to support psychosocial health related to the 2013 flood.
through publicly available information. Snowball sampling was used to recruit the remaining two key informants. All key informants were interviewed over the phone or via Voice Over Internet Protocol (VOIP) software, audio-recorded and transcribed. Interviews lasted approximately 60 minutes and took place between January 2018 and July 2018.

Participants were asked about: their professional roles, the background of the organization they worked for; the psychosocial impact of the 2013 flood on High River residents; the psychosocial needs of those most in need of support following the flood; the types of psychosocial supports available to High River residents before, during, and after the flood; perceived barriers for people accessing psychosocial supports; their perceptions of climate change impacts to mental health; and, (if any) their organization’s approach to addressing mental health consequences of climate change.

5.3.3.2 Focus Groups

Four focus groups took place in the town of High River between June and July of 2018. Participants included those who self-identified as supporting the wellbeing of High River community members before, and/or during, and/or after the 2013 flood. Focus groups differed from key informant interviews as key informants belonged to leadership roles, whereas focus group participants were front-line workers providing psychosocial support. Details on the types of participants (e.g. what type of sector/organization they worked on the frontlines for) can be found in section 5.5.5 of this dissertation.

Similar to the key informant participants, focus group participants included both core, community service representatives and response services representatives. Focus group participants were recruited via posters that were posted at relevant social and health services workplaces and community gathering spaces throughout High River. Focus group participants
were also sought-out via email from publicly available information through an Internet search of front-line social services and health workers. Focus groups lasted approximately 3.5 hours and were audio recorded. Participants were asked to identify community psychosocial assets (i.e. any person, entity, organization, or practitioner that provided social or psychological care) before, during, and after the flood (up until July 2018). Similar to the key informant interviews, participants were also asked to identify any resources that address the broader problem of climate change and to identify how these resources address the issue of climate change and mental health. The objective of these focus group sessions was to harness the knowledge of front-line support workers to better understand and map psychosocial community assets in High River.

5.3.3.3 Semi-Structured Interviews

Semi-structured interviews (n = 18) took place between June and July of 2018 with High River community members who self-identified as marginalized, that is to say anyone who self-identified as one or more of the following: low socio-economic status, female, youth, elderly, pre-existing health concerns, non-white. Understanding the perspectives of marginalized group members was key because we know that they tend to be at greater risk of experiencing negative psychosocial outcomes\(^{43,130}\). Participants were recruited via posters that were placed in public spaces throughout the community of High River and in Okotoks, Alberta (a neighbouring community where many former High River residents resettled after the flood), and via snowball sampling methods. Recruitment criteria consisted of self-identifying as marginalized based on the criteria above and having lived through the 2013 flood. These interviews were semi-structured and, thus, research questions were more conversational in nature. The types of topics discussed pertained to: experiences living in High River; how the environment in High River has changed; and, the type and availability of resources (people, places, policies) available to support
the wellbeing and mental health of High River residents before, during, and after the flood (up until July 2018). Participants were also asked to comment about their perceptions of these resources (e.g. the availability and/or effectiveness of these resources), their perceptions of climate change impacting mental health, and perceptions of how resources to support mental health and wellbeing could be improved. Interviews were approximately 60 minutes in duration and were audio-recorded and transcribed.

All participants in this research were notified verbally and in writing that participation in this study was voluntary and that anonymity would be maintained at all times. This research was approved by the University of Toronto Ethics Board, the University of Alberta Ethics Board, and Alberta Health Services ethics.

5.3.4 Analysis

We took a descriptive qualitative approach to our thematic analysis, whereby we aimed to describe participants perceptions and experiences using participants own words.209 We developed analytic codes that reflected the perceptions and experiences of participants. In-depth details of our analysis can be found in sections 4.5 and 4.6 of this dissertation.

Each data set (key informant interviews, semi-structured interviews, and focus group sessions) was coded using codebooks that were developed by the research team based on emergent themes. Emergent themes were identified by asking: what terms are participants using to describe their experiences? What is this an example of? What themes are consistent amongst each data set? What themes are consistent between each data set? If there were any discrepancies about emergent themes amongst researchers, researchers would discuss these discrepancies, review the data, and re-establish congruent themes. All data sets were analyzed individually first and then all of the data was analyzed together to respond to the research questions: What has
been the health and social service response to the long-term consequences of the 2013 flood in High River, Alberta? And, how can an understanding of this response support community-level psychosocial health? Below, we explore the three key themes that emerged from this analysis.

5.3.5 Results

Three key themes emerged from our data that respond to our initial research question. Firstly, our data suggested that there is a key difference between response interventions and recovery interventions, in particular the data suggested that the long-term psychosocial impacts of extreme weather and climate change require sustained recovery interventions. Secondly, our data suggested that there are unintended consequences related to psychosocial interventions that can incite complex emotions and impact psychosocial recovery. Finally, our data suggested that perceptions of mental health care, by people exposed to climate-related trauma, can guide climate change and mental health response and recovery interventions. Importantly, we provide direct quotes from our participants, these direct quotes are not intended to highlight one-off experiences but, rather, these direct quotes are intended to exemplify and represent the key themes we were seeing in our data based off of number of reflections by our participants. It is also important to bear in mind that the analysis of the data that we provide is our interpretation of our participants’ realities, and our interpretations come laden with our respective social standings and theoretical positionings as critical social sciences researchers in the field of public health. We delve into each of these findings in-depth and offer a table of lessons-learned.

5.3.5.1 Navigating Response and Recovery

The majority of our participants drew interesting distinctions between response interventions and recovery interventions. Consistently, key informant interview participants and focus group participants would make this differentiation by talking about response interventions
as temporary interventions by organizations and groups that were parachuted into the community after the flood for a limited period of time (anywhere from weeks, months, to 1-3 years) to respond to the disaster and provide “emergency” services to support psychosocial wellbeing. Recovery interventions, in contrast, were described as core, community interventions by organizations and groups that were in the community before the flood and were often enhanced after the flood to support long-term psychosocial adaptation. Importantly, key informants and focus group participants in this study included social and health care workers from both response and recovery interventions as outlined above.

In Table 3 below, we provide an overview of psychosocial resources deemed to be available in the community, as identified by focus group participants and key informants, that supported or enhanced psychosocial adaptation before, during, and after the flood, up until present day July 2018 when this research was conducted. We refer to this as asset mapping, as key informants and focus groups participants highlighted specific assets in the community that supported wellness. Notably, these assets not only included specific institutions and organizations, but also less-tangible assets, like a sense of community. A sense of community can be described as social cohesion, trust, and reciprocity that people experience in group settings.

In the table below, we highlight the intervention type, the availability of the intervention, and the differentiation participants made between response and recovery interventions. Intervention types are listed in the order of availability, for example, a sense of community was highlighted by focus group and key informant participants as being a sustained intervention available and accessible to community members of High River before, during, and after the
flood, therefore it is listed first. Interventions referred to as “core community services” have been highlighted with an Asterix in this table.

5.3 Table 3. Psychosocial Asset Mapping

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Availability</th>
<th>Recovery or Response Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sense of Community</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Faith-Based Care</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3. First Responder Care</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Local (Recovery)</td>
<td>Local, Provincial, National, International (Response)</td>
</tr>
<tr>
<td>4. Provincial Government Mental Health Care*</td>
<td>✓</td>
<td>Temporarily unavailable due to the flood</td>
</tr>
<tr>
<td>5. Provincial Government health care *</td>
<td>✓</td>
<td>Temporarily unavailable due to the flood</td>
</tr>
<tr>
<td>e.g. in-patient and out-patient care provided by a physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Municipal Government mental health and social services care*</td>
<td>✓</td>
<td>Temporarily unavailable due to the flood</td>
</tr>
<tr>
<td>Including: family services, literacy programs, programs for people with disabilities, fetal alcohol support, career center, women’s shelter, immigrant services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Private mental health care *</td>
<td>✓</td>
<td>Temporarily unavailable</td>
</tr>
</tbody>
</table>
### Intervention Type

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Availability</th>
<th>Recovery or Response Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e.g. psychoanalysts, psychologists, etc.)</td>
<td>Due to the flood</td>
<td></td>
</tr>
<tr>
<td>8. Food bank*</td>
<td>Temporarily unavailable due to the flood</td>
<td>Recovery</td>
</tr>
<tr>
<td>9. Free or subsidized mental health care</td>
<td>Free mental health care contracted by the Provincial Government (Response)</td>
<td>Subsidized mental health care led by the community with the support of the local government (Recovery)</td>
</tr>
<tr>
<td>10. Disaster Response Organizations</td>
<td></td>
<td>Response</td>
</tr>
<tr>
<td>11. Temporary Shelter (during and after flood)</td>
<td></td>
<td>Response</td>
</tr>
</tbody>
</table>

* *Referred to by participants as core services.*

Now that we have provided an overview of the psychosocial assets in High River that community members have highlighted for us, we turn next to participant perspectives on response and recovery interventions.

#### 5.3.5.2 Addressing Psychosocial Needs

Respondents often noted that response interventions left unmet needs in the community because of the psychosocial sequelae related to a flood. For example, one key informant stated: “I think sometimes things parachute in and parachute out and they haven’t even touched the first few surfaces of what’s going on for folks, because I think a flood, there is so many stages with the flood”[Key Informant 13]. Many participants noted the long-term trauma associated with
flooding, including: the psychosocial toll of displacement and rebuilding, grief and loss associated with the loss of possessions or pets, fears over mold exposure, and fears of another flood occurring. These psychosocial outcomes tended to linger well after response interventions had left the community, and were reported in this research, 5 years after the 2013 flood.

A key challenge for many respondents was that psychosocial resources left before mental health needs related to the flood were fully met. For example, one interview participant commented: “And they [response aid agencies] come in, and for two years, they save the world, and then they walk away, but we all know that two years after a natural disaster, two to five years is when it's the worst because after two years, everybody walks away.” [Semi-structured interview 2]. Emphasising this, one key informant respondent exclaimed:

“Why are we funding for three years for mental health after a major disaster? Why does it end? They have the studies, they know that the time of the disaster and the aftermath of the cleaning-up, you are not back in your home, they are saying that there are youth — that when it rains— children are still climbing into bed with their mom and dad, so why, why does all of that [funding] go away?” She went on to say: “I had a hard time when external resources came in because I wanted to see long-term, sustainable solutions to mental health and not short-term ones.” [Key Informant 14].

While response interventions may not have had the staying-power that many community-members wanted — likely due to financial constraints and program and policy decisions — participants did note that response intervention groups and organizations were effective in mobilizing quickly and providing services when core services were displaced and/or inaccessible because of the flood. In particular, interview respondents highlighted their appreciation for food, shelter, and cleaning supply donations made by response intervention organizations. One
respondent, who had recently immigrated from the Philippines, described the response by outside aid agencies as follows: “they provided everything. They set up a tent. And you can just go there and grab what you need. Cleaning supplies, clothes” [Semi-structured interview 1]. This respondent was particularly impressed because she had experienced flooding a number of times in the Philippines and commented that in the Philippines: “we don’t get that support. Financially, [and] especially the food. We just get noodles. It has happened to us, like every three years, or five years of my life, since I was a child, we are flooded” [Semi-structured interview 1].

Further, respondents highlighted that many of the response interventions had expertise, training, and/or capacity to support psychosocial adaptation. For example, one key informant applauded efforts from a volunteer group from British Columbia (BC) for their quick mobilization efforts and expertise:

“BC has an amazing model of psychosocial support and its volunteer-based, and this is what I am hoping Alberta will do, they kind of have a directory of people who have been trained in psychological first aid and, I believe, most of them have also been trained in skills for psychological recovery”, she goes on to note: “..they have this beautiful database of these folks that have the same training and they are all counsellors, psychologist, social workers… so when a disaster happens, they can kind of contact their directory and then these people can respond for like a week at a time” [Key Informant Interview 13].

In the case of High River, this group of trained professionals was deployed to the community for six-weeks after the flood.

Some participants highlighted that response interventions from outside of the community were often more accessible than core services because some community members may be less-
likely to seek support for mental health from people in the community to whom they are acquainted with, or if there were existing barriers to entry within core services. Speaking of barriers to entry, one key informant from a psychosocial service agency highlighted the challenges experienced by people seeking mental health care from one of the core mental health service providers in the community, she stated: “their in-take procedure is very – it’s like a phone call, it’s quite lengthy, it’s not very personalized, and their in-take department then sets you up with a counsellor”; she went on to note:

“I’ve worked with many people we had to call and do the in-take with them because this is a painful, painful process and so we’d phone— and it’s quite cold — and so we tried to bridge that gap with them with them and we met with the manager to say, ‘could we get to know some of your therapists so that we can refer people?’”… and they were like, ‘nope’, you know, go through in-take and in-take matches them up” [Key Informant 13]. The above demonstrates that some response personnel were able to see some of the pre-existing challenges with core community services.

While it was highlighted in our research that response interventions played a key role in supporting capacity, resources, and addressing pre-existing service challenges; our respondents also highlighted key challenges related to response interventions that will be discussed below.

5.3.5.3 When Helping is Hurting

Most key informants and focus group respondents from core community organizations, highlighted that response resources—while necessary in the immediate aftermath of an extreme weather event—could often be harmful to longer-term psychosocial recovery. They noted that some psychosocial response intervention groups, particularly disaster management groups, had little or no training in mental health first aid or psychological first aid and recovery.
Other participants noted that in the aftermath of a disaster, training in mental health first aid and recovery ought to extend beyond social and health services and include anyone who is interacting with disaster survivors. Speaking to this, one participant noted how the housekeeping and kitchen staff, at the large temporary shelter for displaced flood victims, needed to be trained because:

“the poor housekeepers were getting folks who were telling them they don’t want to live anymore. And the housekeeper is like: ‘what? We don’t know?’, so we built a relationship with them [the housekeepers], to have them refer them to us, but also taught them about grief and loss about the impact of trauma, about how to have – how to be compassionate but how to have boundaries and so we did, like, little three hours in-services for all of the staff” [Key Informant Interview 13].

Most key informants and focus group participants also noted that core mental health services that provided recovery support were, and continue to be, grossly underfunded. One respondent simply stated: “there needs to be more dollars available for psychosocial support in a general sense” regardless of a disaster or not [Key Informant 5]. In general, the majority of semi-structured interview corroborated this sentiment. One interview respondent noted: “Mental health care in all of Alberta is so broken it's not even funny. So broken! They might put the work in initially at first. There is no follow up. There's no follow up to make sure that they're doing okay, you know.” [Semi-structured interview 16]. Noting the challenge of continuous care, one key informant from a core service group highlighted that her organization set up a subsidized mental health care service after the funded mental health care resources left. She noted that her organization had to rely upon a portion of the subsidized funding coming from a private, anonymous donor. She commended that this funding will not be around forever and that there is
a need to find sustained funding sources to help people in the community in their flood recovery, and also to address pre-existing mental health needs [Key informant 1].

Another respondent noted her challenges with finding consistent, quality care that worked for her to address her mental health needs well-before the flood. Referring to care she received from public mental health care, she stated: “It seems that whenever they get a really good person, they transfer them to a bigger place. And I had one lady who was just awesome. But this is years ago. The price of gas went up, and she couldn't afford to drive down here so she took a position in Calgary and I can't drive to Calgary.” [F2F Interview 10]. This quote suggests that there are compounding economic stressors, for both practitioners and patients, that can prevent patients from getting the mental health care they desire.

The majority of semi-structured interview participants focused on the lack of psychosocial support before the flood and the barriers they faced, and continue to face, regarding effectiveness and access. These sentiments seemingly speak to a need for sustained mental health care funding and service provision, rooted in local knowledge and interdisciplinary action, to enhance overall mental health care in the community and to support both response and recovery related to disasters.

5.3.5.4 Unintended Consequences

There are additional unintended consequences related to psychosocial response interventions that can incite complicated emotions and affect psychosocial recovery. Participants from core community organizations in the focus groups and key informant interviews, as well as marginalized community members, shared conflicted feelings related to receiving aid from temporary response organizations. They expressed gratitude for aid, and simultaneously also expressed concerns about the manner in which aid was given. For example, one key informant
emphasized she did not want to seem ungrateful for response service support, she stated: “it’s a challenge to talk about because you never want to seem ungrateful and we are certainly not ungrateful. We had amazing supports and resources here; but we also have to be able to say it still could have been a bit better” [Key Informant 1]. Focus group respondents felt that the intentions of people from response agencies were pure and their aid was valuable, however, there were unintended challenges that emerged from this aid. One participant elucidated this by stating: “there were lots of temporary, short-term supports put in place, and while those are great, it can set the community up for expectations that can’t be met in the future and so that makes it hard” [Key Informant 1]. Another key informant highlighted the challenges faced by clients of psychosocial services when response services left the community: “patients felt like – ok, now who am I going to talk to? Now, I have to start all over, I have to go through all the trauma again with somebody local, you know?” [Key Informant 12]. Respondents emphasised that these challenges stemmed from a lack of continuity built into response aid agencies’ protocols before leaving the community and this may have hindered long-term psychosocial recovery in the community.

Other issues that emerged pertained to opportunities and resources being diverted away from the community to outside agencies. One key informant, from a local psychosocial aid organization, highlighted the complicated emotions of feeling like you were losing work to outside agencies, stating: “for a lot of the service providers it was actually an additional stress. So, as difficult as it was to have your home and business impacted by the flood, now you felt like you were protecting your job because there were other people coming in to do your work” [Key Informant 1]. Corroborating this, another participant noted: “We have all these resources that are
non-for profits that are struggling for funding, so I would have liked to have seen those places complimented with funding…instead of competition coming in” [Key Informant 15].

Some of the complicated emotions included concern over the lack of attention from outside response organizations towards community-level resources. For example, one key informant stated:

“People weren’t always super happy to have the white knight coming in to save the day, they were kind of like ‘we are the ones who are here, we are the ones who know what’s going on’, so there had to be…it had to be handled very respectfully and very….you know, just honoring that point of view” [Key Informant 4].

Corroborating this, focus group participants noted that most of the response services that came into High River from Calgary, Edmonton, or outside of the province to provide psychosocial support would ‘tell you what you need, not ask you what you need’. From this perspective, there appeared to be a lack of regard for local knowledge and leadership from outside response organizations and groups.

A particularly resonant challenge noted by many respondents arose over the overwhelming flow of donations that went towards international or national response agencies instead of towards core community services. One key informant noted: “millions and millions and millions of dollars went to agencies outside of High River…went it into training for people who were only here for a short time; not into our local staff” [Key informant 1]. Focus group participants also emphasised the above, noting that donations given to international or national aid organizations—intended for recovery efforts in the town of High River — rarely went directly to the community.
The majority of key informants and focus group respondents, particularly those in core community service roles, emphasised their gratitude for outside agencies supporting their community when their own agencies were inaccessible or unavailable during and after the flood; however, there was concurrent concern over the lack of capacity building efforts made by these outside response intervention organizations. One respondent, from a core community psychosocial aid organization, reflected on the challenges of working with outside organizations, she stated: “it was one thing not to be in the driver seat of our recovery, but we had to hold on to the bumper for months if not years.” [Key informant 1]. She went on to highlight the importance of letting “the local community be leaders”. She stated: “There are going to be times that they [the local community] can’t lead because maybe they don’t have the expertise or maybe they are impacted themselves”, however, she noted that this can be navigated more effectively by response intervention organizations by “building local capacity whenever possible” [Key informant 1].

A respondent from an outside response organization echoed this and highlighted the importance of coordinating efforts alongside existing community-based efforts. After her agency was awarded a government contract to support psychosocial response after the flood, she soon realized that the contract was awarded without consultation with community-based not-for-profits. She elaborated:

“When we were asked and given the contract, we had assumed that the government had spoken with the not-for-profits in High River and that we were coming in as a big help. What we realized, is that the not-for-profits were not consulted at all”… “we thought that everyone was on the same page, not that the government had gone and done this without collaborating with the people who are on the ground in High River before and after. So, I
would say 90% of the people quickly realized what we were doing and were still appreciate
tive because they were like, ‘there is no way, we do not have the people power to
do this’” [Interview 13].

Respondents often reflected that a priori disaster preparation and management was a key element missing in the Government response to the flood. Focus group respondents suggested that the government was not set up, nor prepared, to deal with an environmental disaster of this scale. Corroborating this, for example, one key informant noted:

“initially because this community was, I mean, I’m using the percentage of about 85% of the infrastructure and population of this community was hit, like devastated, wiped-out on a number of fronts, so what I saw was a number of organizations responding without a clear plan, there was no coordination”[Key Informant 5].

This same participant went on to recount how he was shocked that a provincial government mental health leader phoned him, a faith-based worker, to ask for his advice on how to respond and support community mental health after the flood. Overwhelmingly, respondents noted that foresight, consultations with the local community, and community capacity building were key elements missing from the flood response.

5.3.5.5 Perceptions of Psychosocial Interventions

It was important for us to explore perceptions of mental health care in the community (before, during, and after the flood) from people exposed to the flood. In particular, it was important to gain insight from marginalized community members, who tend to be most at risk and impacted by climate-related trauma. What we found, through semi-structured interviews with a sample of marginalized community members, was that concerns centered around issues related to communication in the immediate aftermath of the flood, and access to, and awareness
of psychosocial resources. Participants also provided evaluations of specific intervention that they perceived to help or hinder psychosocial wellbeing. These core themes are explored in detail below.

5.3.5.5.1 Communication

During the interviews, many participants highlighted the lack of communication the day of the flood. In particular this was due to a lack of an early warning system to warn people of the severity of the flood waters. One semi-structured interview respondent noted that there used to be an early warning system, and there now is, but during the time of the flood the system was unavailable, and volunteers went door-to-door to tell people to evacuate. However, he noted, “they definitely didn't have enough volunteers” to get people to evacuate in time [Semi-structured interview 5]. He recounted how he was the first to warn his grandparents and their neighbours about the need to evacuate.

