Vulnerability to Climate Related Events: A Case Study of the Homeless Population in Waterloo Region

by

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Author's Declaration

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

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

Abstract

Waterloo Region (population 470,000) is the eleventh largest urban region in Canada (2006 Census tract). Within this region, in 2007, 2,831 homeless people defined as commonly living or sleeping in indoor or outdoor spaces not intended for inhabitation used emergency shelters (Homelessness and Housing Group, 2008; Regional Municipality of Waterloo Region, 2007). It is expected that individuals who have inadequate or no permanent housing are particularly exposed and sensitive to environmental conditions such as extreme heat, cold events and poor air quality. Under climate change, it can be expected that the frequency of extreme events and days when air quality fails to meet healthy guidelines may increase. A wide survey of literature from environmental issues related to homelessness in first world countries has demonstrated that there is a research gap in understanding how urban citizens experiencing or facing homelessness adapt to environmental change. Therefore, this research addresses this gap by using both the vulnerability approach to local climate change assessments, and participatory action research to better understand the specificities of adaptation, the available services and future institutional strategies that could enhance the lives of this vulnerable population in relation to local environmental change. The conclusion is that people experiencing homelessness in Waterloo Region have a low vulnerability to climate related events as the social service system which they use is well developed and the climate related events are not severe. However, the vulnerability may increase in the future if service provision changes or if there is an increase in the duration, intensity and frequency of precipitation (rain) or extreme heat days.

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Chapter one- Introduction

1.1   Problem definition

The physical effects of climate change such as increased heat, as well as increased risks of flooding and droughts, and the rapid melting of glacial ice has accelerated measures to not only mitigate, but to plan and adapt to impacts that may already be beyond the control of both governments and individuals (IPCC, 2007). Globally, it can be expected that the most vulnerable regions will endure the most intense, timely and prolonged effects of these changes. Often these regions are home to not only the most physically sensitive environments areas, but house populations that will be the most affected by these changes. A failure to implement mitigation and adaptation strategies will further increase their vulnerability (Cannon, 2003; Adger et al., 2005; Bartlett, 2008).   Although the most vulnerable places may be in the less developed countries, the developed world will also face challenges due to climate change. In this context, there are certain groups of people which will be more vulnerable than others to environmental change. These include the elderly, the very young, the disabled, and the homeless (Cutter, 2003; Ingham, 2007; Kjellstrom, 2008). People experiencing homelessness are already vulnerable due to a plethora of socio-economic, health and lifestyle conditions (Tompsett et al., 2006, Vlahov et al., 2007), yet under climate change this vulnerability could be significantly heightened as this population spends the majority of its time in outdoor spaces without relief from the elements. Accordingly, an analysis of this population and how they are vulnerable to environmental change is the topic of this thesis.

1.2   The vulnerability approach

Recently, global change research has seen increased attention to the concept of vulnerability in both developing and developed world contexts (Ford et al., 2006; Keskitalo, 2008; Young et al., 2008; Heltberg, 2009). Vulnerability assessments provide a way to operationalize the theoretical concepts of this field of studies while providing the basis for additional insights into cross-study comparisons of research designed around common principles. Many of these vulnerability assessments utilize participatory methods (Schröter, 2005; Kristie and Kovats, 2006; Smit and Wandel, 2006; Van Alst et al., 2008; Kjellstrom and Mercado, 2008). Often the assessments conclude that human adaptation to climate change hinges not only on the physical outcomes of the change, but on an array of socio-political factors influencing the possibility of either mitigation or adaptation options (Belliveau et al., 2006; Ford et al., 2006).