Others were concerned over the lack of communication in any other language than English. High River has a large Filipino and Mexican population, as many people from these countries are part of the temporary foreign workers program at a large meat-packing facility near the community. One interview respondent, who volunteered in the aftermath of the flood, relayed her experience listening to the mayor of the town speak at one of the temporary shelters soon after the flood. When the mayor asked this participant how his speech went, she said: ‘Well, if you look around’, I said, ‘English is a second language in this room’. I said, ‘You guys were talking really fast, so, I come and listen as a volunteer and I go back, and I explain as much as I can to them.” [Semi-structured interview 9]. The majority of focus group participants also noted this oversight and highlighted that interpreters had to be brought in to response centers ‘on the fly’ to support the immigrant population as they received aid from response agencies.
Other respondents noted the frustration and anxiety over the unavailability of cell towers during the flooding, which made it difficult to locate loved ones during the evacuation. One semi-structured interview participant noted that it took her brother more than two days to locate her and her two children, she stated: “It was a good two days, it was quite a while where there was no communication, other than what we were seeing on the TV”, she went on to note that the only way her brother found them was by driving around to all of the muster stations located throughout Southern Alberta [Semi-structured interview 17]. Another semi-structured interview respondent noted the challenges for parents, particularly for newcomers who struggle with English. She stated:

“A little boy and his family had got separated. The little boy ended up in Nanton [a neighboring community 21KM south of High River], and he was like 12, and they couldn't find his parents. They had no idea where his parents were. So, they searched for 24 hours, looking for...and of course, they weren't Caucasian. They were Filipino. So, they didn't speak the language real well, and it ended up that they ended up in Blackie [another neighboring community 19KM east of High River]. He ended up —because he was at school, he ended up in Nanton. They ended up in Blackie. I remember the parents coming to get this little boy, and she [the mother] lost it, totally lost it.” [Semi-structured interview 2].

Others relied on social media to locate loved ones. For example, one respondent reflected: “Social media was imperative when the flood hit because nobody had cell phone coverage. Nobody had telephone, and that's how we got hold of people, was we put it on Facebook, ‘We're looking for such-and-such person’” [Semi-structured interview 2]. Many
respondents also noted their frustration over the lack of media coverage on High River, reportedly the hardest hit community by the flood. One respondent noted:

“I remember that while we were watching the news and stuff like that, it was kind of an interesting detachment of everything that's being covered with”…. “And so even though the majority of damage was happening at High River, they were focusing a lot on the small areas of Calgary that were hit”…. “And it's like, ‘here's 5 seconds of coverage for High River, and 20 minutes for Calgary’” [Semi-structured interview 5].

Echoing this, another respondent commented: “we weren't getting those details through the news. We'd get, like, a five second blip. High River flooded, moving on...” [semi-structured interview 4]. The lack of media coverage on the community of High River was a consistent frustration from many respondents who were seeking information about the status of their homes and of the town.

5.3.5.5.2 Access and Awareness

As noted earlier, another key issue amongst semi-structured interview participants centered around issues of access to, and awareness of, psychosocial resources. When asked about the availability of mental health care resources, most participants struggled to identify resources. One participant, a youth in the community, noted her lack of awareness of resources in the community, stating: “I'm sure you can go to the hospital, and I guess that there would be someone that can help you there. Private practices, I don't actually know about what we have” [Semi-structured interview 18]. Another participant who was asked the same question, responded:

“If they had any programs, it was just not advertised that well. So, it was like, from what I knew, that no one really knew of anything that was kind of there to help. They could see
what the community was doing to try and rebuild. And so, it's basically a lot more of the physical repair than the emotional repair that was going on. And I think that was more the priority for the town than anything. So even if they did have a couple of programs, they just weren't really focusing on them” [Semi-structured interview 5].

Another respondent commented that while there are a few remaining core psychosocial resources, many of the services to support psychosocial health have started to disappear in recent years. She noted:

“I know that mental health has still got programs going here in High River, and that's free of charge to my understanding, for anybody that needs it. And of course, Salvation Army is always there for the food bank, which is wonderful. I don't know that there's any other resources at this point…. just those two resources are still there, and I don't know whether it's true, but it sounds like even the mental health side of things are starting to, yeah, subside.” [Semi-structured interview 17].

Another respondent, who now lives outside of High River, also commented on the lack of awareness raising for mental health interventions. She stated:

“there was no, like, kind of, ‘Okay, if you're suffering from...’ …and they do say that five years in is the worst, that's when it starts to get really bad. And you know, that's when people suffer the most. And yet I haven't heard anything and I'm here in High River all the time. We're here all the time. We still have lots of friends here. We participate in lots of things. We go to concerts, we go to classes, and I haven't seen any publicity on it at all” [Semi-structured interview 15].

Other participants noted the challenges of accessing resources. For example, one participant who self-identified as having cognitive disabilities, and had two sons with similar
cognitive disabilities, noted their struggles in receiving support with insurance claims, donations to help them recover some of their losses, and overall psychosocial support. She stated: “so, we had no access to any sort of agency or any kind of formal program. There was just nothing. I don't know how people got things”. She went on to say: “But we tried to access them, but they said there was nothing that they could do for us”… “because we talked about, okay, you know, this is our family. We need help…we need help in dealing with this kind of stuff” [Semi-structured interview 10].

Other participants focused less on the accessibility and awareness of formal resources and instead noted the availability of community. For example, when asked about what types of resources (mental health care and social services) were available after the flood, the first thing many participants noted was a sense of community. For example, one respondent stated: “Well we had each other” she goes on to highlight a few other aid organizations but primarily highlighted the role of community and social connection with neighbours, friends, and newly formed friendships after the flood [Semi-structured interview 4]. Similarly, other participants noted that the sense of community in High River was, and continues to be, something that the town holds in high regard as protective of psychosocial well-being. One participant, speaking of a recent ad she saw on a social media platform, noted: “[if] somebody's down on their luck. Lots of times, you see on there, ‘Young mom, single, recently single mom needs furniture’. By the end of that day, that house is full. It's got couches and chairs and beds and everything. By the end of the day, it's done” [Semi-structured interview 2]. This sense of community appeared to be instrumental in enhancing psychosocial wellbeing in High River. A sense of community was brought up numerous times throughout the semi-structured interviews as a key component to keeping High River afloat before, during, and after the flood.
5.3.5.6 Evaluating Psychosocial Resources

Now that we’ve provided an overview of our findings on: the differences between response and recovery interventions; unintended consequences related to psychosocial interventions; and, perspectives of marginalized community members, we thought it prudent to explore our findings related to evaluating psychosocial resources.

When asked about the resources or services that stood out to participants, the vast majority of respondents commented on the valuable role faith-based institutions played, often in juxtaposition to government resources. For example, one participant noted: “So, I thought the support was really impressive, volunteer support, grassroot support. Government support was a nightmare.” He went on to note: “you know, nobody was on your side there, but the volunteers and the community of faith were there for you”. [Semi-structured interview 3]. Another participant highlighted the psychosocial support from one of the faith-based organizations in the community, she stated:

“they have always been good about listening. So, they were so good. Like, people must have complained 100 times a day about things, or, you know, sharing sadness, and they never made you think that you were overburdening them or, you know, ‘Shut up, I don’t want to hear another thing’. They were good listeners. But, and then, financially, they were the only ones that really helped us.” [Semi-structured interview 10].

Another respondent commented on the selflessness of one particular faith-based community, the Hutterite******* community, who were frequently referenced by participants as being one of the most helpful aid organizations in the direct aftermath of the flood. One respondent commented: “Nobody ever asked them to do anything. Nobody asked them for their

******* Hutterite communities of an Anabaptist sect who hold property in common and generally live in the northwest of Canada and the U.S.A.³⁹⁶
help. Nothing. When we got to that evac [evacuation] center, it was fully stocked with food. The women were there. They came every night. They cleaned the place. They did all of that”. She went on to note that when the local Hutterite colony ran out of food, “the head, the boss guy, phoned all the colonies around southern Alberta and said, ‘I need 5500 pounds of potatoes. Figure out how to get it’, and every colony would bring what they had, and then they would bring it for us.”[Semi-structured interview 2]. Another respondent noted that often times, before the flood in particular, Hutterites were often mocked by members of the community who lacked understanding about the Hutterites’ religious and cultural values. She noted, that since the flood, these perceptions have vastly changed. She stated:

“they are very closed but very strong and very community-oriented and they shouldn't be the butt of anybody's joke because when I saw how hard they worked for us and what they did without any misgivings. I mean, they were there. That was to them their inner calling. That was their duty. Nobody asked them. Nobody told them. They just showed up and they started cooking and they started serving” [Semi-structured interview 11]. Similarly, commenting on how the Hutterite community has been demystified in the community and are now held in high regard since the flood, another respondent stated:

“We have several Hutterite colonies around High River, and you don't really know them except that they come in and they have their distinctive clothing that they wear. During the flood, the Hutterites would come in and set up stations of hot food, and they'd have sandwiches, and drinks, and stew, and chili. Because there was nothing open here. There was no groceries stores. Half the people didn't have water and things like that. And they would go up and down the street, and they'd be yelling, ‘Anybody need food? Sandwiches’, things like that. And so, now that the flood's over, and you see these
wonderful Hutterite people, you're so glad they're there, and you know how kind they are, and they don't seem to be, you know, the group that's way out there, you know, with their own life. They've become real people” [Semi-structured interview 4].

The above suggests that the altruism and support that flood affected respondents received (from a group that they had previously mocked), shifted their attitudes and impressions of this group and helped to build a broader sense of community.

Another key finding from this research was that many participants highlighted the value of non-traditional forms of mental health care like, mindfulness, arts-based wellness activities, and community programs focused on relieving stress. Participants spoke about the value of attending classes on mindfulness, lectures on how to use essential oils for calming, or attending calligraphy classes, Tai-chi and yoga sessions, and drum circles. While, these approaches were often highlighted as helpful for some in their recovery, others noted that these approaches could be ineffective especially when the desire and need was for formal care to address trauma. Reflecting on this, one participant stated:

“We had mental health people come into the community about that time. And I can tell you now that when I was going to those one-on-one meetings and group meetings, there was nothing more dehumanizing than being passed around mandalas, especially as an artist. I don't know what it was. There's something to me that just revolted to the whole idea that I was supposed to find a Zen moment here and take some time for my stress-level and color a mandala. And here I was dealing with, you know, the enormous weight of a situation I couldn't handle by myself and there was no help. No real help” [Semi-structured interview 14].
Importantly, many participants expressed the desire for well-advertised mental health care that was accessible and available to all. Further, the majority of participants emphasized their desire for long-term interventions that aptly addressed individual mental health needs.

5.3.7 Discussion

The results from this research suggest that in High River there were distinct ways in which response and recovery interventions operated to address psychosocial needs, and that this distinction created gaps that could inadvertently harm psychosocial wellbeing. Particularly resonant recovery interventions in High River noted by participants include: a sense of community, faith-based organizations, and core-community services. In the broader disaster, mental health literature, scholars corroborate these findings, in particular with regard to the role of community and community-based services. (see 48, 103, 204, 213, 217, 378). For example, in Building Resilience: Social Capital in Post-Disaster Recovery, Aldrich (2012) contends that social capital and a sense of community are critical elements of post-disaster recovery. In fact, Aldrich contends that these elements are more critical than economic assistance or aid groups or governments213.

Our research also suggests that in High River there were complicated emotions involved in receiving aid from response intervention organizations and groups. Our respondents highlighted that there were simultaneous feelings of gratitude, competition, as well as concerns over resource diversion and a lack of capacity building by response intervention organizations and groups. Key concerns among our participants centered around knowing where and how donations dollars were used, a concern in many post-disaster communities, like for example in New Orleans post-Hurricane Katrina (see 379). Noting this, the National Council of Non-Profits provides a list of disaster recovery donation tips, chief among these tips is to donate to front-line
non-profits focused on recovery efforts, in most cases these would be core community services that existed before and will exist well-after a disaster has occurred.

Additionally, our research suggests that perceptions (from at-risk community members) about psychosocial interventions in High River could shed light on the importance of working with communities to build capacity to support the lingering psychosocial consequences related to a changing climate. Corroborating this, post-disaster researchers find that community collaboration, empowerment, and community-building, enhances disaster recovery and long-term resilience. Gil-Rivas and Kilmer (2016) state that it is “also necessary to build the community’s capacity for informal supports and resources. One crucial means of doing so is to create opportunities and contexts that facilitate social connectedness and interaction” (p. 1326). Similarly, our research findings in our High River case study suggest that informal supports and resources, by way of community connections, was a chief psychosocial protective factor. Taken together these findings offer initial insights on the challenges and opportunities related to response and recovery interventions following climate-related hazards.

In the table below, our findings are consolidated in terms of implications for psychosocial adaptation policy and practice in a Canadian context. These implications are by no means exhaustive, but rather these implications are suggestions for policy and practice based off of our initial exploration of psychosocial adaptation to the 2013 flood in High River, and what our initial exploration may speak to about psychosocial adaptation in a changing climate in Canada more broadly.

The first column includes interventions that support the capacity to adapt the psychosocial consequences of climate change, they are termed: ‘adaptive capacity interventions’. The second column describes the actions (policy or practice) related to the adaptive capacity

The table is not shown in this text.
interventions. The last column describes the potential outcomes related to the adaptive capacity interventions to support or enhance psychosocial adaptation.
### 5.3 Table 4. Implications for Psychosocial Adaptation Policy and Practice

<table>
<thead>
<tr>
<th>Adaptive Capacity Interventions</th>
<th>Action (policy or practice)</th>
<th>Potential Psychosocial Adaptation Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity Building</td>
<td>• Sustained mental health and social service funding</td>
<td>• Enhanced consistency of mental health care and social service provision</td>
</tr>
<tr>
<td></td>
<td>• Government-led consultation†††††††††††† with core community services about the role of response interventions during and after a hazard</td>
<td>• Opportunities to discuss with, and gain insights from, core community service operators about interim measures when core community services are unavailable</td>
</tr>
<tr>
<td></td>
<td>• Publicly available evaluation of funding and resource allocation to response organizations</td>
<td>• Enhanced transparency of how donations and funding to outside operations operates</td>
</tr>
<tr>
<td></td>
<td>• Interdisciplinary collaboration amongst health and social services response and recovery organizations</td>
<td>• Enhanced transitions between response and recovery interventions that support long-term psychosocial wellbeing in the community</td>
</tr>
<tr>
<td></td>
<td>• Engagement and understanding of local knowledge and local capacity</td>
<td>• Local capacity building that supports sustained mental health care</td>
</tr>
<tr>
<td></td>
<td>• Succession planning between response agencies and core community services</td>
<td>• Building or enhancing a sense of community before, during, and after an event</td>
</tr>
<tr>
<td></td>
<td>• Acknowledgement of the role of community in enhancing psychosocial recovery</td>
<td>• Building the capacity of professionals, para-professionals, and people interacting with impacted individuals to address psychosocial needs before, during, and after an event</td>
</tr>
<tr>
<td></td>
<td>• Training in mental health and psychological first aid and recovery to disaster management professionals, first responders, para-professionals, volunteers and support staff interacting with impacted individuals</td>
<td>• Enhanced abilities to respond to psychosocial needs after a disaster</td>
</tr>
<tr>
<td>Mental Health Care Training</td>
<td>• Track trained professionals for subsequent deployments</td>
<td></td>
</tr>
</tbody>
</table>

†††††††††††† *preferably before a hazard has occurred
<table>
<thead>
<tr>
<th>Adaptive Capacity Interventions</th>
<th>Action (policy or practice)</th>
<th>Potential Psychosocial Adaptation Outcomes</th>
</tr>
</thead>
</table>
| **Awareness Raising** | • Community awareness of psychosocial services and resources.  
  o Target awareness raising efforts amongst those most marginalized  
  • In the immediate aftermath of an acute disaster, consider using awareness-raising channels that are broad-ranging, like social media; also consider using traditional awareness-raising channels like posters and advertisements in community hubs and shelters.  
  • Ensure media coverage of disasters appropriately covers rural and remote communities and communities who have been most impacted.  
  • Target awareness-raising efforts to marginalized groups. In particular, consider the demographic and language abilities of community members and target efforts towards people with disabilities, the under-housed and homeless, and immigrants  
  • In the immediate aftermath of an acute disaster, ensure that redundant communication networks are in place to enhance family reunification  
  • Provide access to, and raise-awareness of, formal mental health care interventions (e.g. by mental health care professionals) as well as informal mental health care interventions (arts-based approaches, mindfulness strategies, faith-based care). | • Awareness-raising of psychosocial resources (in particular targeting messages to those most at risk to climate-related hazards)  
  • Augmented reach of messages by use of all available communication channels to support safety, security, and wellbeing.  
  • Expedited reunification of families and friends following an acute climate hazard  
  • Enhanced psychosocial recovery that meets individual needs |
In this table, we highlight the importance of both informal and formal mental health care and of intersectoral actions to support holistic, long-term psychosocial adaptation to a changing climate. It should be noted that our research suggests that successful implementation of the aforementioned actions listed in the above table, will require collaborative actions across disciplines, and these actions ought to be driven by community needs, and thus, require engagement with community knowledge.

5.3.6 Limitations

While perceptions of mental health supports are provided in this research, it is important to highlight that this information remains to be validated through evaluations of psychosocial interventions in such disasters. This study was limited in scope because it was focused on one community, however, it may have parallels in other disaster experiences. Importantly, the disaster management literature does corroborate many of the aforementioned findings, including the importance of redundant communication, capacity building, mental health training, and the role community in the aftermath of a disaster.135, 213, 215, 38, 382.

5.3.8 Conclusion

Interventions that support psychosocial adaptation to a changing climate are important to identify as we are seeing more evidence of the risks and impacts of climate change on mental health. We conducted an initial exploration of interventions involved in psychosocial response and recovery in High River, Alberta following the 2013 flood. Based off of this initial exploration, we provided tentative implications for policy and practice related to climate change and psychosocial adaptation in a Canadian context. It should, however, be noted that additional research on psychosocial adaptations in our changing climate is needed to more substantively inform psychosocial adaptation policy and practice.
Chapter 6: Discussion and Implications

6.1 Introduction

The field of study on climate change and mental health has grown rapidly in the past ten years with researchers around the globe drawing linkages climate change and extreme weather events and subsequent mental health outcomes. While the field of study has grown, it is important to note the ongoing challenges posed by inaction on climate change, which subsequently impacts mental health. In particular, the piecemeal and uncoordinated pace of climate change mitigation and adaptation efforts relative to the pace of the climate change problem poses risks to planetary and public health. As stated in the 2017 Lancet Countdown on health and climate change publication: “The delayed response to climate change over the past 25 years has jeopardized human life and livelihoods”61 (p. 1). This delayed response, particularly amongst governments and industries globally, is problematic when we consider the latest United Nations publication on climate change that states we may only have 12 years to limit climate change catastrophe383. The slow pace of action on climate change is daunting, worrisome, and anxiety-inducing, particularly when we consider the projected threats of climate change to public and planetary health (see 383.1) and our relatively nascent (yet growing) understanding of climate change impacts on mental health. In this conclusion section, I reflect on the field of climate change and mental health broadly, noting where the field emerged from, how it is growing, and how the field of public health is well-positioned to take on the mental health consequences of climate change. I then provide an overview of my contributions to the field and conclude with an integrative discussion of my research findings and explore implications for research and practice. I then end with a discussion on the path forward for the study of climate change and mental health, noting future research opportunities. This conclusion section is not meant to disregard the
overwhelming challenges of the climate change problem, and the slow pace of climate action, but rather to highlight how the problem area can be informed by more research that leads towards action.

6.2 Reflections on the Field

While the field of study on climate change and mental health is still relatively nascent it is important to reflect on the roots of this field of study in the disaster mental health field and to derive lessons learned from this field. Notably, a lot can be learned from the disaster mental health field, including how to empirically study mental health outcomes related to extreme weather (e.g. validated psychometric surveys); the range of psychosocial outcomes related to disasters (e.g. post-traumatic stress disorder to post-traumatic growth); and, the role of disaster response in enhancing psychosocial adaptation. Importantly too, is a discussion on the need and trajectory for the burgeoning field of study on climate change and mental health within the public health field.

The disaster mental health field provides the foundation for the field of study on climate change and mental health. The disaster mental health field focuses on specific extreme events (like technological disasters, environmental disasters, biohazard disaster) and subsequent mental health outcomes. The disaster mental health field has provided a number of psychometric tools to guide the measurement and monitoring of mental health outcomes related to hazards, many of which are noted in Table 1 (Monitoring and Measuring the Climate Change Impacts to Mental Health) in the manuscript entitled, *Addressing Mental Health in a Changing Climate: Incorporating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments*, in section 3.2. A notable example is the Disaster Psychological Assessment and Surveillance Toolkit (Disaster-PAST), which is an open access resource that
provides psychosocial assessment and surveillance tools to improve disaster preparedness and response and to enhance community recovery. This toolkit was developed by the Louisiana State University Health Sciences Center Department of Psychiatry and the Louisiana State Department of Health and Hospitals Office of Behavioral Health following Hurricane Katrina. The Disaster-PAST provides a framework for three distinct post-disaster screening phases: the immediate post-disaster phase (up to 60 days post disaster); the recovery disaster phase (60 days to 1 year post disaster); and, the extended screening phase (1 year and beyond). Some of the validated scales used in this toolkit include the: Generalized Anxiety Disorder Scale (GAD-7); Center for Epidemiologic Studies Depression Scale (CES-D); and, Post-Traumatic Stress Checklist (PCL-C).

Administering psychometric scales like those noted above, provides valuable information about the types and severity of mental health outcomes, like anxiety, depression, and post-traumatic stress disorder. There are also notable scales to measure affirmative mental health outcomes like, post-traumatic growth for example, using the post-traumatic growth index in surveys or interviews (see).

The disaster mental health field also has robust guidance documents to support emergency mental health response following a disaster, like for example, the Inter-Agency Standing Committee (IASC) Guidelines on Mental Health and Psychosocial Support in Emergency Settings that provides guidance on studying mental disorders and distress of the general population following extreme weather events that takes into consideration indicators of risk (e.g. populations at highest risk) and protective factors (e.g. access to mental health care; care providers with mental health literacy, etc.). These guidelines also provide resources on how
to support global communities in the wake of a disaster to establish safety, to re-establish community ties where possible, and suggested efforts to support rebuilding\textsuperscript{189}.

While these measurement tools and guidance documents provide a helpful base to approach the field of study on climate change and mental health there are notable gaps in the disaster mental health field that are pertinent to the field of study on climate change and mental health. For example, the disaster mental health field is well established in connecting extreme weather to poor mental health outcomes, however, there is a lack of connection between extreme weather and climate change in this literature, and extreme weather events are often positioned as ‘natural’ disasters rather than events linked to anthropogenic climate change. By withdrawing the discourse of climate change from discussions on extreme weather events (and subsequent mental health outcomes), there is a risk of viewing extreme events as isolated incidents, rather than connected events — influenced by sociopolitical factors that contribute to anthropogenic climate change and increase the frequency, intensity, duration, and complexity of extreme weather. If we look at events as isolated incidents outside of the climate change context, then the response to these events is often going to require reactive disaster management solutions. The issue, herein, is that this creates a culture of reactive response, rather than proactive efforts focused on climate change mitigation, psychosocial adaptation, and (transformational) resilience\textsuperscript{‡‡‡‡‡‡‡‡‡‡}.

Much of the disaster mental health literature focuses on three stages: the crisis phase, the post-impact state, and the rehabilitation and recovery stage. There is little, if any attention to the pre-disaster phase in the literature. This pre-disaster phase becomes important in a changing

\textsuperscript{‡‡‡‡‡‡‡‡‡‡} As noted in section 1.1, resilience can often be conceptualized as ‘bouncing back’ from climate disruptions, without much recognition of sociopolitical conditions that shape health inequities. Whereas the newly-minted term, ‘transformational resilience’, refers to a ‘bouncing forward’ from climate disruptions through a reckoning with sociopolitical conditions that shape social, environmental, and climate injustices towards environmental health equity\textsuperscript{24}. It is here, within the space of transformational resilience that a reckoning with environmental and climate justice takes shape.
climate where there may be increased anxiety, grief, fear, and worry related to impending climatic hazards. In addition to mental health impacts before, during, and after climate related events, knowledge of the overall climate change problem can lead to ecological grief, anxiety, a loss of a sense of place, and feelings of impending doom.

The emerging study of climate change and mental health helps us to frame the issue in the following way: there are both natural and anthropogenic causes of climate change, there are a multitude of climate-related mental health effects that can occur (and co-occur) at different times — not only after a hazard has occurred — these climate change effects act as threat multipliers to pre-existing social, biological, environmental, and cultural determinants of health, and there are a multitude of interventions needed across sectors to support psychosocial adaptation and transformational resilience to our changing climate. This framing enhances our understanding of the depth of the climate change and mental health problem and also signals the need for climate change and mental health issues to be tackled by actors well-versed in enhancing population-level health by engaging with a variety of different sectors, like for example public health actors (including practitioners, researchers, and decision-makers), to address health inequities. The field of public health is primed to take on the issue of climate change and mental health, as will be discussed below.

The crux of public health is to address population-based health risks, to prevent these risks, to protect populations (particularly those most marginalized — through health equity-focused policies and practices), and to promote health-enhancing behaviours, actions, environments, and policies. Public health professionals are trained to tackle large public health risks by working with actors from other sectors and across disciplines. The field of public health,

---

5555555555 Ecological grief refers to distress related to ecological loss or anticipated losses related to climate change.7
thus, is uniquely positioned to tackle the mental health consequences of climate change: to prevent climate change-related mental health risks, protect populations from these risks and impacts (and address health inequities related to climate change), and promote awareness of the mental health risks and impacts as well as adaptation opportunities. Noting this, there is a call from public health scholars to enhance the scope of public health in the 21st century to include a more significant focus on the ecological determinants of health (EDoH), which include climate change as a determinant of health. This is not to say that the field of public health should abandon its traditional focus on the social determinants of health (SDoH), rather as Eckersley and Cork (2011) put it, “it means expanding its role… [i]t means going back to public health’s roots in a broad, progressive movement that improved not only health, but quality of life more broadly” (p. 31). As these authors also note, health is not only impacted by the environment, but human health impacts the state and wellbeing of the environment; this complex, reciprocal, and positively reinforcing relationship supports the function of social and ecological systems. These authors suggest that population-level health challenges — particularly mental health issues — affect social morale, the public mood, and community resilience, and ultimately collective responses to things like a changing climate. Left unchecked, both climate change and poor population-level health will continue to reinforce one another, putting planetary and public health at greater risk. Thus, public health actors are urgently needed to tackle the health threats (including the mental health threats) of climate change, which are considered to be among the greatest public health threats of our time by some public health researchers.

Below I highlight the contributions that this dissertation work makes to the field of public health and discuss a path forward for future research and action within the field of public health.
6.3 Contributions

As noted in the introduction of this dissertation there are three notable research gaps in the burgeoning field of study on climate change and mental health that my research sought to address. Firstly, there are few empirical studies investigating the long-term psychosocial consequences of climate change, particularly in Canada. Secondly, there are few studies exploring how the long-term risks and impacts are being addressed via response interventions. Third, the field of study on climate change and mental health is relatively theory-lite. Below I explore my substantive, theoretical, and methodological, contributions aimed at addressing these gaps. Before doing so, it is prudent to note that my case study research in High River was an initial, exploratory study intended to investigate an under-researched and undertheorized area of study. Thus, I highlight my contributions and my findings as suggestive contributions and findings to the study of climate change and mental health, rather than definitive claims.

6.3.1 Substantive Contributions

A number of scholars in the past decade have documented the mental health effects of climate change, predominantly highlighting near-term mental illness and mental problems related to climate hazards (see for example: 35, 40, 43, 48, 85, 87, 130, 351). Few, however, document affirmative mental health outcomes related to climate hazards and even fewer document the long-term sequelae related to climate hazards. These were two key research gaps that my doctoral research aimed to address through an initial exploration of the range of long-term psychosocial effects of the 2013 High River flood and relating these findings to the broader topic of climate change and mental health. I aimed to speak to these research gaps by conducting an empirical study of the psychosocial consequences of flooding, five-years after a major flooding event in a community prone to flooding, and by asking my interview participants about any
affirmative feelings or behaviours that they experienced after the flood. As noted, my findings suggest that there were indeed long-term (self-reported) mental health outcomes related to the flood, including mental problems, mental illness, and affirmative outcomes. By noting the affirmative outcomes, I was better able to see what characteristics supported psychosocial adaptation, like for example a sense of community in High River, which was commonly reported amongst respondents. The findings of my research contribute to the field of study on climate change and mental health because they suggest that climate hazards, in particularly acute climate hazards like flooding, can pose long-term mental health threats to people, and also that we can learn from affirmative mental health outcomes related to climate hazards to enhance psychosocial adaptation to a changing climate.

6.3.2 Theoretical Contributions

A key area that I noticed while conducting my literature review on climate change and mental health (that formed chapter 3 of this dissertation) was that there were few publications that explicitly detailed the use of theory. That said, Cunsolo et al. (2012) take an explicit Ecohealth approach to their multi-year study of Inuit mental health and climate change in Canada’s North\textsuperscript{40}. Ecohealth is a conceptual approach that links health, social systems, and ecosystems and emphasizes the following core principles: systems thinking, transdisciplinarity, participation, sustainability, equity, and knowledge-to-action\textsuperscript{386, 387, 388, 389}. The conceptual approach offered by Ecohealth, however, cannot quite be considered a theoretical orientation as it is often referred to as a ‘movement’, an ‘approach’, a ‘practice’ and as a ‘research-style’, but rarely as a substantive theoretical orientation. Besides the Ecohealth approach, only a few other studies within the climate change and mental health literature reference a specific theoretical orientation.
To address this aforementioned theory-gap, I explored what Political Ecology might have to offer my research within the study of climate change and mental health. In particular, section 5.1 of this dissertation is a publication explicitly focused on exploring a critical Political Ecology of climate change and mental health for public health audiences. The aim of this contribution was to provide a theory-focused overview for public health audiences to illuminate the often-hidden sociopolitical conditions that can shape health inequities and also how sociopolitical conditions can shape societal-level adaptation response interventions in the study of climate change and mental health. In the manuscript in section 5.1 of this dissertation, a critical Political Ecology lens allowed us to see how power relationships between governments and business-interest groups could influence socioeconomic disparities in High River and contribute to mental health inequities related to a changing climate. Further, a critical Political Ecology lens allowed us to critically explore what the environment means and to whom, with a particular focus on what adaptation to our changing climate means and to whom. Further, the manuscript in 5.2 (although not explicitly stated in the manuscript) is influenced by critical Political Ecology. In this manuscript I problematize perceptions of climate change and conceptualizations of marginalization, adaptation, and resilience by reflecting upon what these perceptions and conceptualizations may signal and to whom, paying close attention to the overarching influences of sociopolitical conditions on these perceptions and conceptualizations. This is the first-known publication on climate change and mental health that explicitly incorporates social theory, thus, allowing me to provide a unique contribution to this field of study.

6.3.3 Methodological Contributions

As theory guides methodology, I looked to Political Ecology scholars to better understand their methodological approaches. This was in an effort to glean guidance on how to
approach my research. Quickly, however, I learned that PE is a broad theoretical approach, and much of the loose methodological guidance by political ecologists was centered around letting the problem at hand guide the study methodology. A chief component of PE is its methodological plurality; thus, many political ecologists conduct mixed-methods research. With this understanding at hand, I critically engaged with my research questions and my skills as a researcher, to derive a study design that helped me to address these questions to the best of my abilities. I soon realized that multiple (predominantly qualitative methods) were needed to answer my research questions and an analysis of climate change and mental health information would be needed. Thus, I landed on a mixed methods study that included: a desktop climate change and health vulnerability and adaptation assessment, followed by key informant interviews with health and social services leaders, followed by focus groups with front-line health and social services workers, and concluding with semi-structured interviews with a sample of community members who identified as marginalized. This research design allowed me to investigate the lived experiences of High River community members after the 2013 flood. This design differed from other studies that research the mental health consequences of flooding in that it did not rely on psychometric data, such as psychometric surveys, but rather relied upon a qualitative interpretation of the lived-experience. By collecting different sets of data, my goal was to look deeply into the psychosocial outcomes of the flood, from a number of different perspectives. From a methodological standpoint, my research contributes to a growing field of study on climate change and mental health by providing a mixed methods, (predominantly using qualitative methods) to understanding the long-term psychosocial consequences of flooding.

It is also important to reflect here that one of the key challenges of conducting mixed methods research is that it can be challenging to navigate positivist and interpretivist paradigms
which can create epistemological and ontological tensions in the research. I aimed to navigate these tensions by being explicit about how my theoretical orientation of critical Political Ecology guides my methodology. In approaching the topic area, I noted my ontological realism in the positivist science on climate change. Namely that global temperatures are rising due to natural forcing and anthropogenic climate change and that climate hazards, like flooding, are projected to increase and be more frequent\(^1\) (particularly in High River according to quantitative data from the Prairie Climate Consortium)\(^{326}\). I collected quantitative data about climate projections and the state of mental health in the climate change and health vulnerability assessment. This data collection helped me to better understand and explore positivist scientific interpretations of climate change and mental health in the community of High River.

I also noted my alignment with critical Political Ecology and my epistemological skepticism about truth claims related to exposures and experiences of climate change. Namely, that there are many voices who are silenced or overlooked in the study of climate change science and its effects, in particular marginalized groups’ lived experiences tend to be overlooked in positivist truth claims about exposures and effects of climate change. Methodologically, I aimed to explore the role of lived experiences in my mixed methods study design through semi-structured interviews with participants who self-identify as marginalized. The aim of this was to hear about the lived experiences of the 2013 flood and the lived experiences of navigating psychosocial wellbeing in the aftermath of the flood. The aim was to couple this qualitative data with the data collected through the climate change and health vulnerability assessment and to explore how the data spoke to each other and to better understand how the lived experiences were reflected (or not) in the quantitative data, and vice versa. Further, as qualitative methods took precedence in this study, the aim was to explore how the lived experiences could contribute
to knowledges and experiences of climate change and its effects on mental health, and how lived experiences could contribute to the understanding of adaptation. As critical Political Ecology Tim Forsyth notes, the goal of exploring lived experiences within critical PE-influence research, is not to say that these are necessarily accurate knowledge claims about positivist climate science, but rather that these lived experiences contribute to our understanding of social realities related to the topic area, and an understanding of social realities can enhance equity-focused policy and practice. The strength of this approach in this study is that this exploration of social realities may enhance public health policies and practices on climate change and psychosocial adaptation.

6.4 Integrative Discussion and Implications for Research and Practice

The findings from thesis dissertation suggest a number of things for research and practice on climate change and mental health. The findings from my literature review suggest that:

- there are a host of mental health outcomes related to our changing climate, including: mental illness, mental problems, and affirmative outcomes;
- there are disproportionate risks and impacts to those most marginalized in society;
- there are a number of ways to measure and monitor these outcomes (e.g. qualitative interviews, review of emergency department visits, psychometric scales);
- there are a number of priority adaptation actions that support psychosocial health, including: policy responses (like improved access and funding to mental health care); surveillance and monitoring of psychosocial impacts of climate hazards; specific mental health care practices (like the aforementioned stepped-care approach); preparation and response plans (like climate change mitigation and adaptation planning); community-based interventions, and special training for care providers; and,
• there are key factors that can influence psychosocial adaptation, like for example: social capital, a sense of community, conducting vulnerability and adaptation assessments, mental health literacy, government assistance to enhance access and funding, communication, and culturally relevant resources.

My empirical investigation in High River, Alberta suggests specific findings related to the 2013 flood that may have implications for the broader study on climate change and mental health and for public health practice. Specifically, my research findings related to my case study in High River suggest that:

• there appear to be a range of complicated psychosocial outcomes from the 2013 flood, including mental health outcomes like self-reported PTSD, anxiety, fear, compassion fatigue, distress, socioeconomic impacts from the lack of insurance coverage; and a sense of community;

• there appear to be long-term sequelae related to the 2013 flood, including self-reported PTSD, anxiety when it rains, trauma over rebuilding, and distress related to looming climatic hazards and environmental degradation;

• there appear to be populations most at risk to the psychosocial impacts of the 2013 flood include those already marginalized based on age, socioeconomic status, gender, immigration, and abilities;

• psychosocial support-seeking behaviours appear to be impacted by social, cultural and economic factors (including life experiences, over-reliance on self-efficacy, and the stigma of mental illness);
• there appear to be notable differences between response and recovery efforts; the former focused on immediate emergency response, the latter focused on long-term, sustainable support;

• there appear to be interdisciplinary/intersectoral actions that can be taken by public health and social services actors to support or enhance psychosocial adaptation, like for example:
  o building community capacity to cope, mental health care training, awareness raising of psychosocial resources and supports; building-in redundant communication channels to increase awareness of impending disasters and how to respond; and, provision of a multitude of psychosocial response interventions.

• Political Ecology may help public health practitioners see the often-hidden sociopolitical conditions, like power relationships between governments and business-interest groups, that influence health inequities related to climate change and mental health;

• A critical Political Ecology lens can also support the problematization of what the environment means, and to whom; thus, supporting critical inquiry into perceptions of climate change, and critical inquiry of adaptation for whom and to what. Further, a critical Political Ecology can support reflections of sociopolitical conditions on conceptualizations of marginalization, adaptation, and resiliency in a changing climate.

  Taken together these findings suggest that there appear to be long-term psychosocial implications related to climate change hazards and that an understanding of these long-term
implications may help inform policy and practice related to sustained mental health care provision. An understanding of the host of psychosocial outcomes may better inform psychosocial adaptation planning and implementation. An understanding of who is most at risk to the psychosocial impacts of climate hazards and who may be more likely to seek help, may help to inform targeted measures to prevent and protect population-level mental health from climate-hazards. An understanding of the key differences between response and recovery interventions may help to inform capacity-building programs that bridge response and recovery services and practices in communities with long-term sequelae related to climate hazards. An understanding of the types of interdisciplinary/intersectoral actions may help health and social services actors enhance psychosocial adaptation to climate hazards. And, an understanding of how sociopolitical conditions shape health inequities, and how sociopolitical conditions can influence conceptualizations and perceptions of marginalization, adaptation, and resilience in a changing climate, may provide public health audiences with critical reflections on what the environment means and to whom related to the topic of climate change and mental health.

6.5 Path Forward

The field of study on climate change and mental health is growing rapidly. Despite its rapid growth, however, there are still large knowledge gaps in this field that require additional research. In general, there is a need for more empirical studies investigating psychosocial outcomes from climate hazards, including slow-creeping climate hazards like sea-level rise, and acute hazards like wildfires, and sub-acute hazards like pervasive drought. The publication in section 3.2 is meant to provide some guidance in this regard, particularly for any organization or institution conducting climate change and health vulnerability and adaptation assessments that address the mental health effects of climate change. More specifically, there appears to be a need
for additional empirical investigations looking at the long-term mental health effects of climate hazards.

There is also a need for empirical investigations looking at the indirect psychosocial outcomes like displacement, loss of a sense of place, community strife, violence, and conflict. Methodologically, there is a need for more participatory action research in communities on the front-lines of climate change similar to Cunsolo and colleagues research in Nunatsiavut, Labrador with Inuit populations experiencing melting sea-ice (see for example 40, 85). A key population group on the front lines of climate change are our youth and children who have grown up witnessing climate change effects and the relative inaction from governments, organizations and institutions. This demographic will inherit the earth and are increasingly demanding action on climate change, like for example through the global, youth climate strike movement 390. There is a need for further investigation of the climate change impacts to child and youth mental health and also investigation on how this demographic is coping with the dire predictions for their futures on this planet. Another key area that requires more research is on psychosocial adaptation opportunities to a changing climate, including empirical investigations that evaluate the effectiveness of psychosocial interventions.

Importantly, there is a surge of interest in this topic area with a call to action for more funding and research to explore the mental health consequences of climate change. In a recent Canadian-specific policy briefing for the Lancet Countdown on climate change, which is a global task force dedicated to tracking the health effects and responses to climate change, leading health professionals in Canada highlighted seven priority areas for public health actors to address in our changing climate in Canada. One of these seven priorities was to fund increased study of the mental health effects of climate change and psychosocial adaptation opportunities 329. This
signals a burgeoning commitment to investigate and address the psychosocial impacts of climate change on Canadians, a topic area in need of much more research and support so that population level mental health can be better protected within our rapidly changing climate.
References


14. Mental illness and addictions: Facts and statistics. CAMH. http://www.camh.ca/en/hospital/about_camh%0D%0A/newsroom/for_reporters/Pages/add ictionmentalhealthstatistics.aspx%0D%0A. Published 2012.


Organization.


36. Berry HL, Bowen K, Kjellstrom T. Climate change and mental health: A causal pathways

doi:10.1177/1010539510392556


45. Adger WN, Barnett J, Chapin FS, Ellemor H. This must be the place: Underrepresentation of identity and meaning in climate change decision-making. Glob Environ Polit. 2011. doi:10.1162/GLEP_a_00051


56. Jennings TL. Transcending the Adaptation/Mitigation Climate Change Science Policy


2008.
79. Intergovernmental Panel on Climate Change. IPCC MANAGING THE RISKS OF EXTREME EVENTS AND DISASTERS TO ADVANCE CLIMATE CHANGE ADAPTATION - Summary for Policymakers.; 2012. doi:10.1017/CBO9781139177245
104. Links J. Predicting Community Resilience and Recovery After a Disaster. CDC.
113. Alderman K, Turner LR, Tong S. Assessment of the health impacts of the 2011 summer


130. Dodgen, D. D, Donato N, Kelly A, et al. Ch. 8: Mental Health and Well-Being. The

148. UN: Number of Syrian refugees passes five million. Aljazeera.
149. Siriwardhana C, Stewart R. Forced migration and mental health: Prolonged internal
displacement, return migration and resilience. *Int Health*. 2013. doi:10.1093/inthealth/ihs014


171. Durkalec A, Furgal C, Skinner MW, Sheldon T. Climate change influences on environment as a determinant of Indigenous health: Relationships to place, sea ice, and


175. Legal Mandate. U.S. Global Change Research Program USGCRP.


195. Canadian Disaster Database. Public Safety Canada.


223. Services AH. *North Zone Mental Health and Wellness Recovery Services Executive SUnmmary for Albertans Impacted by the 2016 Fort McMurray Wildfire*.; 2016.


1411.


230. CMHA. Mental Health in the Balance: Ending the Health Care Disparity in Canada.


321


294. Services AH. About AHS. Alberta Health Services.
303. Bell D. “We can’t pretend that climate change isn’t there”: Notley stands firm on carbon tax if NDP re-elected. CBC News. 2019.
308. Fortney V. Fortney: “I was a bit crazy to take it on,” says the mayor who helped High River get back on its feet. Calgary Herald. 2018.
309. Five Years Later. High River Online.
310. McGarvey D. High River has moved on 5 years after devastating flood, but some still face uncertain future. CBC News. 2018.
312. CIUSSS. Montréal’s Director of Public Health Presents Findings from the Health Survey Flood Victims.
316. Gerein K. Budget 2017: Alberta’s health spending still soaring despite efforts at restraint.