"Mainstreaming" is the concept when climate change adaptation and vulnerability reduction are incorporated into the larger sociopolitical and economic policies of a region or country in the developing world (Huq et al., 2003; Klein et al., 2005).   The so called "vulnerability approach" conceptualized by Smit and Wandel, (2006), to community climate change assessments is an example of a participatory approach incorporating both physical and socio-economic factors into a determination of current and future vulnerability to environmental change in a defined area (Smit and Wandel, 2006; Ford et al., 2009). The analytical frameworks for vulnerability analysis are as varied as the theoretical underpinnings of the concept of itself, yet most include an analysis of vulnerability and the identification of specific options for stakeholders to reduce that vulnerability (Schröter, 2005). For the purpose of this research, the chosen analytical framework will reflect that of Smit and Wandel (2006) which outlines the steps as follows: **"**engaging stakeholders and community members, and assessing exposures,

sensitivities and adaptive capacity, with the aim of identifying the risks of current and past exposures, and how they deal with these, including factors and processes that constrain their choices" (289) (See diagram p. 53). The empirical work of the thesis assesses current vulnerability while later chapters speculate on future conditions.

1.3   Research purpose and objectives:

This research focuses on the vulnerability and adaptive capacity of the urban homeless population in Waterloo Region to local environmental change. As stated, vulnerability assessments often focus on climate change adaptation in developing countries (Adger, 2001; Lendrum, 2007; Hahn, et al., 2009). Often the literature that does exist for communities in the developed world focuses on resource dependent sectors such as agriculture, aboriginal groups or health sector analyses (Patz et al., 2005; Belliveau, 2006; Wall, 2007; Allison et al., 2009; Ford et al., 2009). In the urban developed world context there is often focus on industrial sectors such as transportation, and land use planning (Ingham, 2007; McGrananhan, et al., 2007). Literature which assesses the vulnerability of marginalized groups in an urban context, such as the homeless, is virtually underdeveloped (Ramin and Svaboda, 2009). The literature that does exist focuses primarily on single weather events which cause problematic conditions for this population, but generally does not address these events or the resultant adaptive strategies in a comprehensive form using members of the population as the main source of information (Lera-Randle- El, 2006; Mehta, 2006; Herselman, 2008; Layton, 2008; Raymond, 2009).   Therefore the purpose of the research presented here is *to better understand how members of the urban homeless population in Waterloo Region are affected by environmental change by using the vulnerability framework to climate change and techniques from participatory action research.*

Therefore, the underlying research question is; *how are people experiencing homelessness in Waterloo Region vulnerable to environmental change?* The research question is answered using three subsequent research objectives:

The first objective is to gather insight into the role of weather, air quality, extreme weather events (exposures) on their lives and the strategies used to deal with these (adaptations) from the perspectives of the absolute homeless population;

The second objective is to put the identified exposures into the context of the short and long term climate records and projections for the Region.

The third objective is to outline existing services and the way in which they are used based on the interviews with members of the homeless population, and available secondary data, in order to better understand current and future adaptive capacity.

1.4   Thesis outline:

The plan to operationalize these three objectives is developed through distinct sections of the thesis. After the introductory chapter, chapter two provides a literature review of the different approaches to vulnerability as well as a definition of key terms. Chapter three provides an understanding of vulnerable populations and homelessness. Chapter four outlines the study area as well as concepts related to the social service system in the study area. This chapter also includes a Regional housing service inventory and addresses the second research objective by using climate data to provide a better understanding of the Regional conditions which were mentioned as problematic during the qualitative interviews. Chapter five outlines participatory action research as the research methodology used in the thesis as well as the vulnerability approach to climate change assessments as the guiding application framework. Chapter six addresses objectives one and three by exploring the most problematic environmental exposures as reported by the target population, the adaptations used to deal with the exposures, the constraining and the enabling factors and the exogenous and endogenous variables influencing the adaptive capacity of people experiencing homelessness. Chapter seven estimates future vulnerability and adaptive capacity by investigating anticipated climate change scenarios while chapter eight provides a discussion and possible future aspects of adaptive capacity. Chapter nine provides an overview of the findings and recommendations for further research.

Chapter two- Approaches to vulnerability and conceptual definitions

This review is a wide overview of the literature as it relates to vulnerability studies. There are seven themes presented with a definition of vulnerability for this project provided in the last theme.