328. Officer of Health M. A Climate of Concern: Climate Change and Health Strategy for Toronto 2015 Attachment 1 Toronto Public Health A Climate of Concern: Climate Change and Health Strategy for Toronto.
342. Snowdon W. Fort McMurray wildfire costs to reach almost $9B, new report says. CBC News.
343. Return Wallaceville to Undeveloped State. Town of High River. Lessons learned for a political ecology of climate change and mental health. The aforementioned political ecology of health research, in particular the work of Baer and Singer (2009), provides a theoretical base from which to explore a politics. Published 2019.


359. Medical Definition of Sequela. MedicineNet.


374. Friel S, Berry H, Dinh H, O’Brien L, Walls HL. The impact of drought on the association between food security and mental health in a nationally representative Australian sample.
Carleton TA. Crop-damaging temperatures increase suicide rates in India. Proc Natl Acad Sci. 2017;201701354. doi:10.1073/pnas.1701354114
Public Health. World Health Organization.
Appendix

Appendix A: Supplementary materials for Addressing Mental Health in a Changing Climate: Incorporating Mental Health Indicators into Climate Change and Health Vulnerability and Adaptation Assessments

Table S1. Summary of Articles Included in Review

<table>
<thead>
<tr>
<th>Article #</th>
<th>Article Citation</th>
<th>Country</th>
<th>Literature Type</th>
<th>Study Design (where applicable)</th>
<th>Participants</th>
<th>Outcomes Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Adger et al. (2011)</td>
<td>Maldives and Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative Case Study</td>
<td>Case study of Pacific Islanders of Atolls and Inuit in the Canadian Arctic</td>
<td>Relationship to place (emotional, symbolic, environmental, spiritual)</td>
</tr>
<tr>
<td>3.</td>
<td>Agnew et al. (2012)</td>
<td>Global</td>
<td>Literature Review – Theoretical review (of crime and climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>5.</td>
<td>Aiena, et al. (2016)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative survey (Measuring resilience, meaning and PTSD)</td>
<td>Mississippi coastal residents (perceived effect group and non-perceived effect group)</td>
<td>Perceptions of meaning, resilience, and Post-Traumatic Stress Disorder related to environmental degradation</td>
</tr>
<tr>
<td>6.</td>
<td>Aitsi-Selmi et al. (2015)</td>
<td>International</td>
<td>Literature Review – Narrative Review (Health and wellbeing post disaster)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>7.</td>
<td>Ajibade et al. (2015)</td>
<td>Nigeria</td>
<td>Empirical Research Article</td>
<td>Quantitative Survey (13 Item Additive Scale – questions pertained to whether or not respondents had experienced: damage to properties, impacts to individual health, restricted movement, infrastructure damage, and loss of lives)</td>
<td>1003 flood impacted Nigerians in Lagos</td>
<td>Flood impacts based on a biopsychosocial model of socio-economic, demographic, behavioural and environmental factors</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>8.</td>
<td>Ajibade et al. (2013)</td>
<td>Nigeria</td>
<td>Empirical Research Article</td>
<td>Mixed methods (Interviews, survey and focus groups)</td>
<td>Women in Lagos, Nigeria who experienced flash floods; 36 interviews, a survey (n = 453) and 6 focus groups</td>
<td>Vulnerability and resilience among flooded women in Lagos, Nigeria</td>
</tr>
<tr>
<td>9.</td>
<td>Alberini et al. (2006)</td>
<td>International</td>
<td>Empirical Research Article</td>
<td>Quantitative – survey (conjoint choice questions about adaptive capacity to climate change)</td>
<td>100 Climate change (climatologists), public health professionals, and emergency response professionals</td>
<td>Perceptions about adaptive capacity to climate change</td>
</tr>
<tr>
<td>10.</td>
<td>Albrecht et al. (2007)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Mixed Methods (qualitative interviews; ethnographic field work, surveys using the Environment al Distress ED scale)</td>
<td>Interviews with 60 people living in Upper Hunter (region with persistent drought and mining). Ethnographic field work and surveys with residents of Upper Hunter region</td>
<td>Distress related to environmental change (drought and mining)</td>
</tr>
<tr>
<td>11.</td>
<td>Albrecht (2011)</td>
<td>Globally - examples mainly based in Australia; Grey Literature (chronic climate change and</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>12.</td>
<td>Alderman, et al. (2012)</td>
<td>Australia</td>
<td>Literature review - systematic review (Flood and human health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>13.</td>
<td>Alderman et al. (2013)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative - Survey (Kessler 6 scale and the PTSD civilian checklist PCL-C 19)</td>
<td>960 flood affected people (during the 2011 Brisbane summer floods) in Australia</td>
<td>Health effects (physical and mental) of 2011 flooding in Brisbane, Australia</td>
</tr>
<tr>
<td>14.</td>
<td>Allen et al. (2014)</td>
<td>Global</td>
<td>Literature Review – Narrative review of social factors that influence mental health</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>15.</td>
<td>Almedom et al. (2008)</td>
<td>Global</td>
<td>Literature Review – Narrative Review on resilience research (policy and practice)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>16.</td>
<td>Almedom, et al. (2007)</td>
<td>Eritrea</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey (Sense of Eritrea who have been)</td>
<td>265 men and women in Eritrea who have been</td>
<td>Resilience related to displacement</td>
</tr>
</tbody>
</table>

also refers to Inuit psychosocial effects – psychoterrative syndromes)
<table>
<thead>
<tr>
<th>Article #</th>
<th>Article Citation</th>
<th>Country</th>
<th>Literature Type</th>
<th>Study Design (where applicable)</th>
<th>Participants</th>
<th>Outcomes Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Almedom et al. (2015)</td>
<td>Not specified</td>
<td>Literature Review – theoretical review</td>
<td>N/A</td>
<td>displaced from rural and urban areas (compared to those who have not been displaced)</td>
<td>N/A</td>
</tr>
<tr>
<td>20.</td>
<td>Anderson et al. (2011)</td>
<td>Global</td>
<td>Literature Review – Narrative Review of mental health and wellbeing</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>21.</td>
<td>Anderson et al. (2017)</td>
<td>USA</td>
<td>Literature Review – Climate change and</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes measured</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>---------------</td>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>23.</td>
<td>Austin et al., (2015)</td>
<td>Canada</td>
<td>Literature Review – Narrative review (public health adaptation to climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>25.</td>
<td>Bajayo (2012)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (community resilience to climate change via public health planning)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>26.</td>
<td>Bardsley et al. (2012)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (climate change vulnerability for the Alinytjara Wilurara Natural Resources Management region)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>27.</td>
<td>Barnett et al. (2015)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (climate change adaptation)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>28.</td>
<td>Bei et al. (2013)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitate – Survey (surveying for anxiety, PTSD, self-report health, satisfaction with life)</td>
<td>274 older adults (age 60+) before and after flood exposure</td>
<td>Health outcomes (physical and mental) of older adults</td>
</tr>
<tr>
<td>30.</td>
<td>Bell (2012)</td>
<td>USA</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------</td>
<td>---------------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>31.</td>
<td>Bergström et al. 2014</td>
<td>Not specified</td>
<td>Literature Review - Theoretical review (macro, micro, meso understanding of resilience - nature of resilience)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>32.</td>
<td>Berkes et al. (2013)</td>
<td>Not specified</td>
<td>Literature Review - Narrative Review (on community resilience from a social-ecological systems perspective and from the psychology of development and mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>33.</td>
<td>Berry et al. (2008a)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative – Analysis of statistic census</td>
<td>Residents of rural Australia</td>
<td>Mental health effects of climate change</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------</td>
<td>---------------</td>
<td>------------------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>Berry et al. (2008b)</td>
<td>Australia</td>
<td>Literature Review – Narrative</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Review (Rural mental health</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>implications of climate change)</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>Berry et al. (2009a)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative Survey</td>
<td>963 Residents of Eurobella Shire in New South Wales, Australia (aged 19-97)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(self-report on social capital</td>
<td>Social capital’s relationship to mental health</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>and psychological distress)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>Berry et al. (2009b)</td>
<td>Global</td>
<td>Literature Review – Narrative</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Review (Climate change impacts to</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>mental health and opportunities</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>for public health)</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>Berry et al., (2010a)</td>
<td>Global</td>
<td>Literature Review – Narrative</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Review (mental health risks</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and impacts from climate change)</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>38</td>
<td>Berry et al., (2010b)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (climate change and mental health adaptation)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>39</td>
<td>Berry et al. (2011)</td>
<td>Australia</td>
<td>Literature Review – Review of epidemiological research on Farmer’s mental health risks related to climate change</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>40</td>
<td>Birkmann et al. (2010)</td>
<td>Sri Lanka and Indonesia</td>
<td>Literature Review – Narrative Review (Response related to climate related extreme events and disasters)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>41</td>
<td>Bonanno (2012) Not Specified</td>
<td>N/A</td>
<td>Literature Review – Narrative Review (Resilience constructs related to psychosocial health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>42.</td>
<td>Bourque et al. (2014)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (Climate change as an opportunity for public mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>43.</td>
<td>Bowles (2015)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (Climate change and health adaptation (physical and mental) amongst Indigenous)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>44.</td>
<td>Bragg et al. (2012)</td>
<td>Australia and New Zealand</td>
<td>Literature Review – Narrative Review (Ecopsychology and environmental/ecological change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>45.</td>
<td>Brown (2015)</td>
<td>Global</td>
<td>Grey Literature (Resilience, development and global change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>46.</td>
<td>Brown et al. (2011)</td>
<td>Not specified</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------</td>
<td>------------------</td>
<td>-----------------------------------------------------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>47</td>
<td>Bunch (2011)</td>
<td>Not specified</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(social-ecological resilience, health and well-being)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Bunyavanchich et al.</td>
<td>Not specified</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>(2003)</td>
<td></td>
<td></td>
<td>(climate change impacts on child health)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>Burch et al. (2014)</td>
<td>Canada, BC</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Transformational change related to climate change responses)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------</td>
<td>---------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>--------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>51.</td>
<td>Burton et al. (2016)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (Psychosocial and physical health consequences of flooding)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>52.</td>
<td>Butler et al. (2014)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (climate change impacts on mental health and cognition)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>54.</td>
<td>Cameron (2012)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (Critique of vulnerability and adaptation approaches (related to</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>----------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>55.</td>
<td>Cardwell et al. (2013)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Semi-structured interviews about perceptions of climate change and health</td>
<td>22 residents of Golden Horseshoe (Southern Ontario)</td>
<td>Perceptions of climate change impacts to human health</td>
</tr>
<tr>
<td>56.</td>
<td>Carnie et al. (2011)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Qualitative - Interviews in school-based forums about drought-related mental health experiences</td>
<td>Youth and teachers in rural NSW, Australia</td>
<td>Mental health outcomes related to drought</td>
</tr>
<tr>
<td>57.</td>
<td>Carroll et al. (2010)</td>
<td>England</td>
<td>Empirical Research Article</td>
<td>Qualitative – Interviews and focus groups with people who had been flooded and agency workers</td>
<td>Flooded residents of Carlisle northwest England and agency workers working with flooded residents.</td>
<td>Health (physical and mental) and social impacts of a flood disaster</td>
</tr>
<tr>
<td>58.</td>
<td>Carroll et al. (2009)</td>
<td>England</td>
<td>Empirical Research Article</td>
<td>Qualitative – phenomenological study</td>
<td>Flooded residents of Carlisle northwest England and agency workers</td>
<td>Health (physical and mental) and social impacts of a flood disaster</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------</td>
<td>---------------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>-------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>59.</td>
<td>Castleden et al. (2011)</td>
<td>Not specified</td>
<td>Literature Review – Systematic Review with a narrative summary on concepts of resilience related to public health</td>
<td>N/A</td>
<td>N/A working with flooded residents.</td>
<td>N/A</td>
</tr>
<tr>
<td>60.</td>
<td>Chand et al. (2008)</td>
<td>Global</td>
<td>Literature Review – Narrative Review of climate change impacts to mental health</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>61.</td>
<td>Cheng, et al. (2013)</td>
<td>Canada</td>
<td>Literature Review – Narrative review of the health co-benefits and risks of adaptation strategies to climate change</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>62.</td>
<td>Cheshire et al. (2015)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative review (of community resilience, social capital and</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>63.</td>
<td>Chowdhury et al. (2011)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (of climate change and psychosocial impacts)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>64.</td>
<td>Cameron et al. (2015)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (of climate change adaptation and resilience in Nunavut, Canada)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>66.</td>
<td>Clayton et al. (2014)</td>
<td>USA</td>
<td>Literature Review – Narrative Review of climate change impacts</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>67.</td>
<td>Clayton et al. (2017)</td>
<td>USA</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>of climate change impacts to mental health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68.</td>
<td>Congues, (2014).</td>
<td>Australia</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>of well-being related to Drought in Australia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69.</td>
<td>Coombe et al. (2015)</td>
<td>Australia</td>
<td>Literature Review - Systematic review (of teacher-mediated interventions to support child mental health post disaster)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>70.</td>
<td>Costello et al. (2009)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (of managing the health effects of climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>---------------</td>
<td>----------------------</td>
<td>--------------------------------------------------------------------</td>
<td>---------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>71.</td>
<td>Cox et al.</td>
<td>Canada</td>
<td>Empirical Research</td>
<td>Qualitative – field testing of rural resilience index (including</td>
<td>Rural, remote coastal communities in</td>
<td>Assessment of disaster resilience</td>
</tr>
<tr>
<td></td>
<td>(2014)</td>
<td></td>
<td>Article</td>
<td>semi-structured interviews and focus groups)</td>
<td>Canada</td>
<td></td>
</tr>
<tr>
<td>72.</td>
<td>Crabtree</td>
<td>Developing</td>
<td>Literature Review –</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>(2012)</td>
<td>Countries</td>
<td>Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(of epidemiological</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>literature related</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>to the mental health</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>implications of climate</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>change-related</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>flooding in</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>developing countries.</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>73.</td>
<td>Crabtree.</td>
<td>Developing</td>
<td>Literature Review –</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>(2013)</td>
<td>Countries</td>
<td>Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(of psychosocial</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>resilience post-flood)</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>74.</td>
<td>Cunsolo Willox et</td>
<td>Canada</td>
<td>Empirical Research</td>
<td>Qualitative - Case study of Nunatsiavut (Interview and descriptive</td>
<td>Residents of Nunatsiavut (72 in-depth</td>
<td>Climate change impacts on a sense of place</td>
</tr>
<tr>
<td></td>
<td>al. (2012)</td>
<td></td>
<td>Article</td>
<td>Residents of Nunatsiavut (72 in-depth interviews, and 112</td>
<td>in-depth interviews, and 112</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>descriptive questionnaires)</td>
<td>descriptive questionnaires)</td>
<td></td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>75.</td>
<td>Cunsolo Willox et al. (2013a)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Case study of Nunatsiavut (interviews)</td>
<td>Residents of Nunatsiavut</td>
<td>Climate change impacts on health and wellbeing</td>
</tr>
<tr>
<td>76.</td>
<td>Cunsolo Willox et al. (2013b)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Case study of Nunatsiavut (67 in-depth interviews)</td>
<td>Community members and local and regional health professionals of Nunatsiavut</td>
<td>Climate change impacts on mental health</td>
</tr>
<tr>
<td>77.</td>
<td>Cunsolo Willox et al. (2014)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Case study of Nunatsiavut</td>
<td>Community members and local and regional health professionals of Nunatsiavut</td>
<td>Climate change impacts on mental health</td>
</tr>
<tr>
<td>78.</td>
<td>Cusack et al. (2011)</td>
<td>Not specified</td>
<td>Literature Review – Narrative review (of the impact of heatwaves on people with substance abuse and mental health conditions)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>79.</td>
<td>Cutter et al. (2008)</td>
<td>USA</td>
<td>Grey Literature (of research on community resilience related to hazards)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>80.</td>
<td>Davidson et al. (2006)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (of risks and impacts of disaster, lack of access to care impacts abilities to adapt to disasters)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>82.</td>
<td>Dean et al. (2011)</td>
<td>Not specified</td>
<td>Literature Review – Narrative review (of the relationship between biodiversity and</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>83.</td>
<td>Deeming et al., (2014)</td>
<td>Europe</td>
<td>Literature Review – Narrative review (of resilience and adaptation related to hydrometeorological hazards based on 5 case studies across Europe)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>84.</td>
<td>Deppisch et al. (2013)</td>
<td>Not specified</td>
<td>Literature Review – Narrative review (of applying social-ecological resilience thinking to transdisciplinary research on climate change adaptation)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>85.</td>
<td>Dodgen et al. (2016)</td>
<td>USA</td>
<td>Literature Review – Narrative review (of the mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>--------------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>86.</td>
<td>Doherty et al. (2011)</td>
<td>Global</td>
<td>Literature Review – Narrative review (of the psychologica l impacts of climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>87.</td>
<td>Dorji (2006)</td>
<td>Bhutan</td>
<td>Literature Review – Narrative review (of the psychosocial and mental health implications of disaster in Bhutan)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>89.</td>
<td>Durkalec et al. (2015)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative - Case study of Inuit community in Nain (participant observation, interviews (n = 22), focus groups (n = 2), and participant observation)</td>
<td>Nain residents;</td>
<td>The impact of climate change on a sense of place for Inuit community</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>90.</td>
<td>Ebi et al. (2016)</td>
<td>Not specified</td>
<td>Literature review – Narrative review (of health vulnerabilities related to extreme events)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>91.</td>
<td>Edwards et al., (2015)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey (rural and regional areas of Australia)</td>
<td>8,000 residents of rural and regional Australia</td>
<td>Impact of drought on mental health</td>
</tr>
<tr>
<td>92.</td>
<td>Edwards et al. (2011).</td>
<td>Not specified</td>
<td>Grey Literature (of climate change, resilience and transformation related to climate change and human health and wellbeing)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>93.</td>
<td>Eichler (2015)</td>
<td>Canada</td>
<td>Literature Review – Narrative review (of climate change coping for children)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>--------------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>94.</td>
<td>Eisenman et al. (2015)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative - household survey (Kessler Distress Scale)</td>
<td>Residents of Wallow Fire Arizona (n = 1387 households)</td>
<td>Psychological distress related to wildfire</td>
</tr>
<tr>
<td>95.</td>
<td>Evans et al. (2016)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Qualitative - Key informant interviews and multi-stakeholder workshops</td>
<td>Representative of the fisheries and tourism sectors of the Great Barrier Reef region</td>
<td>Psychosocial and structural limits to climate change adaptation</td>
</tr>
<tr>
<td>96.</td>
<td>Every-Palmer et al. (2016)</td>
<td>Australia</td>
<td>Literature Review – Narrative review (of the role for psychiatry in the field of climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>97.</td>
<td>Fernandez et al. (2015)</td>
<td>Not specified</td>
<td>Literature Review – Systematic mapping review (of flood impacts to mental health in river catchments)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>98.</td>
<td>Few et al. (2004)</td>
<td>Not specified</td>
<td>Literature Review: Narrative review (of climate related-floods and health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>--------------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>--------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>99</td>
<td>Fleming et al. (2015)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey (perceptions of how climate change affects wine industry)</td>
<td>50 Wine Industry Growers</td>
<td>Stress related to climate change impacts to wine industry growers</td>
</tr>
<tr>
<td>100</td>
<td>Ford et al. (2012)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (of Indigenous health related to climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>101</td>
<td>Ford et al. (2016)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Workshops on community-based adaptation approaches to research</td>
<td>Sample of Inuit residents in Canadian Arctic</td>
<td>Role of community-based adaptation research in climate change research</td>
</tr>
<tr>
<td>102</td>
<td>Fresque-Baxter et al. (2012)</td>
<td>Not specified</td>
<td>Literature Review – Narrative review (of place and identify related to climate change adaptation)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>103</td>
<td>Friel et al. (2014)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey (population-based survey)</td>
<td>Sample of Australian adults</td>
<td>Perceived impact of drought on food security and mental health</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>104</td>
<td>Fritze et al. (2008)</td>
<td>Global</td>
<td>Literature Review – Narrative review (climate change and mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>105</td>
<td>Fundter et al. (2008)</td>
<td>Netherlands</td>
<td>Literature Review – Narrative review (of health impacts related to large-scale floods)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>106</td>
<td>Furgal et al. (2008)</td>
<td>Canada</td>
<td>Literature Review – Narrative review (health impacts of climate change in Canada’s north)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>107</td>
<td>Füssel et al. (2007)</td>
<td>Not specified</td>
<td>Literature Review – Narrative review (of vulnerability related to climate change research)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>108</td>
<td>Galea et al. (2007)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative (survey)</td>
<td>Hurricane Katrina survivors</td>
<td>Hurricane-related stressors and mental health</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>110</td>
<td>Gifford (2011)</td>
<td>Not specified</td>
<td>Literature Review – Narrative review (of psychological barriers to climate change mitigation and adaptation)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>111</td>
<td>Goh et al. (2012)</td>
<td>Developing countries</td>
<td>Literature Review – Narrative review (climate change impacts on gender in developing countries)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>112</td>
<td>Gray (2008)</td>
<td>Not Specified</td>
<td>Grey Literature (commentary long-term health impacts of flooding)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>113</td>
<td>Green et al. (2014)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (climate change impacts on the health and wellbeing on Indigenous peoples in remote Australian communities)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>114</td>
<td>Green et al. (2012)</td>
<td>Australia</td>
<td>Literature Review – Narrative review (of theory and practice related to climate change vulnerability assessments for remote Indigenous communities in Australia)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>116</td>
<td>Greene (2014).</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (of resilience and ecological systems)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>117</td>
<td>Gruebner et al. (2015)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative – Telephone survey (using e Posttraumatic Stress Checklist for DSM-5 (PCL-5) and the nine-item Patient Health Questionnaire (PHQ-9) to measure depression)</td>
<td>418 Adults affected by Hurricane Sandy</td>
<td>PTSD and Depression of people exposed to Hurricane Sandy</td>
</tr>
<tr>
<td>118</td>
<td>Gunn et al. (2012)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey (Kessler Psychological Distress Scale)</td>
<td>309 Drought-affected southern Australian farmers</td>
<td>Stress and coping of farmers related to drought</td>
</tr>
<tr>
<td>119</td>
<td>Gutierrez et al. (2016)</td>
<td>USA</td>
<td>Literature Review – Narrative review (climate justice in rural, southeast, USA)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>-------------</td>
<td>-------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>121</td>
<td>Hannigan et al. (2011)</td>
<td>UK</td>
<td>Literature Review – Theoretical Review (of policies related to mental health in the UK)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>123</td>
<td>Hart et al. (2011)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (of drought)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>124</td>
<td>Hendersen et al. (2015)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (climate change and mental disorders)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>125</td>
<td>Höfler (2014)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (of psychosocial resilience in adults related to disasters)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>126</td>
<td>Holmes (2015)</td>
<td>Trinidad and Tobago</td>
<td>Literature Review – Narrative Review (of risk and resilience related to climate hazards and extreme weather)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>127</td>
<td>Holmgren (2012)</td>
<td>Not Specified</td>
<td>Grey Literature (of adapting to climate change and peak oil)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>128</td>
<td>Hunter (2009)</td>
<td>Australia</td>
<td>Literature Review – Narrative</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>129</td>
<td>Hutton (2005)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (Psychosocial consequences of climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>130</td>
<td>Imperiale et al. (2016)</td>
<td>Italy</td>
<td>Literature Review – Narrative Review (community resilience post-disaster in L’Aquila)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>131</td>
<td>Inder et al. (2011)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative – Cohort case study using surveys (Household, Income and Labour Dynamics in Australia Survey; Australian Rural Mental Health)</td>
<td>Rural and remote population in Australia</td>
<td>Climate related mental health adversities</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>----------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>132</td>
<td>Jain, (2015)</td>
<td>Global</td>
<td>Other – Commentary</td>
<td>Study; Hunter Community Study; and Extending Treatments, Education and Networks in Depression study</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>133</td>
<td>Jane-Llopis et al. (2011)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (addressing the burden of mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>134</td>
<td>Jaspal et al. (2014)</td>
<td>Not Specified</td>
<td>Literature Review – Theoretical Review (Using social representation theory and identity process theory trying to understand human)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>135</td>
<td>Jenkins et al. (2011)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (mental health and global development)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>136</td>
<td>Joerin et al, (2014)</td>
<td>Global</td>
<td>Literature Review - Theoretical Review (concept of resilience related to disasters)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>138</td>
<td>Keim (2008)</td>
<td>Global</td>
<td>Literature Review – Narrative review (of public health’s role in climate change adaptation)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>139</td>
<td>Keim (2011)</td>
<td>Global</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>140</td>
<td>Keller (2013)</td>
<td>France</td>
<td>Literature Review – Narrative Review (Paris Heatwave)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>141</td>
<td>Kessler (2008)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative – Surveys (TSQ for mood and PTSD, and Kessler 6)</td>
<td>815 residents who experienced Hurricane Katrina</td>
<td>Mental illness and suicidality</td>
</tr>
<tr>
<td>142</td>
<td>Kirmayer et al. (2011)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (of resilience constructs from the perspectives of Indigenous peoples - Inuit, Métis, Mi'kmaq, and Mohawk)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>143</td>
<td>Kjellstrom et al. (2013)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (of non-communicable health risks of climate)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>144</td>
<td>Koger et al. (2011)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (psychological solutions and strategies to address climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>145</td>
<td>Kuehne (2014)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Qualitative – Interviews</td>
<td>Key informants irrigators from the South Australian Riverland (n = 11)</td>
<td>Farmers perceptions of climate change and adaptation responses</td>
</tr>
<tr>
<td>146</td>
<td>Kukarenko, (2011)</td>
<td>Arctic Region</td>
<td>Literature Review – Narrative Review (of human health, gender, and climate change in the Arctic)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>147</td>
<td>LaLone (2012)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Qualitative - Ethnographic case study of rural Appalachia</td>
<td>Sample of people who experienced tornados in rural Appalachia</td>
<td>Social capital mobilization post-disaster</td>
</tr>
<tr>
<td>148</td>
<td>Lamond (2014)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>149</td>
<td>Lang (2015)</td>
<td>Not Specified</td>
<td>Grey Literature (of climate change and mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>150</td>
<td>Leff (2008)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (climate change and psychiatry)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>152</td>
<td>Levine et al. (2011)</td>
<td>Africa</td>
<td>Literature Review – Narrative Review (adaptive capacity and climate change in Africa)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>153</td>
<td>Levy et al. (2015)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (climate change social justice and human rights)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----------------------------------</td>
<td>---------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>154</td>
<td>Lindahl et al. (2013)</td>
<td>Not Specified</td>
<td>Grey Literature (mental health, health equity, and social sustainability)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>155</td>
<td>Loboda (2014)</td>
<td>Arctic</td>
<td>Literature Review – Narrative Review (adaptation and climate change in the Arctic)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>156</td>
<td>Lorenz et al. (2016)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (of resilience in disasters)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>157</td>
<td>Lowe et al. (2013)</td>
<td>OECD Member countries</td>
<td>Literature Review – Systematic Review (of health vulnerabilities – related to floods)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>158</td>
<td>Luber et al. (2015)</td>
<td>Global</td>
<td>Grey Literature Review (climate change and human health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>159</td>
<td>MacDonald et al. (2015)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – In-depth interviews</td>
<td>Youth aged 15–25 from five</td>
<td>Protective factors that support</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------</td>
<td>--------------------</td>
<td>--------------------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>160</td>
<td>Manyena (2014)</td>
<td>Zimbabwe</td>
<td>Empirical Research Article</td>
<td>Qualitative – Case study</td>
<td>Zimbabwe</td>
<td>Discourse and narratives of disaster resilience</td>
</tr>
<tr>
<td>161</td>
<td>Marinucci et al. (2014)</td>
<td>USA</td>
<td>Literature Review – Narrative Review (or resilience in public health to climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>162</td>
<td>McFarlane et al. (2012)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (of mental health services post-disaster)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>163</td>
<td>Miles et al. (2011)</td>
<td>Not Specified</td>
<td>Literature Review – Theoretical Review (Resilience and disaster modelling)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>164</td>
<td>Molnar (2010)</td>
<td>Global (focus on rural areas)</td>
<td>Literature Review – Narrative Review (of societal responses to communities of the Nunatsiavut region of Labrador, Canada)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>165</td>
<td>Moteshareiet al. (2016)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (of sustainability modelling – human and earth systems)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>166</td>
<td>Morello-Frosch et al. (2011)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Qualitative – Observation and interviews</td>
<td>Three community and advocacy-based rebuilding and organizing project</td>
<td>Resilience related to Hurricane Katrina</td>
</tr>
<tr>
<td>167</td>
<td>Morrissey et al. (2007)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (disaster, climate change, and mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>168</td>
<td>Morss et al. (2011)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative review (climate change and societal outcomes)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>169</td>
<td>Moser (2013)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (adaptation</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>---------------</td>
<td>-----------------------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>170</td>
<td>Munro et al. (2017)</td>
<td>England</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey (Measuring depression PHQ-2; anxiety using Generalised Anxiety Disorder [GAD]-2 anxiety scale, and post-traumatic stress disorder, measured by the Post-Traumatic Stress Disorder Checklist [PCL]-6 scale)</td>
<td>Flooded residents</td>
<td>Mental health outcomes of flooding</td>
</tr>
<tr>
<td>171</td>
<td>Myers et al. (2011)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (of indirect effects of climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------</td>
<td>----------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>172</td>
<td>Myers et al. (2012)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (public health, emotions and climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>173</td>
<td>Nahar et al. (2014)</td>
<td>Bangladesh</td>
<td>Literature Review – Narrative Review (mental health care post-disaster in Bangladesh)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>174</td>
<td>Neria et al. (2009)</td>
<td>Not Specified</td>
<td>Grey Literature (Mental health and disasters)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>175</td>
<td>Neria et al. (2012)</td>
<td>USA</td>
<td>Literature Review – Narrative Review (Mental Health effects of Hurricane Sandy)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>176</td>
<td>North et al. (2013)</td>
<td>Global</td>
<td>Literature Review – Narrative review (mental health and community disaster response)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>---------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>177</td>
<td>Nurse et al. (2010)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (climate change and mental health response)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>178</td>
<td>Oba et al. (2010)</td>
<td>Thailand</td>
<td>Empirical Research Article</td>
<td>Qualitative – Focus groups</td>
<td>People who experienced the flood, health professionals, and health volunteers</td>
<td>Perceptions of psychological wellbeing</td>
</tr>
<tr>
<td>179</td>
<td>O’Brien et al. (2010)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (of climate, security, and ethics)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>180</td>
<td>Obrien et al. (2014)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative – longitudinal review of rainfall records and survey</td>
<td>Sample of drought-affected rural and urban dwellers</td>
<td>Mental health related to drought</td>
</tr>
<tr>
<td>181</td>
<td>O’Donnell et al. (2016)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (disasters, mental health, older adults)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>---------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>184</td>
<td>Ojala (2016)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative review (children, emotions, climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>185</td>
<td>Opara (2014)</td>
<td>Nigeria</td>
<td>Grey Literature (Climate change in Nigeria)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>186</td>
<td>Ortega-Egea et al. (2014)</td>
<td>Europe</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey</td>
<td>Sample of European citizens</td>
<td>Psychosocial correlates of climate change mitigation behaviours</td>
</tr>
<tr>
<td>187</td>
<td>Ostry et al. (2010)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Case study</td>
<td>Communities in BC</td>
<td>Climate Change and health impacts</td>
</tr>
<tr>
<td>188</td>
<td>Padhy et al. (2015)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (of mental health effects of climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>189</td>
<td>Page et al. (2010)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (of climate change and mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------</td>
<td>---------</td>
<td>----------------------------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>190</td>
<td>Parlee et al. (2012)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>191</td>
<td>Parsons et al. (2016)</td>
<td>Global</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>192</td>
<td>Petrasek et al. (2013)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Interviews</td>
<td>(12–25 years old) in the Inuit community of Rigolet, Nunatsiavut, Canada (n = 20)</td>
<td>Observations and perceptions of climate change</td>
</tr>
<tr>
<td>193</td>
<td>Phua (2015)</td>
<td>Internat</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>194</td>
<td>Polain et al. (2011)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Mixed Methods – Semi-structured content forums and content analysis</td>
<td>One hundred and fifty older farmers, their families, Industry and Investment NSW, rural financial and mental health services, the</td>
<td>Perceptions of mental health consequences of climate change</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>195</td>
<td>Popovski et al. (2012)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (climate change victims)</td>
<td>N/A</td>
<td>Country Women's Association and other non-government agencies. N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>197</td>
<td>Rahman et al. (2014)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (of youth perceptions of climate change impacts to health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>198</td>
<td>Pfefferbaum et al. (2011)</td>
<td>USA</td>
<td>Grey Literature (community)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>199</td>
<td>Ramsay et al. (2011)</td>
<td>Global</td>
<td>Grey Literature (PTG, resilience, spirituality related to climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>200</td>
<td>Rataj et al. (2016)</td>
<td>Developing Countries</td>
<td>Literature Review – Systematic Review (extreme weather and mental health disorders)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>201</td>
<td>Reser et al. (2012)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (coping with climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>202</td>
<td>Reser et al. (2011a)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (psychological responses and adaptation to climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>203</td>
<td>Reser et al. (2011b)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------</td>
<td>--------------------</td>
<td>------------------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>204</td>
<td>Rice et al. (2016)</td>
<td>Asia pacific</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(climate change and mental health)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mixed Methods Research</td>
<td>Aboriginal people, service</td>
<td>Perceived impact of drought on social and emotional wellbeing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Article</td>
<td>providers and other stakeholders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>207</td>
<td>Rodriguez-Llanes et al. (2013)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(measuring psychological resilience to disasters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>208</td>
<td>Roeser (2012)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(communication and adaptation and coping with climate change)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>---------</td>
<td>-----------------------------------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>209</td>
<td>Roufeil et al. (2014)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (health challenges in rural Australian communities)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>210</td>
<td>Rudolph, et al. (2015)</td>
<td>Global</td>
<td>Literature Review (Narrative Review – climate change and health inequities)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>211</td>
<td>Rufat et al. (2015)</td>
<td>Global</td>
<td>Literature Review (Narrative Review of case studies–social vulnerability and floods)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>212</td>
<td>Sahni et al. (2016)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Quantitative – Public health surveillance (emergency department visits, administrative data)</td>
<td>People who experienced the 2013 flood</td>
<td>Health events (including mental health)</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------</td>
<td>-------------------</td>
<td>------------------------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>213</td>
<td>Saniotis et al. (2010)</td>
<td>Australia</td>
<td>Literature Review – Narrative Review (climate change impacts on older adults)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>214</td>
<td>Sapiains et al. (2016)</td>
<td>Not Specified</td>
<td>Empirical Research Article</td>
<td>Qualitative</td>
<td>People who thought climate change is natural and those who thought it is human-induced (N = 156)</td>
<td>Individual responses to climate change</td>
</tr>
<tr>
<td>215</td>
<td>Satcher et al. (2007)</td>
<td>USA</td>
<td>Literature Review – Narrative Review (of disasters and mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>216</td>
<td>Schmeltz et al. (2013)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Qualitative - field report from Hurricane Sandy</td>
<td>Street canvasses, governmental reports, community flyers, and meeting transcripts, as well as firsthand observations by a local nonprofit Red Hook Initiative (RHI) and community</td>
<td>Accounts of the effects of Sandy and the response to daily needs</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>217</td>
<td>Schrader et al. (2013)</td>
<td>Not Specified</td>
<td>Other – commentary (mental health researchers learning from climate change debate)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>218</td>
<td>Schulte et al. (2016)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (climate change and occupational health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>219</td>
<td>Schulte et al. (2009)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review and framework (climate change and occupational health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>220</td>
<td>USA Shultz et al. (2017)</td>
<td>USA</td>
<td>Other – Commentary (health consequences of Hurricane Karvey)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>221</td>
<td>Searle et al. (2009)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (psychological impacts of</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------</td>
<td>----------------</td>
<td>------------------------------------</td>
<td>--------------------------------</td>
<td>---------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>223</td>
<td>Selvey et al. (2015)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (health and climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>224</td>
<td>Shaw et al. (2009)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Participatory capacity building approach</td>
<td>Community of Delta</td>
<td>Climate change scenarios for capacity building Social vulnerability and social resilience</td>
</tr>
<tr>
<td>225</td>
<td>Shaw et al. (2014)</td>
<td>UK</td>
<td>Empirical Research Article</td>
<td>Mixed Methods – Case study (interview, discourse review)</td>
<td>Residents of flood prone area; health service providers (interviews), community facilities (discourse review)</td>
<td>N/A</td>
</tr>
<tr>
<td>226</td>
<td>Sharifi et al. (2016)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (of community resilience assessment tools)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>227</td>
<td>Shukla. (2013)</td>
<td>Global</td>
<td>Literature Review – Narrative Review</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>228</td>
<td>Silove et al. (2006)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review</td>
<td>(extreme weather and mental health)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>229</td>
<td>Smoyer-Tomic et al. (2004)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review</td>
<td>(health consequences of drought in Canadian prairies)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>230</td>
<td>Simpson et al. (2011)</td>
<td>Global</td>
<td>Literature Review – Narrative Review</td>
<td>(mental health, wellbeing, climate change)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>231</td>
<td>Spence et al. (2012)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative - Survey</td>
<td>Sample of American public (n = 653)</td>
<td>Perceptions about the psychological implications of climate change</td>
</tr>
<tr>
<td>232</td>
<td>Stain et al. (2011)</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey (Kessler 10 distress scale)</td>
<td>Adults in rural areas exposed to chronic drought (n = 302)</td>
<td>Psychological impact of chronic drought</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------</td>
<td>-----------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>233</td>
<td>Stanke et al. (2012)</td>
<td>UK</td>
<td>Literature Review – Narrative Review (mental health consequences of prolonged drought)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>235</td>
<td>Stephenson et al. (2014)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (long-term health impacts of flood)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>236</td>
<td>Stuart et al. (2011)</td>
<td>New Zealand</td>
<td>Literature Review – Narrative Review (of health education and response to vulnerable people during heat waves)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>237</td>
<td>Sung et al. (2011)</td>
<td>Taiwan</td>
<td>Empirical Research Article</td>
<td>Quantitative - In patient data interpolated with meteorological data (longitudinal study)</td>
<td>Psychiatric Inpatient Medical Claim dataset of the National Health Insurance Research Database.</td>
<td>Schizophrenia related to daily temperatures</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>----------------------------------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>238</td>
<td>Swim et al. (2009)</td>
<td>USA</td>
<td>Literature Review- Narrative Review (psychology and climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>239</td>
<td>Swim et al. (2011)</td>
<td>USA</td>
<td>Literature Review-Narrative Review (Human behaviour, psychology and climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>240</td>
<td>Swim et al. (2011)</td>
<td>USA</td>
<td>Literature Review – Narrative Review (Psychology and climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>241</td>
<td>Syal et al. (2011)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative – Survey</td>
<td>U.S. Environmental health directors</td>
<td>Individual level beliefs about climate change and human health</td>
</tr>
<tr>
<td>242</td>
<td>Tapsell (2010)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (of psychological impacts of flooding)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>243</td>
<td>Thomas et al. (2014)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>-------------</td>
<td>------------------</td>
</tr>
<tr>
<td>244</td>
<td>Thornley et al. (2015)</td>
<td>New Zealand</td>
<td>Empirical Research Article</td>
<td>Qualitative – focus groups and interviews</td>
<td>92 community-based leaders and residents participated in 11 focus groups and 29 interviews</td>
<td>Community response to earthquake</td>
</tr>
<tr>
<td>245</td>
<td>Tierney, K. (2014)</td>
<td>Global</td>
<td>Grey Literature (Disasters and social and institutional factors)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>246</td>
<td>THRIVE (2004)</td>
<td>Various</td>
<td>Grey Literature (community resilience to health disparities - toolkit)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>247</td>
<td>Tobias et al. (2014)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative – Community based research (Anishinaabe communities in Ontario, Canada; in-depth interviews)</td>
<td>Elders of Anishinaabe community (n = 46)</td>
<td>Environmental impacts of land dispossession</td>
</tr>
<tr>
<td>248</td>
<td>Tong et al. (2010)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (environmental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------</td>
<td>-------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>249</td>
<td>Tonna et al. (2009)</td>
<td>Australia</td>
<td>Literature Review - Narrative Review (mental health and drought)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>250</td>
<td>Tosone et al. (2015)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative - Survey</td>
<td>244 social workers from New Orleans</td>
<td>Shared Traumatic Stress</td>
</tr>
<tr>
<td>251</td>
<td>Trombley et al. (2017)</td>
<td>USA</td>
<td>Literature Review – Narrative Review (climate change and mental health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>252</td>
<td>Trang et al. (2016)</td>
<td>Vietnam</td>
<td>Empirical Research Article</td>
<td>Quantitative - Hospital admission data</td>
<td>Database from Hanoi Mental Hospital covering 5 years from 2008 to 2012 was used</td>
<td>Mental health disorders</td>
</tr>
<tr>
<td>253</td>
<td>Truelove et al. (2015)</td>
<td>Sri Lanka</td>
<td>Empirical Research Article</td>
<td>Qualitative – Case study</td>
<td>192 paddy farmers from five villages in the dry zone of Sri Lanka.</td>
<td>Perceptions of drought risk perceptions, beliefs about efficacy, village identification, and perceived descriptive norms</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------</td>
<td>------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>254</td>
<td>Turner et al. (2012).</td>
<td>Australia</td>
<td>Empirical Research Article</td>
<td>Quantitative - Survey</td>
<td>2011 floods on residents of the greater Brisbane region</td>
<td>Health impacts of the 2011 flood (mental and physical)</td>
</tr>
<tr>
<td>255</td>
<td>Tunstall et al. (2006).</td>
<td>England and Wales</td>
<td>Empirical Research Article</td>
<td>Mixed Methods Research – Survey (General Health Questionnaire and interview)</td>
<td>Sample of residents in 30 flood-affected areas</td>
<td>Health effects of flooding</td>
</tr>
<tr>
<td>256</td>
<td>Van Kessel et al. (2014)</td>
<td>Not Specified</td>
<td>Literature Review – Systematic Review (resilience and disaster interventions)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>257</td>
<td>Vasseur et al. (2015)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative - Interviews</td>
<td>Men and women from 10 coastal communities in three provinces (Quebec, New Brunswick, and Prince Edward Island)</td>
<td>Perceptions and reactions to extreme weather</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------</td>
<td>-------------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>259</td>
<td>Vida et al. (2012)</td>
<td>Canada</td>
<td>Empirical</td>
<td>Quantitative</td>
<td>Under age 65 and over age 65 for three geographic areas in Quebec</td>
<td>Behaviors, pathological worrying, and the Big Five personality traits</td>
</tr>
<tr>
<td>260</td>
<td>Vins et al. (2015)</td>
<td>Not Specified</td>
<td>Literature Review – Systematic Review (mental health outcomes related to drought)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>261</td>
<td>Wainwright et al. (2009)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (climate change and psychology)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>262</td>
<td>Waite et al. (2017)</td>
<td>England</td>
<td>Empirical</td>
<td>Quantitative</td>
<td>Households that had been flooded between Dec. 2013 and March 2014</td>
<td>Mental health outcomes of flood</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>263</td>
<td>Wang et al. (2014).</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Quantitative – Emergency department visits related to ambient temperatures</td>
<td>People who visited Toronto Emergency Room for behavioural and mental disorders during extreme temperatures.</td>
<td>Mental and behavioural disorders</td>
</tr>
<tr>
<td>264</td>
<td>Weissbeker (2011)</td>
<td>Global</td>
<td>Grey Literature (Climate change and human well-being)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>265</td>
<td>Wenden (2011).</td>
<td>Global</td>
<td>Grey Literature (Climate change, vulnerability, and women)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>266</td>
<td>West et al. (2008)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative – Cross-sectional survey</td>
<td>New Orleans Police Department (NOPD) personnel who provided law enforcement and relief</td>
<td>Post-Traumatic Stress Disorder</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>267</td>
<td>White et al. (2016)</td>
<td>Global</td>
<td>Literature Review – Narrative Review (global mental health and wellbeing)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>268</td>
<td>Wilby et al. (2012)</td>
<td>Various</td>
<td>Literature Review – Narrative Review (climate change adaptation to floods)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>269</td>
<td>Wilson et al. (2010)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Quantitative - GIS mapping</td>
<td>Areas vulnerable to climate change in the USA</td>
<td>Social and environmental determinants</td>
</tr>
<tr>
<td>270</td>
<td>Winkler et al. (2015)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (of mitigation and adaptation related to climate change)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>271</td>
<td>Wolf et al. (2015)</td>
<td>Canada</td>
<td>Empirical Research Article</td>
<td>Qualitative-Q interview methods</td>
<td>Sample of people in two Labrador communities</td>
<td>Values and traditional practices in</td>
</tr>
<tr>
<td>Article #</td>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
<td>---------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>272</td>
<td>Wolkin et al. (2015)</td>
<td>USA</td>
<td>Empirical Research Article</td>
<td>Qualitative – Interviews and workshops</td>
<td>Nine key informant interviews were conducted with emergency managers; workshop with emergency managers</td>
<td>climate change adaptation Social vulnerabilities and approaches to disaster management</td>
</tr>
<tr>
<td>273</td>
<td>Wulff et al. (2015)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (health resilience to disasters)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>274</td>
<td>Yusa et al. (2015)</td>
<td>Canada</td>
<td>Literature Review – Narrative Review (climate change, drought, human health)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>275</td>
<td>Zakour et al. (2013)</td>
<td>Not Specified</td>
<td>Grey Literature (disaster vulnerability and community)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>276</td>
<td>Zaremohz zabieh et al. (2013)</td>
<td>Not Specified</td>
<td>Literature Review – Narrative Review (Role of Internet in</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Article Citation</td>
<td>Country</td>
<td>Literature Type</td>
<td>Study Design (where applicable)</td>
<td>Participants</td>
<td>Outcomes Measured</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>flood protection and wellbeing for youth)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
References for Supplementary Materials


399


403


DisasterCenter at the University of Oklahoma Health Sciences Center, Oklahoma City, OK.