2.1   Hazards approach

The traditional approach to vulnerability developed out of literature from (White, 1945; Burton et al., 1978; Alexander, 1993; and Cutter, 1996). The similarity among this group of researchers was that natural hazards were seen as the main driver in the concept of vulnerability. Vulnerability was seen as a function of the pre-existing condition of the hazard (Cutter, 1996). Conditions of natural hazards that rendered individuals vulnerable could be measured as magnitude, frequency, duration, areal extent and rapidity of onset of events (White, 1945; Burton, et al., 1993). The idea of a natural process becoming a hazard is a function of its impact on individuals or society which can cause significant disruptions in structures and everyday processes of a place (Burton et al., 1993). In her later work, Cutter discusses the social aspects of vulnerability to hazards and has developed a widely recognized Social Vulnerability Index to natural hazards for the United States (Cutter, 2000).

2.2   Vulnerability and climate change approach

There is generally agreement among climate change scenarios on an increase in the intensity of extreme precipitation events and storms, increased summer and winter temperatures, changes in the El Nino/Southern Oscillation (ENSO), and prolonged periods of drought (Meehl et al 2007). In addition, the International Panel on Climate Change (IPCC) concludes that there will be increased sea levels due to the melting of glaciers and land based ice shelves and thermal

expansion, and related higher incidences of salt water intrusion into inhabited areas, as well as increased flooding and erosion (IPCC, 2007).

When approaching the concept of vulnerability and its relationship to the events described above as examples of climate change, there are two schools of thought. The first group takes vulnerability as a starting point and considers vulnerability as a characteristic of social and ecological systems that is generated by multiple factors and processes (O'Brien, 2007). This interpretation of vulnerability is called contextual vulnerability and is related most frequently to human security framings. Human security is defined as occurring when and where individuals and communities have the options necessary to end, mitigate or adapt to risks to their human, environmental and social rights, and have the capacity and freedom to exercise these options (GECHS, 1999). "Vulnerability is considered to be influenced not only by changing biophysical conditions, but by dynamic social, economic, political, institutional and technological structure and processes (contextual vulnerability)" (O'Brien, 2007; 76). This perspective includes scholars such as (Adger, 1999; Füessel, 2005; Belliveau, Smit and Bradshaw, 2006; Smit and Wandel, 2006 and O'Brien, 2007). The starting point from which to study and understand vulnerability from this perspective are the characteristics of a system that make it more or less vulnerable with the aim of reducing the impacts of climate change (Füessel, 2005). Although a look back at the work of Wisner (1984) shows that stressors were a significant part of vulnerability to hazards, the work as it relates to climate change enhances the idea of scale in assessing vulnerability in terms of individual, community, regional or national levels of analysis.

In addition to the idea of nested scales, the contextual climate change theory points out the significance of social, political and economic stressors that determine who is vulnerable and why they are vulnerable within the context of these scales (Smit and Wandel, 2006; O'Brien,

2007). These stressors also can be characterized as local and broad scale determinants as illustrated in Figure 1 below. "In this context vulnerability, exposures, sensitivities, adaptive capacity and their determinants are dynamic and vary by type, from stimulus and are place and system specific" (Smit and Wandel, 2006).
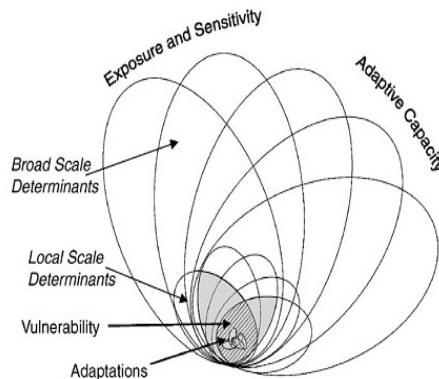
Figure 1- Nested hierarchy of vulnerability

From Smit and Wandel (2006)