269. Wilson, S. M., Richard, R., Joseph, L., & Williams, E. (2010). Climate change, 
    environmental justice, and vulnerability: an exploratory spatial analysis. Environmental 
    Justice, 3(1), 13–19. DOI: 10.1089/env.2009.0035
270. Winkler, M. S., Röösli, M., Ragettli, M. S., Cissé, G., Müller, P., Utzinger, J., & Perez, 
    L. (2015). Mitigating and adapting to climate change: a call to public health 
    professionals. International Journal of Public Health, 6, 631-2. DOI:10.1007/s00038- 
    015-0722-7
    climate change. Evidence from a Q method study in two communities in Labrador, 
    Canada. Cambridge University Presshttps://doi.org/10.1017/CBO9781139149389.011
272. Wolkin, A., Patterson, J. R., Harris, S., Soler, E., Burrey, S., McGeehin, M., & Greene, 
273. Wulff, K., Donato, D., & Lurie, N. (2015). What is health resilience and how can we 
    publhealth-031914-122829
274. Yusa, A., Berry, P., J Cheng, J., Ogden, N., Bonsal, B., Stewart, R., & Waldick, R. 
    (2015). Climate change, drought and human health in Canada. International journal of 
    environmental research and public health, 12(7), 8359-8412.DOI:10.3390/ijerph120708359.
    promoting youth well-being in flood-prone communities. Asian Social Science, 9(11), 
    75–82. https://doi.org/10.5539/ass.v9n11p75
Appendix B: University of Toronto Ethics

October 20, 2017

Dr. Blake Poland
PUBLIC HEALTH SCIENCES (LSPH)
DALLA LANA SCHOOL OF PUBLIC HEALTH

Ms. Katie Hayes
PUBLIC HEALTH SCIENCES (LSPH)
DALLA LANA SCHOOL OF PUBLIC HEALTH

Dear Dr. Poland and Ms. Katie Hayes,

Re: Your research protocol entitled, "Responding to a changing climate: An investigation of the psychosocial consequences of climate change and community-based mental health responses in High River"

ETHICS APPROVAL

Original Approval Date: October 20, 2017
Expiry Date: October 19, 2018
Continuing Review Level: 1

We are willing to advise you that the Health Sciences Research Ethics Board (REB) has granted approval to the above-named research protocol under the REB’s delegated review process. Your protocol has been approved for a period of one year and ongoing research under this protocol must be renewed prior to the expiry date.

Any changes to the approved protocol or consent materials must be reviewed and approved through the amendment process prior to its implementation. Any adverse or unanticipated events in the research should be reported to the Research Oversight and Compliance Office - Human Research Ethics Program as soon as possible.

Please ensure that you submit an Ethics Renewal Form or a Study Completion/Closure Report 15 to 30 days prior to the expiry date of your current ethics approval. Note that ethics renewals for studies cannot be accepted more than 30 days prior to the date of expiry.

If your research is funded by a third party, please contact the assigned Research Funding Officer in Research Services to ensure that your funds are released.

Please note, all approved research studies are eligible for a routine Post-Approval Review (PAR) site visit. If chosen, you will receive a notification letter from our office. For information on PAR, please see http://www.research.utoronto.ca/wp-content/uploads/documents/2014/05/PAR-Program-Description-1.pdf.

Best wishes for the successful completion of your research.

Yours sincerely,

Elizabeth Polis, Ph.D.
REB Chair
Appendix C: Alberta Health Services Ethics

### Study Information

<table>
<thead>
<tr>
<th>Title: Responding to a Changing Climate: An Investigation of the Psychosocial Consequences of Climate Change and Community-Based Mental Health Responses in High River</th>
<th>Expected End Date:</th>
<th>September 30, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected No. of Subjects: 45</td>
<td>Study Type:</td>
<td>Observational</td>
</tr>
<tr>
<td>Intervention Type (if applicable): Choose an item.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Research Ethics Board

<table>
<thead>
<tr>
<th>REB #: Pro00080568</th>
<th>REB Approval Date: 7 March 2018</th>
</tr>
</thead>
</table>

### Research Finance

<table>
<thead>
<tr>
<th>Funding Source: None (If multiple sources, select all that apply)</th>
<th>Sponsor/Funder Name(s): Unfunded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Account Administered by: Choose an item.</td>
<td>Account Reference Number(s):</td>
</tr>
<tr>
<td>Financial Account Administered by: Choose an item.</td>
<td>Account Set-up Status: Choose an item</td>
</tr>
</tbody>
</table>

### Research Contracting

<table>
<thead>
<tr>
<th>Contract or Legal Requirements Negotiated/Administered by: Choose an item</th>
<th>CIA/Legal Requirements Completion Date: Click here to enter a date.</th>
</tr>
</thead>
</table>

### Purchased Services Agreement Executed

<table>
<thead>
<tr>
<th>Lab</th>
<th>Choose an Item</th>
<th>Pharmacy</th>
<th>Choose an Item</th>
<th>HIM</th>
<th>Choose an Item</th>
<th>Other (specify): Choose an Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI</td>
<td>Choose an Item</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Choose an Item</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Principal Investigator

<table>
<thead>
<tr>
<th>Name: Katie Hayes</th>
<th>Name: Katie Hayes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty: Other PhD Candidate</td>
<td>Title:</td>
</tr>
<tr>
<td>Department: N/A</td>
<td>Research Team/Unit:</td>
</tr>
<tr>
<td>Division: N/A</td>
<td>Phone: 202.365.7640</td>
</tr>
<tr>
<td>University: Other</td>
<td>Email: <a href="mailto:katie.hayes@mail.utoronto.ca">katie.hayes@mail.utoronto.ca</a></td>
</tr>
<tr>
<td>Email: <a href="mailto:katie.hayes@mail.utoronto.ca">katie.hayes@mail.utoronto.ca</a></td>
<td></td>
</tr>
</tbody>
</table>

### Study Summary

This study aims to explore the resources (programs, policies, support networks, services, etc.) available to support the mental health wellbeing of people who have recently experienced an extreme weather event. The researcher's goal is to understand the impact of the 2013 High River flood on residents of this community and also to understand what types of resources were and are available to support their mental health and wellbeing before, during, and after the flood – including the present-day resources.
B. Population under Recruitment:

In order to contact participants to take part in key informant interviews, the researcher will collect potential participants’ names, email addresses, telephone numbers, and addresses (where applicable). This information will be sourced primarily through publicly available documents found on the internet. The researcher may also receive this information from participants who have joined the study through recruitment posters.

C. Operational Impacts:

The researcher would like the recruitment poster to be placed in both the High River Public Health Clinic and the High River Mental Health Clinic. The poster is to recruit the general public to participate in a telephone survey. If staff wished to take part in the research (as the general public) they can participate as well during non-work hours.

The researcher is requesting that one staff member be interviewed for one hour during work time. The staff’s name is Laurie Roe. The researcher is not requesting the contact information for this staff member. The researcher will obtain the contact information from public sources. In an initial review I do not see that Laurie Roe is an employee of AHS at this time.

As well the researcher will be contacting Dr. Michael Trew, as physicians are not AHS staff O/A is not needed for this person.

Interviews will be conducted over the phone and a second interview may be conducted in person, the researcher is not requesting any space in an AHS facility for the in person interviews.

<table>
<thead>
<tr>
<th>Operational Area Impacted</th>
<th>Approver Name</th>
<th>Title</th>
<th>Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Rural Mental Health</td>
<td>High River</td>
<td>Janet Clae - Assessor Kim Fraché</td>
<td>Executive Director - Addiction &amp; Mental Health</td>
</tr>
<tr>
<td>Community Public Health</td>
<td>High River Public Health Centre</td>
<td>Laurie Blandíka - Assessor Shelly Philley</td>
<td>Executive Director - Community, Rural, and Mental Health, Calgary Zone</td>
</tr>
</tbody>
</table>

D. AHS Staff as Study Subjects – Summary of Impact:

One person (Laurie Roe) is being requested to have a one hour interview during work time. The researcher will use the internet to contact this person for their contact information.

E. Transfer of AHS Data: N/A

<p>| AHS Administrative Approval (All Zones Except Edmonton): |</p>
<table>
<thead>
<tr>
<th>Date Issued</th>
<th>Name of Approver</th>
<th>Title</th>
<th>Approved</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 9, 2018</td>
<td>Carrie-Anne Dick</td>
<td>Research Administration Advisor</td>
<td></td>
</tr>
</tbody>
</table>
Appendix D: Key Informant Interview Guide

Below is an interview guide for the Key Informant Interviews.

1. Can you provide me with a bit of background on your organization?
   a) Probe: What does your organization do? How does it do it?
   b) Probe: Structure, governance, how it is funded, broad description of your clientele, etc.

2. What is your role with this organization?

3. (How) does your organization support the mental health and well-being of High River residents? What are the specific services, materials, interventions you offer in this regard? Probes:
   a) When are these services available?
   b) How are these services offered?
   c) Who funds these services?
   d) Who benefits most from these services?
   e) Who tends to rely most on these services (e.g. youth? Women? Elderly? People with low SES?)
      • Why do you think these groups are most reliant on these services?
   f) In your opinion, do you think there are groups in High River who are currently underserviced with regard to services that support mental health and well-being? If so, why do you think this is the case? If not, can you please explain?

4. What (other) resources (facilities, groups, centers, policies, materials, etc.) are currently available in High River to support mental health and wellbeing?
   a) (How) do you work with these resources?
      • Are there any challenges between your organization and these other resources? If so, can you describe them for me?

5. Following extreme weather events, like the 2013 flooding did you see a change in the number of clients accessing (or attempting to access) resources to support their mental health and well-being? Probes:
   a) If so, what type of support were clients accessing (or attempting to access)
      • (Probe: for what type of conditions and/or situations)

6. Are there any specific resources that are available to support mental health and wellbeing before, during, and after extreme weather events? (like the 2013 flooding). Probes:
   a) Does your organization increase services after these events? If so, can you describe these services?
b) More broadly, did you see a change in the number or level of services throughout High River to support mental health and wellbeing immediately after the 2013 flooding? If so, can you describe these changes?

c) What about a few months to a year after the 2013 flooding, were there any changes in resources that support mental health and wellbeing? Can you describe these changes?

7. In the past 5 years have you seen any changes in requests/demand (from the community) for mental health and wellbeing services from your organization? If so, can you describe these requests for services?

8. In the past 5 years have you seen any changes level or number of services that support mental health and well-being in High River? If so, can you describe these changes?
   a) What are the most significant changes that have occurred within your organization over the past 5 years that may support mental health and wellbeing of your clientele?

9. Does your organization implement any specific strategies to support mental health and well-being related to the larger issue of climate change? If so, can you describe these for me?

10. In your opinion, do you think climate change presents any risks to the mental health and well-being of High River residents? If so, can you please describe these risks? If not, why do you think this is not the case? (Probe: what groups or geographic areas are most at risk in your opinion, why?)

11. Is there anything else you think I should know?
### Appendix E: Key Informant Interview Codebook

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A deluge of psychosocial outcomes</td>
<td>Psychosocial Impacts of the flood, e.g: trauma, anxiety, flood babies; suicide; stress-related deaths; food bank use; domestic abuse; displacement, irreplaceable loss; ‘loss of innocence’; ‘understanding of social issues’; sense of community; resiliency</td>
</tr>
<tr>
<td>2.</td>
<td>Core community services and resources</td>
<td>Description of type of care, including: history; governance and funding; hours of operation; populations served; roles and responsibilities; novel aspects of care; community-based or formal care; collaborations and partnerships</td>
</tr>
<tr>
<td>3.</td>
<td>Parachute services and resources</td>
<td>Descriptions of services and resources that are not from High River these may include temporary, short-term supports that came to High River. This code captures the: history; governance and</td>
</tr>
<tr>
<td>Code</td>
<td>Definition</td>
<td>Rationale</td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
<td>-----------</td>
</tr>
<tr>
<td>4.</td>
<td>When helping is hurting</td>
<td>Services that aim to provide support, however, they may inadvertently cause negative effects. (e.g. parachuting in to the community without knowledge of the community or consultation with the community; when services leave and set expectations for the community that can’t be met; impersonal intake with mental health clients; unawareness of psychosocial needs when addressing basic needs; challenges of responding without a plan; limitations to services offered; timing and location of services (e.g. hours of operation, where services operate); off-loading responsibility; language used around mental health as a barrier)</td>
</tr>
<tr>
<td>5.</td>
<td>Building capacity to cope</td>
<td>Supporting individuals’, organizations’, communities’ capacity to cope (e.g. Walking alongside people to build self-efficacy; building rapport; supporting communities to build their own capacity to address mental health needs; collaborations amongst organizations)</td>
</tr>
<tr>
<td>6.</td>
<td>Drawing comparisons and juxtapositions</td>
<td>Comparing or contrasting experiences, e.g: Insurable vs. non-Insurable events; flood vs fire (e.g. Fort McMurray); insurance coverage; comparing flood damage; insiders (residents) vs.</td>
</tr>
<tr>
<td>Code</td>
<td>Definition</td>
<td>Rationale</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>outsiders (people outside of High River) experiences; comparisons based on where displaced to (e.g. Saddlebrook vs. family supports); comparing immigrant experiences to Canadian experiences; rural vs. urban experiences; comparing socioeconomic experiences; comparing needs</td>
<td>interview respondents made. In nearly every interview there was some form of comparison or juxtaposition highlighted, particularly when talking about the extent of flooding that people had or when comparing floods to fires (e.g. experiences of people exposed to the High River flood and people exposed to the Fort McMurray wildfires).</td>
</tr>
<tr>
<td>7. Hierarchy of needs</td>
<td>Community needs before 2013, during the flood (June 2013), after (2-3 years; 2013-2016), to present day (to 2018) (e.g. Need for safety, security and shelter during event; emergence of mental health care after safety and security restored)</td>
<td>-This code captures the verbatim or nuanced reference to Maslow’s hierarchy of needs that participants spoke about. -This code was created to capture participants’ expressions of the community’s needs (and how these needs changed) during three key time frames: during the flood, after the flood, and present day.</td>
</tr>
<tr>
<td>8. The journey of recovery</td>
<td>Lingering mental health effects post-flood (PTSD, anxiety) or lingering mental health effects triggered by the flood; triggers and reminders (e.g. anxiety when it rains; anxiety on the anniversary); long-term effects; socioeconomic strain</td>
<td>This code reflects the participants’ reference to the length of recovery and/or that recovery is the current state that High River is in. This code was created to capture references to stressors over time, remedies, and the ongoing processes of recovery linked to the flood.</td>
</tr>
<tr>
<td>9. Ignorance is bliss?</td>
<td>Coping with mental health and/or climate change though self-medicating; denial, disavowal, and scapegoating.</td>
<td>This code reflects the query that ignorance may not be bliss.</td>
</tr>
<tr>
<td>Code</td>
<td>Definition</td>
<td>Rationale</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>420</td>
<td>Questioning ignorance related to reaching out for social services; questioning ignorance of the relationship between people and their environment</td>
<td>This code was created to capture references to ignoring the mental health outcomes through addictions or by ignoring the climate change problem through denial, disavowal or scapegoating. These forms of ignorance are framed by participants as a way of coping. This code captured ignorance at the individual and societal levels.</td>
</tr>
<tr>
<td>10. Looming</td>
<td>Looming risk of climate change, extreme weather, environmental degradation; how these environmental risk factors affect psychosocial wellbeing</td>
<td>This code was created to capture participants’ references to the ongoing risks of flooding, of climate change, and/or of environmental degradation.</td>
</tr>
<tr>
<td>risks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. In the</td>
<td>People or groups who are perceived to be overlooked by mental health care OR who avoid accessing mental health care. E.g. People who aren’t accessing psychosocial care despite needs (stigma, stoicism, pride, financial barriers or physical barriers); underserviced populations (including people in caring profession); people falling through the system</td>
<td>This code was created to capture participant’s discussions on who is overlooked with regard to accessing mental health care. This code is meant to capture the people and groups that interview respondents highlighted as those who could use/needed care but did not seek support because of stigma or physical or financial barriers to access.</td>
</tr>
<tr>
<td>shadows</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. In the</td>
<td>People or groups who are perceived to be the most at risk; people who receive supports (e.g. elderly, kids, people with special needs)</td>
<td>This code was created to capture the people that respondents highlighted as the people who were/are most at risk to the mental health consequences of the flood and/or those who receive the most support.</td>
</tr>
<tr>
<td>spotlight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Bouncing</td>
<td>References to resilience (or lack thereof); references to getting back to ‘normal’ or the lack of normal; flood</td>
<td>This code was created to capture the words of respondents who spoke</td>
</tr>
<tr>
<td>Code</td>
<td>Definition</td>
<td>Rationale</td>
</tr>
<tr>
<td>------</td>
<td>------------</td>
<td>-----------</td>
</tr>
<tr>
<td>14. Nothing about us without us</td>
<td>Local knowledge and expertise; those closest to the problem are the best ones to solve the problem</td>
<td>This code is a phrase that captures, verbatim, one of the respondent’s phrases about the need for local knowledge and decision making. This code was created to capture how respondents talk about the need for localized solutions that include local perspectives, opinions, and input.</td>
</tr>
<tr>
<td>15. Re-traumatization and the second disaster</td>
<td>Stress related to Disaster Recovery Program (DRP); dealing with insurance; constant construction</td>
<td>This code was created to capture what participants often referred to as “the second disaster” which was the government-led Disaster Recovery program. This code is also used to capture participants discussions about re-traumatisation related to dealing with insurance or seeing construction in the community.</td>
</tr>
<tr>
<td>16. Flood identity</td>
<td>Flood as a defining moment for community; an automatic bond; a shared history; a different understanding; a sense of coming together</td>
<td>This code was created to capture participants framing of how people identified with the flood; many participants indicated that the flood was an event that created a sense of shared history – something that could not be</td>
</tr>
<tr>
<td>Code</td>
<td>Definition</td>
<td>Rationale</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>17. Navigating</td>
<td>Overflow of compassion for communities and neighbours; compassion fatigue (especially amongst people in caring professions); compassion for people who have experienced disasters in other communities/countries</td>
<td>understood unless you had experienced it. This code was created to capture the way participants spoke about compassion, about the overflow of compassion for friends and neighbours but also the challenges of experiencing or witnessing compassion fatigue.</td>
</tr>
<tr>
<td>Compassion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Community</td>
<td>Elements of High River that existed before the flood (and potentially after); the character of High River. E.g.: Strong sense of community before flood; features of a rural community; a sense of community after the flood that needs to be woven into the existing fabric.</td>
<td>This code was created to capture how respondents articulated the features of High River that existed (and potentially still exist) after the flood.</td>
</tr>
<tr>
<td>fabric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Apparatuses</td>
<td>Using Foucault’s term “apparatuses of security” to describe expressions of power through processes of control that govern self-regulating behaviours. Foucault’s term, ‘apparatuses (dispositifs) of security’, refers to knowledge structures (e.g. ideologies), institutional and physical mechanisms, and processes that regulate behaviours.</td>
<td>This code was created to describe expressions of power and control. This code captures the operation and execution of power that participants highlighted in the interview.</td>
</tr>
<tr>
<td>of security</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I understand apparatuses of security to mean: expressions of power through social-environmental control.