In contrast, the end point approach or outcome vulnerability uses a scientific framing of climate change which requires a better understanding of key biophysical processes and impacts (O'Brien, 2007). Authors such as Füessel and Klein (2006) and Smit and Pilifosova (2003) point out that it favors physical flow views about matter and energy between systems components. The end point perspective identifies the impacts of climate change and takes into account adaptations that might mediate these impacts. The spatial distribution aspect of this approach is seen in the focus on climate changes scenarios for geographic areas, using different inputs into the climate change models related to physical characteristics of the place. Adger and Kelly (1999) identify the end point approach as a sequence of analyses beginning with projections of future emission trends, moving to the development of climate scenarios and themes to the

biophysical impact studies and the identification of adaptive options (p. 326). Vulnerability can be represented quantitatively by human mortality, costs and damages, and ecosystem damage. In its basic form, vulnerability is "the degree to which a system is susceptible to or unable to cope with the adverse effects of climate change, including climate variability and extremes." Further, the approach sees vulnerability to climate as a function of exposure, sensitivity, and adaptive capacity (IPCC, 2007).

2.3   Risk management approach

Disaster management literature takes a physical perspective in its approach to vulnerability. Bio-physical events are considered as contributing to overall vulnerability by assessing the harm done to a system, which requires relief from outside sources to recover following the event. Ben Wisner's (2004) *At Risk* highlights the concept of disaster when the bio-physical hazards meet with the individuals in their patterns of everyday life. The more vulnerable a population is due to macro-level variables, the less adaptive capacity and the more vulnerable they are in relation to bio-physical hazards. Wisner provides a detailed model of how the pressure from both macro-level variables creating vulnerability meets with these physical hazards to cause a release whereby a disastrous event may occur. The *Pressure and Release model* is important in the current context, because the beginning of macro and micro level variables of vulnerability are elicited and the concept of "disaster" is defined as occurring when there is significant vulnerability in a system to not manage the effects of the natural hazards. Kasperson (2006) discusses the amplification of risk at two stages in the transfer of information about risk and in the response mechanisms of society. In this context the social responses to risk posed by bio-physical hazards interact with psychological, social and institutional and cultural

processes in ways that may amplify or attenuate public responses to the risk or risk event (Kasperson, 2006).

2.4   Political ecology approach

The field of political ecology was pioneered by Blaikie and Bloomfield in the seminal text, *Land Degradation and Society*, 1987. Throughout this text the concept of structural interactions of elements of society (e.g. the economy and political systems) with the environmental problems of land degradation and other bio-physical changes. This concept of interacting influences is the main tenet of political ecology, and scholars such as Biersack (2006) and Peet (2007) and provides a comprehensive analysis of environmental land degradation, including the societal aspects that cause this phenomenon. Although early Political Ecology scholarship focused on the developing world, it can be used to understand first world human-environment relationships (Collins, 2008) if properly contextualized. A key feature of political ecology is the inclusion of both structure and agency. Also in this context, Political Ecology places high value on an understanding of hierarchies, levels and scale which are all contextually specific. In addition, this approach follows these aspects in relation to how the eco-system conditions interact with livelihood outcomes which are dominated by power, processes and institutional conditions (Armitage, 2008). Further, the concept of societal values is paramonut in this type of conceptualization, as social actors construct different opinions around nature-society interactions, which can, in turn, affect policy outcomes (Armitge, 2008).

2.5   Resilience approach

The resilience approach to vulnerability takes in its basic form the idea that vulnerability is not registered by exposure to hazards alone but also in the resiliency of the system experiencing hazards. Resilience is the capacity of a system to absorb recurrent disturbances

while maintaining essential structures, processes and feedbacks (Turner, 2003; Holling 2004; Walker, 2004; Berkes, 2007). There are three main reasons for incorporating the concept of resilience into vulnerability approaches. First, hazards can be evaluated holistically in a human-environment system. Second, the emphasis is on the ability of a system to adapt to a hazard by absorbing the disturbance and adapting to it. Processes of adaptation, or re-organization, called panarchy often occur simultaneously across scales, in sub-systems and in larger subsystems (Holling, 2004). Third, resilience thinking enables policy options for dealing with uncertainty and change (Berkes, 2007). Due to the uncertainty around natural risks, resilience develops from a framework around which to deal with uncertainty through four types of adaptive mechanisms: First, learning to live with change and uncertainty by building a memory of past events, abandoning the idea of stability, and increasing the capability to learn from crisis (Adger, 2005). Second, nurturing diversity by increasing options such as diversity in the ecological sense, economic opportunities in the livelihood sense, and the diversity of players who can bring new ideas, information and dialogue in the policy sense (Berkes and Folke 1998; Mitchell, 2004). Third, by combining different kinds of learning and knowledge into a system this can increase the opportunity for cross-scale linkages and enhance the understanding of possible stressors causing increased vulnerability (Berkes, 2002; Holling, 2004). Fourth, by creating opportunities for self-organization, the resilience of a system can be strengthened through community-based management, cross-scale management capabilities, strengthening institutional memory and nurturing learning organizations (Berkes and Folke, 1998; Holling, 2004; Folke, 2005). Therefore, resilience thinking is a forward way of anticipating change and providing specific techniques with which vulnerability can be reduced.