Apparatuses of security in this study include mechanisms (policies, actions, protocols, ideologies, knowledge structures) that guide/govern/control social-environmental relationships, like:

- Declaring state of emergency, forced evacuation, military brought in;
- Funding mechanisms, governance (e.g. control of operations, who, how, when, to provide support) and execution of mental health provisions and
<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>infrastructure rebuilding (e.g. DRP, insurance) related to the flood</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Declaring annexed lands and flood zones</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Ideologies, perceptions, and actions around climate change, mental health (how climate change and/or mental health is framed or avoided)</td>
<td></td>
</tr>
</tbody>
</table>

*Note: As noted in my proposal I take a Foucauldian approach to power (power acting as a colour dye throughout the entire social fabric – permeating all relationships); I also look at power from the lens of Michal Mann who describes power as relational and that there are four key sources of power (military, political, economic, and ideological).*

*Broadly, this code helps me to analyze expressions of power and sources of power related to the psychosocial response to climate-related extreme weather.*
Appendix F: Focus Group Guide

1. Before the 2013 flooding, what types of resources (facilities, groups, centers, specific people, neighbourhood groups, materials, etc.) were available to support the well-being and mental health of High River residents?
   a) What did these resources offer?
   b) Where were these resources located?
      o (Note: all participants will have an enlarged map of the city and can identify these resources by noting them with a marker on the map)
   c) To your knowledge, who managed these resources (e.g. specific people, groups, institutions, organizations?)
      o To your knowledge, did any of these people, groups, institutions, organizations work together?
      o To your knowledge, were there any noticeable challenges or tensions between any of these people, groups, institutions, organizations?
   d) In your opinion, were there any barriers for accessing these resources?
      o Barriers can include things like: transportation issues, not feeling welcome, communication challenges, not open during specific times, too far to access, etc.
   e) Do any of these resources work with specific populations (e.g. youth, women, First Nations Peoples, etc.)? Please explain.

2. In the days, weeks, and months following the 2013 flooding, what types of resources (facilities, groups, centers, specific people, neighbourhood groups, materials, etc.) were available to the community to support well-being and mental health? (note: you do not need to repeat the resources already mentioned)
   a) What did these resources offer?
   b) Where were these resources located? (Probe: see map)
   c) Who managed these resources (e.g. specific people, groups, institutions, organizations?)
      • Did any of these people, groups, institutions, organizations work together?
      • Where there any noticeable challenges or tensions between any of these people, groups, institutions, organizations?
   d) Were there any barriers to accessing these resources?
      • Barriers can include things like: transportation issues, not feeling welcome, communication challenges, not open during specific times, too far to access, etc.

3. What resources that were mentioned earlier are no longer available? To your knowledge, why are these resources no longer available?
4. What types of resources are available now (in addition to those mentioned earlier – note: you do not need to repeat the resources already mentioned)?
   a) What do these resources offer?
   b) Where are these resources located?
   c) Who manages these resources (e.g. specific people, groups, institutions, organizations?)
      - Do any of these people, groups, institutions, organizations work together?
      - Are there any noticeable challenges or tensions between any of these people, groups, institutions, organizations?
   d) Are there any barriers to accessing these resources?
      - Barriers can include things like: transportation issues, not feeling welcome, communication challenges, not open during specific times, too far to access, etc.
   e) What resources that were mentioned earlier are no longer available?

5. In your opinion are there any resources or interventions that you have noted that stand out to you? Why?

6. Do any of the resources you mentioned address the broader problem of climate change? If so, how?
## Appendix G: Focus Group Codebook

<table>
<thead>
<tr>
<th>Theme</th>
<th>Details</th>
</tr>
</thead>
</table>
| **1. Communication Breakdown** | - Issues with communications breakdown, before (lack of warning - no early warning system), during (cell towers unavailable) and after the flood.  
  - Comms system failed us, no cell service, no landlines  
  - Misinformation after the flood and a lack of focus on High River (a lot of the focus was on Calgary) – contributed to panic, worry, and instability  
    - Fed a different message by the news media about damage and destruction; needed to see it themselves  
  - Finding a balance between panic and protection: Now there are early warning systems in place – challenges of balancing between panic and protection – warning systems can be anxiety inducing for people  
  - Language of infuriation: After the flood, the following would trigger people: “getting things back to normal;” – drove people crazy; “It’s called High River, what did they expect?” also a point of contention.  
    - “I don’t want to be known as the flood town – don’t want this to be my story”  
  - Media merits: media called out inconsistent insurance practices and coverage  
  - Word of mouth: people telling each other about resources vs. getting info from official sources  
  - Warning apps – trigger people – makes people anxious  
  - Interpreters: had to get stuff translated on the fly  
  - Health System: Hospital evacuated (women in labour); assisted living evacuated; all agencies displaced (doctor’s offices, core agencies: Rowan, Literacy for Life, Wildrose Community Services; SNAPS)  
  - Physical: ‘High River Hack’ (air quality and mold); asthma;  
  - Suicide and death: Concerns about suicide rates after flood, rise in suicide events (anecdotal evidence) and death of elderly after the flood (surge in funerals); suicide attempts  
  - Family challenges: divorce  
  - Trauma: changes relationships and your trajectory  
  - Lack of control: over things being taken away; over environment  
  - Whole community affected: physical, mental, emotional |
| **2. A deluge of psychosocial outcomes** | |

426
<table>
<thead>
<tr>
<th>Theme</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psychosocial needs:</strong></td>
<td>The psychosocial impacts related to the flood still very present today; lots of reported issues related to socioeconomic challenges</td>
</tr>
<tr>
<td><strong>Complicated emotions:</strong></td>
<td>Hard time feeling empathetic; guilt of not being more affected when comparing to your neighbors, friends, family. Wanting to help community more but burning out and not helping one’s own situation first; anger, distrust, anxiety but also an overwhelming sense of community.</td>
</tr>
<tr>
<td><strong>Comparison:</strong></td>
<td>Comparing to fort Mc (Fire vs flood); comparing insurance; comparing loss; comparing grief; comparison also based on how people were coded (e.g. homes were coded by level of impact: red, orange, yellow, green) – nobody wanted to admit they were green, red was a badge of honour); comparison to Calgary (difference is that HR is a close-knit community); ‘everything feels unfair’</td>
</tr>
<tr>
<td><strong>Guilt:</strong></td>
<td>People who weren’t affected feeling bad for those whose whole world was affected</td>
</tr>
<tr>
<td><strong>Relationship with stuff:</strong></td>
<td>Not wanting things; wishing that some things had been salvaged; having to make decisions in difficult times; holiday items; increase in hoarding</td>
</tr>
<tr>
<td><strong>Timing:</strong></td>
<td>Suicides 2+ years later; 6-9 months after physical trauma, mental health implications (esp. because of financial issues)</td>
</tr>
<tr>
<td><strong>Triggers:</strong></td>
<td>Rain, anniversary, what people would say; one-year ceremony to commemorate people who died; sounds, smells; darkness)</td>
</tr>
<tr>
<td><strong>Violence and aggression:</strong></td>
<td>Picking fights as a coping mechanism; rise in domestic abuse;</td>
</tr>
<tr>
<td><strong>Anger:</strong></td>
<td>Lack of control, nobody to blame</td>
</tr>
<tr>
<td><strong>Volume of people affected:</strong></td>
<td>Emotions escalate; waiting around during crisis and early recovery stage;</td>
</tr>
<tr>
<td><strong>Mental health and emotional crisis</strong> – participants noted they are different</td>
<td></td>
</tr>
<tr>
<td><strong>Sense of community:</strong></td>
<td>A huge part of the experience “High River Strong – this is who we are”</td>
</tr>
<tr>
<td><strong>Overwhelming generosity:</strong></td>
<td>So much food; huge sense of community</td>
</tr>
<tr>
<td><strong>Desensitized with disaster:</strong></td>
<td>Not programmed to think something bad will happen until it does</td>
</tr>
<tr>
<td><strong>Whole town trauma</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Took everything to be empathetic</strong></td>
<td></td>
</tr>
<tr>
<td>Theme</td>
<td>Details</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Sick from heat and mold:</strong> noise was ridiculous, no parks for kids</td>
<td></td>
</tr>
<tr>
<td><strong>Survivor guilt:</strong> huge in the town</td>
<td></td>
</tr>
<tr>
<td><strong>Death of animals – subsequent psychosocial impacts</strong></td>
<td></td>
</tr>
<tr>
<td><strong>3. Displacement</strong></td>
<td>Displacement to high school, then to Blackie, Nanton, Okotoks, Lethbridge, Calgary (incl. University of Alberta), Saddlebrook; Rodeo groups as place to pick up cleaning supplies, water; some people never came back to High River’ those permanently displaced had less access to any of the mental health supports; Okotoks and Calgary did have some flood-related mental health resources.</td>
</tr>
<tr>
<td>People having to quit jobs because of where they were displaced to</td>
<td></td>
</tr>
<tr>
<td>Hospitals needed to evacuate within 48 hours; there were women in labour</td>
<td></td>
</tr>
<tr>
<td>Schools – getting kids out as quick as they could</td>
<td></td>
</tr>
<tr>
<td>All agencies displaced</td>
<td></td>
</tr>
<tr>
<td>Evacuation centers set up in Blackie, Nanton, Okotkos</td>
<td></td>
</tr>
<tr>
<td>Seniors homes evacuated – displaced and then when they were able to return one of the centers caught fire</td>
<td></td>
</tr>
<tr>
<td>Only 1 church didn’t flood</td>
<td></td>
</tr>
<tr>
<td>Welcome center set up at Rodeo grounds – people could pick up cleaning supplies</td>
<td></td>
</tr>
<tr>
<td>Hamptons neighbourhood 17-20 days not allowed in</td>
<td></td>
</tr>
<tr>
<td><strong>4. The Journey of Recovery</strong></td>
<td><strong>Recovery:</strong> Long term; 2 years out “shouldn’t I be over this?” – 5 years later same situation; still happening today; triggers (every spring, when it rains); still difficulty talking about flood; living in state of fear; everyone can define the starting point but not when it ends</td>
</tr>
<tr>
<td><strong>Humbled:</strong> not used to asking for help; awareness of what it means to be without, to be homeless;</td>
<td></td>
</tr>
<tr>
<td><strong>Stigma of mental health:</strong> still here but getting better; Wanting self-efficacy (why can’t I do this on my own?); fear of going to Calgary Counselling Service;</td>
<td></td>
</tr>
<tr>
<td><strong>Coping:</strong> unhealthy coping (picking fights); spike in drug use; lingering effects; tears at community meetings; people feeling like they are getting left behind; rhetoric of ‘take care of yourself’ – how when life is in shambles;</td>
<td></td>
</tr>
<tr>
<td>Theme</td>
<td>Details</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>• It was important to know the level of impact (how people were coded; the town provided bus tours so people could see the</td>
<td></td>
</tr>
<tr>
<td>• People still angry – tears still at town hall meetings; business gone;</td>
<td></td>
</tr>
<tr>
<td>• Spring of 2018; heighten mental health needs – “crisis levels”</td>
<td></td>
</tr>
<tr>
<td>• “can’t discount that there is still recovery today”</td>
<td></td>
</tr>
<tr>
<td>• “Seeing the sandbags makes me realize we are still not over it”</td>
<td></td>
</tr>
<tr>
<td>• After basic needs met, mental health needs emerged: “after getting things back to ‘normal’, why am I feeling like this? Shouldn’t I be over it?”</td>
<td></td>
</tr>
<tr>
<td>• A ceremony was held one year later for the 4 people who died, many people were angry about the ceremony – wanting to move forward</td>
<td></td>
</tr>
<tr>
<td>• Continuing triggers – rains, sounds, darkness</td>
<td></td>
</tr>
<tr>
<td>• Kids are anxious, as well as their parents, feeding off of their parents energy</td>
<td></td>
</tr>
<tr>
<td>• Morning items; concerns about mold on things that have been kept</td>
<td></td>
</tr>
<tr>
<td>• From trauma to strength</td>
<td></td>
</tr>
<tr>
<td>• Desire to be able to solve mental health with self-help; “why can’t I do it myself?”</td>
<td></td>
</tr>
<tr>
<td>• “Emotions still raw 5 years later”</td>
<td></td>
</tr>
<tr>
<td>• Go on autopilot, in denial</td>
<td></td>
</tr>
<tr>
<td>• Looking at a 5 to 10 year recovery if nothing else happens – need for sustainable care</td>
<td></td>
</tr>
<tr>
<td>• Everybody can define the starting point but not the end point</td>
<td></td>
</tr>
<tr>
<td>• Don’t always see the mental health needs</td>
<td></td>
</tr>
<tr>
<td>• Anger - mother nature did this to us – changed our lives permanently (Discuss with perceptions about CC)</td>
<td></td>
</tr>
<tr>
<td>• “Trauma changes your trajectory and your relationships”</td>
<td></td>
</tr>
</tbody>
</table>

5. **Divergent experiences for newcomers:**

- Immigrants in High River had different experiences with the flood, this was often not their first experience with extreme weather events or large-scale trauma; most felt overwhelmed by the outpouring of generosity from strangers and especially from the government; if this were Kenya or Philippines the government wouldn’t help people out.
- Democratic voice; immigrant population found this interesting
<table>
<thead>
<tr>
<th>Theme</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immigrant population not trusting banks, had money in boxes – lost everything that tried to acquire in Canada</td>
<td></td>
</tr>
<tr>
<td>Underserviced: vital communication not translated; if people lost their IDs they couldn’t access services; lack of culturally appropriate food</td>
<td></td>
</tr>
<tr>
<td>Temporary foreign workers very: mostly sent to temporary community (Saddlebrook – located near Cargill); placed in trailers in the middle of nowhere. Concerns about how to get to work; some displaced to Lethbridge, UofA; 2 hours to commute to Cargill; Saddlebrook built and bus system put in place to get people to and from work.</td>
<td></td>
</tr>
<tr>
<td>Immediate concerns: how do I get back to work? Many were used to their governments not doing anything post-disaster</td>
<td></td>
</tr>
<tr>
<td>Immigrant community: Syrian refugees, philipino, African, Latino</td>
<td></td>
</tr>
<tr>
<td>Services that came into High River from Calgary, Edmonton, or outside of the province to provide psychosocial support – these services ‘tell you what you need not ask you what you need”; lack of respect for what locals need; ‘intention pure but ability to be of service rather than create unintentional problems). These services disappeared after funding dried up. ‘Setting expectations, now what?’. Also issues with being told what ‘we need’ vs being asked ‘what do we need’. Important to build local capacity.</td>
<td></td>
</tr>
<tr>
<td>“band-aid solutions”</td>
<td></td>
</tr>
<tr>
<td>Temporary community Saddlebrook – 2 years: good food, good services – but when funding gone – now what?</td>
<td></td>
</tr>
<tr>
<td>Crisis response for immigrants – not culturally relevant (e.g. food); small, simple changes needed; getting signs translated on the fly; greeting people in their mother tongue</td>
<td></td>
</tr>
<tr>
<td>AHS - Door knocking campaign; Psychosocial flood discussions/committee</td>
<td></td>
</tr>
<tr>
<td>Social sustainability club (focus was on making sure the work done post-flood wouldn’t disappear)</td>
<td></td>
</tr>
<tr>
<td>Services that became sustainable – High River Cares became ‘Our High River’; noting that community needs to sustain the town</td>
<td></td>
</tr>
<tr>
<td>Hearts and minds (came in before the flood but was an active resource post-flood)</td>
<td></td>
</tr>
<tr>
<td>Theme</td>
<td>Details</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>AHS given a ton of money – to provide registered psychologists to schools.</td>
<td>• AHS services post-flood; seniors support services; grief support clubs</td>
</tr>
<tr>
<td>Most services gone after 2 years – band-aid solutions</td>
<td>• Provincial funding in bits and pieces</td>
</tr>
<tr>
<td>Services were once free but now have to pay for them</td>
<td>• Services were once free but now have to pay for them</td>
</tr>
<tr>
<td><strong>When helping is hurting:</strong></td>
<td>• “They don’t ask what you need, they tell you what you need”</td>
</tr>
<tr>
<td></td>
<td>• “step back from the desire to help, tunnel vision, intentions are pure but the ability to be of service rather than create unintentional problems”</td>
</tr>
<tr>
<td>Lack of crisis training for – at check-in, volunteers noted: “why do they all cry?”</td>
<td>• “Calgary Counselling Center – amazing – connected through FCSS – they left and there was a huge outcry – nothing else available – waitlists – FCSS arranged to bring back and called High River counselling center</td>
</tr>
<tr>
<td>Red Cross was instrumental in opening centers</td>
<td>• Red Cross was instrumental in opening centers</td>
</tr>
<tr>
<td>After 2 days the federal and provincial government were involved</td>
<td>• After 2 days the federal and provincial government were involved</td>
</tr>
<tr>
<td>Samaritan’s Purse</td>
<td>• Samaritan’s Purse</td>
</tr>
<tr>
<td>Calgary City personnel sent</td>
<td>• Calgary City personnel sent</td>
</tr>
<tr>
<td>Saddlebrook set up - Hull Services brought in</td>
<td>• Saddlebrook set up - Hull Services brought in</td>
</tr>
<tr>
<td>Schools – speakers brought in to talk about trauma</td>
<td>• Schools – speakers brought in to talk about trauma</td>
</tr>
<tr>
<td>Canadian mental health brought people in</td>
<td>• Canadian mental health brought people in</td>
</tr>
<tr>
<td>untraditional – drum circle; drop-in programs</td>
<td>• untraditional – drum circle; drop-in programs</td>
</tr>
<tr>
<td>Getting kids to play- creative solutions; art therapy and music therapy</td>
<td>• Getting kids to play- creative solutions; art therapy and music therapy</td>
</tr>
<tr>
<td>Acupuncture services</td>
<td>• Acupuncture services</td>
</tr>
<tr>
<td>Red cross made town “jump through hoops to get donated money” – added stress; “in the first 1-2 months they were a god-sent, after that they were a barrier” didn’t ask what community wanted or needed; red tape of Red Cross, “don’t parachute in and tell people what to do” -won’t donate to them; donate directly to community; RC didn’t build relationships with community</td>
<td>• Good things from Red Cross: they’d cover thing the DRP wouldn’t</td>
</tr>
<tr>
<td>Religious groups that came in to respond: Samaritans purse; Mennonites; Christian Reform; World Renew;</td>
<td></td>
</tr>
<tr>
<td>Theme</td>
<td>Details</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
</tbody>
</table>
| **7. Core community services and resources** | • “Paternalistic approach – ‘we are the experts’ – we would love for you to do the work but just ask us!”

- Core services in the community before and after the flood:
  - AHS services (MH clinic); Hospital; Salvation army; First Responders; churches; government resources (disaster response); immigrant services (FCIS); FCSS; Wildrose Community Connection; SNAPS; Fetal alcohol society; AIMS (adult – employment and housing); literacy for life; Rowan shelter (created in 2012); seniors tea; McBride career group; Work place benefits (e.g. EAP); Mental health and victim services (responded to Flood); Mobile response team (available: before, during, and after); private counselors and psychologists; Parent links; Public Health; Childrens Rehan services; Recreation center; Service clubs (Rotary, Lion’s club; Scouts); Ministerial associations; Morman’s; Children and family services; school services; Veterinary services; Medicine Tree Manor; Assisted living for adults; Foothills foundations; healthy moms, healthy babies program; postpartum support groups; seniors friendship center; 1 social worker at hospital; Food for thought (meals for kids at school); clinics in town; grief counselling and support; Detours
- Interagency meetings before the flood and after – hearing what groups are dealing with in the community; sharing information and strategies
- After the flood: doing things differently (e.g. social profits; emergency response coordination; psychological first aid; soft-touch mental health); however, not prepared to support our colleagues;
- *Participants noted that they should have been meeting before the focus group
- How to sustain relationships with parachute services (me vs them; support + help)
- “way more community-based services since the flood”
- Lots of resources available to High River but not in High River (Calgary; Okotoks); need to travel to Calgary for many mental health needs
- Faith-based services lauded – “they were awesome”; don’t have to be a member for them to help you
- Groups working together – need to do that all the time – now groups are reaching out and working together more |
### Theme | Details
--- | ---
FCSS – | provided a 2 pager – where to go, what to do; created interagency meetings; connected with Slave Lake to learn from their experiences
AHS – before the flood, there was a review of the services and mental health needs; the review identified a lack of available mental health and addictions care
* Spent 6 months on the terms of reference for psychosocial committee; “AHS didn’t listen to our feedback”; AHS report got lost – people would go to Calgary for mental health services
* An immigrant family pushed the father to get help because of his depression, too months; finally went to AHS and they said there was nothing they could do to help
* Programs focus on staff need not patient need
* “Mental health needs don’t end at 5PM”
* “Other agencies pick up the pieces because AHS has dropped the ball”

8. **Caring Community Fatigue:**

- majority of people from High River who work in some form of caring/first responder field were personally affected by the flood; there was a ‘call to duty’ to help out their own community but also a lot of burnout because a sense of home/refuge/disconnection was lost; our services not able to make decisions because they were in the thick of it.
- Lack of concern (by employers) for those in caring professions – put to work regardless of psychosocial state
- Decision makers put their own stuff on hold to help their community “would you do the same if it was just a job?” – it hit them later – it’s still hitting them
- US group brought in to the United church to support disaster response workers
- Need care for caregivers

9. **Spectrum of Psychosocial Care**

- Faith-based (Hutterites, Mormons in particular really stepped in); neighbours helping neighbours; teachers, first responders, Salvation Army.
- Love hate relationship with Red Cross: things that people liked was that the Red Cross set up opening/welcoming centre; what they didn’t like was that the community was not sure where all the money goes, and there was a lack of mental health care training for Red Cross volunteers there to ‘help’. 
<table>
<thead>
<tr>
<th>Theme</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Often highlighted that it is important to know where your dollars go and to support local charities; need for classes PFA; PFA offered through AHS, Victim Services; understanding the difference between mental health and emotional crisis; care from politicians who were also affected;</td>
</tr>
<tr>
<td></td>
<td>FCSS seen as a great resource – shared info, knew what the town needed; connected with Slave Lake (fire) shared learnings; looked at what types of supports would be needed down the road)</td>
</tr>
<tr>
<td></td>
<td>Core psychosocial care in High River (before, during, after): Literacy for life, Rowan house (women’s shelter), FAS, Parent Link, Wildrose community services, neighbours/community; FCSS</td>
</tr>
<tr>
<td></td>
<td>Doing things different: Social profits; focus on sustaining relationships, networks; interagency meetings/sharing; High River Cares – door knocking campaign to check-in on wellbeing after flood; social sustainability club; focus on the community needing to sustain the town; Hearts and Minds brought into schools; Safe Spot (orange dot on businesses to support wellbeing of people in community – special training provided); community cafes</td>
</tr>
<tr>
<td></td>
<td>Increase in community-based MH care: After flood, more community oriented services</td>
</tr>
<tr>
<td></td>
<td>People looking out for people: connection one another to resources; people didn’t want to leave town or miss out; social interaction important; ‘High River Strong’ – “this is who we are”; shared history (defining everything as before or after the flood; conversation starter); people trusted their neighbours more than outside agencies.</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy: Need to be prepared; survival kits;</td>
</tr>
<tr>
<td></td>
<td>Non-traditional care: drum circles, drop-in programs; art therapies</td>
</tr>
<tr>
<td></td>
<td>Corporate philanthropy: Royal bank paid for 1 extra curricular for each child; put mortgage payments on hold</td>
</tr>
<tr>
<td></td>
<td>United church: books on trauma -over 200</td>
</tr>
<tr>
<td></td>
<td>Acupuncture: free</td>
</tr>
<tr>
<td></td>
<td>Banks: put mortgage payments on hold</td>
</tr>
<tr>
<td></td>
<td>Rec center: very well utilized</td>
</tr>
</tbody>
</table>

10. In the spotlight

- Seniors, youth (children)— lacked a focus on parents (long-term struggles with domestic abuse, divorce); lack of culturally appropriate counselling and services to new immigrants with little English – no networks
Theme

Details
- Kids needed routine and structure; focus on supporting this; still held grad in August; Parents Link opened, could drop off kids – safe space so parents could go do what they needed to do.
- “lots of things for children and youth” – sports,
- Seniors programs - shuffleboard

11. In the shadows
- Populations overlooked:
  - Nothing for teens or adults;
    - How can parents help kids if they can’t help themselves (equating to oxygen mask on an airplane, put yours on first)
  - First responders “what do you do when 15/20 of your people are in the midst of it”
  - Overlooking immigrant needs in the crisis response stage – e.g. food and dietary needs “Canadian food – would rather go hungry than eat it”; immigrants who don’t have important documents to demonstrate address, thus missing out on government provided aid.; status of immigrants was often dependent on where they worked;
    - Newcomers punished – their shifts at Tim Hortons cut back; for locals who wanted more shifts to support their finances post-disaster
    - Lack of culturally appropriate counsellors after the flood (now have one)
  - Helping profession: “are they being taken care of?”
    - Self-care needed for services providers; RCMP sent home after the flood; self-care now a focus but pre-flood was questionable – lip service more than anything
      - Now support after 6 months; told to call EAP
      - Afraid to ask “how are you doing?” because don’t have the tools to support
    - Teachers overlooked – because of duty to care for kids
<table>
<thead>
<tr>
<th>Theme</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>o business groups feeling like they’ve been left behind</td>
</tr>
<tr>
<td></td>
<td>o Seniors – many died a few years after flood; experienced the flood and then the retirement building many were moving back to caught fire – some were permanently displaced (by choice)</td>
</tr>
<tr>
<td></td>
<td>o Difficult for men to ask for help - so used to fixing things; sometimes their supports looked different</td>
</tr>
<tr>
<td></td>
<td>o Parents – feeling guilt that they couldn’t be there for their kids</td>
</tr>
<tr>
<td></td>
<td>o White collar people who couldn’t ask for help</td>
</tr>
<tr>
<td></td>
<td>• Adults with disabilities</td>
</tr>
</tbody>
</table>

12. Mismanagement, Unprepared / Band aid solutions

- “The system is not set-up for this”
- **Volunteer groups:** Poorly managed, lack of coordination, no crisis training (e.g. when checking people in for housing services, ‘why do they all cry?’); lack of respect for community voice
- **Lack of protection:** Lack of vigilance with regard to drug predators: ghost town, drug predators would come in to the town to deliver drugs – peoples coping strategies via drugs – spike in drug use
- How does/can the town support business in the midst of recovery? |

13. Bureaucracy, power and corruption (relate to Apparatuses of Security code from KI interviews)

- **Power & Corruption:** Before the flood town mayor was a developer and there was a lot of big developments in flood plains; the mayor has since changed (people seem to like the new mayor because he’s not a developer but a funeral director who has lived in High River his whole life).
- There is lingering distrust for government (Provincial) over how the flood was handled (asking RCMP to take everyone’s guns (lack of trust for RCMP for a long time), poor guidance on the Disaster Recovery Program (insurance); revictimized by system (DRP); Government knew that they were permitting homes to be built on flood plains (giving permits) – greed, money; government bought (some) properties that were flooded – thought they were done. ; Politicians using flood gatherings as an opportunity to boast, brag and leave
- **Insurance:** Different rules all the time; elderly couples told no the first time and wouldn’t fight; those who fight or
<table>
<thead>
<tr>
<th>Theme</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>called on the government got better payouts. Media pointed out the inconsistencies and some insurance agencies would change their tune. A complete debacle; lacked standardization; people would often compare what they did or didn’t get and commiserate about the Disaster Recovery Program (Gov’t led). “revictimized by the system”; loss of business as well as homes;</td>
<td></td>
</tr>
<tr>
<td>• Lack of support from higher up; system not set-up for this; not taking care of those who are in the caring services (lip service – tell people to call EAP); not prepared before 2013; trying to get support when people don’t have the right perspective; we have a lot of rules but they don’t always work; farmers came to help clean up with machinery and were turned away because of legal/liability; same as food from Hudderites; Pure North Vitamin brought in vitamins and Red Cross threw them out because they didn’t know what they were (understand the safety aspect but don’t throw away, give them back)</td>
<td></td>
</tr>
<tr>
<td>o Mismanagement of contracts)</td>
<td></td>
</tr>
<tr>
<td>• People donated to Red Cross (thinking the money would be used in a certain way); still millions of dollars sitting there unused in High River; town has tried to get this money; was successful in getting a $1M grant for ‘Safe Spot’. Need for full disclosure of where funds go; hitting people in the heartstrings to donate and then not used in the town</td>
<td></td>
</tr>
<tr>
<td>• Human made mistakes: “why did they build in a flood plain?”; building on the river – the river goes where it wants to; Government knows about building on flood plains and gives permits – “greed” – people with money wanted to build homes</td>
<td></td>
</tr>
<tr>
<td>o “When land flooded – but not the house, the government bought the house and thought they were done”</td>
<td></td>
</tr>
<tr>
<td>• Politicians would boast, brag, and then leave – no answers for front-line workers</td>
<td></td>
</tr>
<tr>
<td>o Politicians would use platform after the flood; Mayor at that time (Emile) would bear the brunt of distrust – he had a rough time</td>
<td></td>
</tr>
<tr>
<td>o Provincial politicians were booed; people trusted each other, when outsiders came in trust went down (especially with DRP and insurance)</td>
<td></td>
</tr>
<tr>
<td>o No consulting by politicians to the people</td>
<td></td>
</tr>
<tr>
<td>• Hutterites were amazing – they were shut down because they were giving food and the kitchens weren’t designated food safe. “We have rules, but they don’t always work”</td>
<td></td>
</tr>
<tr>
<td>Theme</td>
<td>Details</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>• Distrust for RCMP – for a longtime – it was outside RCMP members; our RCMP members couldn’t make decisions for the community because it was too close to home.</td>
<td></td>
</tr>
<tr>
<td>• Farmers came to help clean out the town; got kicked out because of legal and liability issues; they know what to do and were appalled they were turned away.</td>
<td></td>
</tr>
</tbody>
</table>
| • DRP as a moving target – always being told different things  
  o “DRP was a nightmare” - FCSS helped people figure out how to fill out forms, etc.; DRP staff took backlash from the community; Municipality set up a committee to deal with DRP and frustrations from community; this was the first time DRP had been used |
| • Couldn’t volunteer without approval |
| • Chaos at Provincial level with political leadership – Redform premier, then Jim Prentice,  
  Then he lost to Notley;  
• 8Million dollars of unused support from Red Cross for Southern Alberta floods  
• Don’t take away resources after 3 years |

14. Navigating the emotions of giving and receiving

• **Giving**: Outpouring of support from stranger across the country and from Red Cross, Government, Salvation army, faith-based groups etc. Fostered a sense of compassion, altruism, and community (Canada-wide). This did not come without its challenges (e.g. insensitive donations, hoarding, corruption). “insensitive donations” – bag of garbage ‘donated’; may have been a mistake but…”; Government giving people in Low SES situations $2,500 – being given when many battle addictions issues.

• **Receiving**: Corruption – people taking things when they weren’t affected by the flood; hoarding; not used to asking for help, hard time receiving (humbling experiences); fighting over microwaves, mattresses;

• **Overwhelming donations**: quilts, bedding, food, etc.

• **Forgiving**: people were very forgiving how you would respond to generosity; gave people space

• **Grateful** BUT: things could have been done better
15. Looming Risks

**Environment, Climate Change:** hot right after flood, people looking to the sky; hail storm right after 2013 flood and then tornado warnings.

- climate change – ‘scary’; ‘not dealing with this again’; “don’t want this to happen again”; what can we do? Need for emergency preparedness; can’t predict if this will happen again; can’t control weather; after flood really hot and hail storm (more damages and insurance claims); ‘global warming’ – ‘weather is weather’, happened before.
  - “can’t unknow what we know now” – need for better preparedness; woke people up to being prepared for emergencies
- Mitigation may not be enough protection for next event but makes people feel better; lots of deforestation in the mountains. (Cougar Creek and Canmore; hwy 40 Kananaskis); CC not a big topic with people; more aware of weather changing;
- **Hyper aware of environment:** People know how much snow is in the mountain, hyperaware of rainfall, drive over the bridge every day and can see water-levels; etc.
- **Blame:** nobody to blame (environmental)
- “Everybody looks at the river”
- “Can’t control the weather”; unpredictable
- Had a tornado warning while we were at the welcome center after the flood; then a hail storm
- Global warming – floods have happened before
- Mitigation now may not be enough but we have to believe it will
- Deforestation of mountains – cougar creek – and Canmore; washed out areas of hwy 1
- Experienced floods before, this was a one in 200 year flood; it was different – beyond belief
- ‘Climate change not a big topic for people
- **With climate change** – “nothing is being done”
16. Haste and Waste

- **Waste:** Everyone told to put refrigerators in garbage (even if weren’t affected); doors being kicked in; people wish this had been done more cautiously; drywall in landfill led to lots of contamination; anecdotal evidence that 10 years of landfill from the flood; haste + waste.
- **Haste:** People forced to make decisions in a difficult time; throwing things away that maybe didn’t need to be thrown;
  - Opposite: hoarding
- A lot of donations ended in the landfill; drywall ended up in the landfill - leads to contamination
- A vitamin group came in and tried to give out freely government shut it down and threw away everything (haste and waste)

17. Sense of place

- **Infrastructure:** Shops (who is shopping after this?); stores that aren’t really stores but movie sets; how does the town support businesses after this? restructuring of town – people upset because there’s no parking; constant construction = constant reminders; natural progression of a growing city occurring at the same time as the flood recovery; why were things built in the flood plain to begin with. Seniors not being able to access parking; no place to park in front of clinics; town park cleaned up quickly, ‘people needed something clean and green’; berms make people feel safe
- Place affected by mold concerns;
- No real stores – movie sets
- Issues with parking since the reconstruction which is a hindrance for elderly population; enhances inaccessibility
- Roads, parts of town constantly being shut down because of construction
- How do you keep High River’s downtown vibrant when big box stores come in close by (e.g. Okotoks)
- Natural progression of a small town growing at the same time as flood recovery
- Homes were labeled: red, orange, yellow, green – “so what were you” – comparing; nobody wanted to admit they were green (guilt); red was a badge of honour
Theme | Details
--- | ---

"One lady found out her house was red and she was relieved, the not knowing was terrible”

Bus tour was offered so people could see their neighbourhoods and homes; see where the damages were.

- It there was another flood, people would stay to protect their belongings
- cleaned the downtown park – whole community needed something clean and green again
- Now – house prices going up – new community; new, younger families in the community; population higher now than ever before; schools are full; new buildings and businesses; Cargill is thriving;
- Putting in the berm helped people feel safe – positive about changes to the town;

18. Lessons learned from the Superflood

- High River provided lessons learned for Ft.McMurray: how, when to communicate, respond, and rebuild; High River was the perfect storm (more impactful than anticipated);
- Sustainable Mental Health Funding and Care: shift in resources after flood; band-aid solutions; funding gone after 2 years; no sustainable care even though need is there.
  - Sustainable psychosocial support: Churches (Salvation Army); don’t need to be a member to get help
- Our plan is still not robust enough: municipal and provincial guidance not coordinated
- Know where your dollars go: Urging people not to donate to Red Cross after Ft.Mc – donate to salvation army
- Importance of engaging the community:
  - Don’t focus on event; divert peoples memories from the date
  - “So much learning around how to coordinate and respond to a crisis”
  - “Respect what locals need”
- Learned so many things about mental health
- “We’d be so much better prepared if it happened again”
<table>
<thead>
<tr>
<th>Theme</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. Bouncing Back with</td>
<td><strong>Community resilience and community enhancement</strong>: supporting people through community cafes, BBQs, informal get-togethers; there’s still a stigma to talk about mental health, community gatherings tend to be how people cope if they are not seeking formal mental health care.</td>
</tr>
<tr>
<td>community?</td>
<td><strong>Growing community</strong>: High River more populated now than before the flood; schools are full; new businesses; Cargill still thriving</td>
</tr>
<tr>
<td></td>
<td><strong>Guilt</strong>: “People who felt guilty didn’t get involved a lot”</td>
</tr>
<tr>
<td></td>
<td><strong>Shared history</strong>: a marker of before and after; sense of bonding</td>
</tr>
<tr>
<td></td>
<td><strong>Hot air balloon</strong>: not an anniversary marker but something to bring the community together</td>
</tr>
<tr>
<td></td>
<td><strong>Preparedness</strong>: we need to be prepared at the individual level 2 day survival kit</td>
</tr>
<tr>
<td></td>
<td><strong>Share experience</strong>: need to share stories</td>
</tr>
<tr>
<td></td>
<td><strong>Friendship centers</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Our High River</strong>: ‘gives the community a voice’</td>
</tr>
<tr>
<td></td>
<td><strong>How’s your five</strong>: more focus on checking in with the community; community wellbeing</td>
</tr>
<tr>
<td></td>
<td><strong>Sense of community “blew me away”</strong>: going to move from BC to Calgary but moved to High River instead; sense of community dormant until the flood;</td>
</tr>
<tr>
<td></td>
<td><strong>Training the community</strong>: Psychological First Aid;</td>
</tr>
</tbody>
</table>
Appendix H: Face-to-face Interviews - Semi-Structured Interview Guide

Below is an interview guide, the questions will not necessarily be asked in order and some of the questions may not be asked.

1. How long have you lived in High River?
2. What are some of the things you like about living here?
3. How has the town changed in the past 5 years? (Probe: changes in government? Changes in demographics?)
4. How has the environment changed here in the past 5-10 years? (Probe: what are you seeing now that you haven’t seen before? What has changed?)
   a. In your opinion, do you think climate change is impacting any changes you have seen? If so, how? If not, why not?

5. What kind of resources (people, places, policies, etc.) are available in High River to support the wellbeing and mental health of people living in High River?
   a. (Probe: if the participant indicates there currently none, ask if there ever were resources available and ask them to describe these resources and what happened to them)
6. Are there any resources (that support the wellbeing and mental health of people living in High River) that are no longer here? What happened to these resources?
7. Do any of the resources that are here now, or that were here, work together? If so, how? If, not why do you think this is the case? (Probe: do any of these resources work together to support the overall well-being of residents of High River?)
8. Do you think there is enough resources to support people’s mental health and wellbeing here in High River? (Probe: Why or why not?)
9. ‘Do you think that everyone has access to resources based on their need’ (equal vs. equitable). Please explain (why or why not)
   a. In your opinion are there any barriers for people who may want to access these resources? Can you describe what you think some of these barriers are?
10. Right after the 2013 flooding, were there more or less resources available to support the wellbeing and mental health of people living in High River?
    a. What about now, would you say there are more or less resources available? (Probe: Why do you think this is so?)
11. Do you think people need more resources to support their mental health and wellbeing after events like the 2013 flood? (Probe: why or why not?)
12. If you were asked for your advice on how any of the resources you mentioned could be improved, what would you say? (Probe: what would you want them to know to make things better or to change things?)
13. What else do you think I should know?
### Appendix I: Face-to-Face Interview Codebook

<table>
<thead>
<tr>
<th>Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. High River is Home</td>
<td>This code captures anything related to how the respondents talk about living in High River, including the love community members have for High River and why most people would never leave despite flooding.</td>
</tr>
<tr>
<td>2. Flood Imprint</td>
<td>This code represents how the flood imprinted on respondents; without prompting many wanted to tell their story of the day; noting the things that still resonate with them about that day (e.g. concern for family and friends’ safety; lack of communication; disbelief; sense of community).</td>
</tr>
<tr>
<td>3. Mementos, Meaning, and loss</td>
<td>This code captures how people characterize what they lost in the flood; most highlight that it is the small things (mementos and photos) that are the most meaningful and spark an emotional response because they are lost. -This code also captures respondents relationship with stuff/things.</td>
</tr>
<tr>
<td>4. Perceptions of governing bodies and leadership</td>
<td>This code represents the perceptions respondents have for people in positions of leadership (e.g. government, police, RCMP, military etc).</td>
</tr>
<tr>
<td>5. Fairness and frustration</td>
<td>This code represents respondents feelings of injustice and frustration regarding insurance, the DRP, getting support from aid organizations; frustration over the buy-out program; frustration about why people were allowed to build in flood plains in the first place.</td>
</tr>
<tr>
<td>6. Denial and disavowal about reoccurrence</td>
<td>This code represents respondents’ emotions about the likelihood that another flood and emotions related to the issue of climate change.</td>
</tr>
<tr>
<td>7. Deluge of outcomes</td>
<td>This code represents how respondents’ talked about the psychosocial outcomes related to the flood and flood recovery. E.g. Altruism, stronger sense of community; increase in drug and alcohol abuse; anxiety; PTSD; Wanting some sense of normalcy; Anger; Triggering previous traumas; Post-Traumatic Growth; Gratitude and hope; Grief;</td>
</tr>
<tr>
<td>8. Compound Life Experiences</td>
<td>This code represents how the flood may have been one additional stressor that compound other life experiences.</td>
</tr>
<tr>
<td>9. Journey of Recovery</td>
<td>This code represents the long-term psychosocial and socioeconomic effects on individuals and the community. Many are still paying for flood related repairs; businesses couldn’t stay, which made way for the movie industry to take up space (love-hate relationship with this). Many still experience trauma related to the event.</td>
</tr>
<tr>
<td>10. Triggers to this day</td>
<td>This code represents the triggers that people highlight that continue to affect them or people they know (e.g. smells, sights, sounds).</td>
</tr>
<tr>
<td>11. Haste and waste</td>
<td>This code represents what some respondents referred to as hasty decisions by people and the government; e.g. not drying out homes and rebuilding too quickly resulting in mold; things being thrown away that didn’t need to be.</td>
</tr>
</tbody>
</table>
| 12. Role of communication | This code represents respondents issue with the lack of communication and/or the importance of communication during the crisis; the fears and
<table>
<thead>
<tr>
<th>Codes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Perceptions of supports and services</td>
<td>This code highlights respondents’ perceptions of supports and services to support psychosocial wellbeing before, during, and after the flood (up until present day). This code also captures respondents’ references to the arts community – something embedded in the culture of High River and something that supports wellness.</td>
</tr>
<tr>
<td>14. Impact of giving and receiving</td>
<td>This code represents’ respondents feelings about giving and receiving. Respondents often felt embarrassed to receive; they may have felt overwhelmed by the generosity, etc.</td>
</tr>
<tr>
<td>15. Response Oversight</td>
<td>This code represents’ respondents perceptions about oversight by people/organizations responding to the flood. Many spoke about the lack of culturally relevant support; lack of mental health training for volunteers, etc.</td>
</tr>
<tr>
<td>16. Informal Psychosocial Care</td>
<td>This code represents how respondents’ talk about psychosocial support that supports their wellbeing. E.g. programs/supports that are not labelled mental health care, things that build community networks. Giving back is also a common theme that supports peoples’ wellness.</td>
</tr>
<tr>
<td>17. Self-efficacy</td>
<td>This code represents how respondents’ self-identify as capable of taking on difficult tasks themselves; self-describing as survivors, resilient, strong – after experiencing the trauma; or in general, their life experiences have made them feel as though they can handle the stress and trauma related to the flood on their own.</td>
</tr>
<tr>
<td>18. Environmental Awareness</td>
<td>This code represents how respondents talk about the environment/ecology.</td>
</tr>
<tr>
<td>19. Sharing stories of the flood</td>
<td>This code represents respondents’ stories of the flood. Respondents weren’t asked about the day of the flood, but most wanted to report their story of how the day(s) unfolded.</td>
</tr>
</tbody>
</table>