2.6   Urban health application

Recently a new school of thought has emerged in relation to vulnerability studies. This focuses on a conceptualization of the determinates for urban health equity and impacts as they relate to potential climate change scenarios (Kristie and Kovats, 2006; Confalonieri et al. 2007; Vlahov et al., 2007; Kjellstrom and Mercado, 2008). Ramin and Svaboda (2009) have presented the most significant study in the health specific sector. This research includes a wide range of environmental stressors and relates them to their health outcomes of the homeless population in urban Toronto, Ontario. This paper calls both for more research in the area as well as a more interdisciplinary approach. The urban health literature is an example of more generic vulnerability assessments for a specific sector. Similar to the work of Smit and Wandel (2006) which conceptualizes four main components of vulnerability as the exposure and sensitivity, the adaptive capacity and specific adaptations, the urban health model uses an adaptation baseline, coping capacity and adaptive capacity as the three central components of vulnerability. Smit and Wandel (2006) discuss the idea that the vulnerability of any system is reflective of the exposure and sensitivity of that system to hazardous conditions and the ability, adaptive capacity or resilience of the system to cope, adapt or recover from the effects of those conditions.

Kristie and Kovats (2006) define vulnerability as the degree to which individuals and systems are susceptible to or unable to cope with the adverse affects of climate change. An examination of the adaptation baseline is considered to be the adaptation measures and actions in place in a region or community to reduce the burden of particular health outcomes. Coping capacity is the adaptation options that could be implemented in the short term. Specific adaptations arise from a region's or community's coping capacity. Finally adaptive capacity includes the general ability of institutions, systems and individuals to adjust to potential harm, to

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utilize opportunities, or to cope with the consequences of climate change. In addition, the future adaptive capacity of communities includes increasing the resilience to what future climate change may bring (Kristie and Kovats, 2006). The addition of health outcomes to the application of vulnerability studies is a recent shift to include the specific factors that result from climate change and the interactions with system variables as well as physical climactic stressors. Kjellstrom and Mercado (2008) have also provided a framework for urban health that also has some parallel with the vulnerability literature. The idea is that macro-level variables, such as economies and political structures, affect municipal level influences such as local governments, city populations, markets and local political structures. The interventions for effective urban health management takes place between these macro-level determinates and the micro-level factors such as urban living and working conditions, housing quality, infrastructure and access to health and social services. In the individual level determinate category, we find variables such as empowerment and capacity to participate, social support networks, inclusion of vulnerable groups, health related knowledge and health seeking behaviors. All of these determinates then converge to provide health outcomes (See Figure 2 below). The concept is directly related to vulnerability assessments because it provides a detailed framework of social determinates which affect the individual level of vulnerability. This model does not take any geographic scale considerations into account, but rather, highlights the modifying influences whereby societal structures on individual behavioral patterns which ultimately influence health outcomes (See Figure 3).

The IPCC (2007), Chapter 8, also includes a detailed analysis of the pathways that affect health outcomes (Figure 3). This model is more comprehensive in its attempt to include climate and resultant changes to environmental conditions, direct physical exposures (storms, floods),

indirect exposures (changes in water, air, land, industry, ecosystems) and social economic disruption. The condition of individual health systems is also given weight in an end determination of health impacts. This model, although, not explicitly identified as a vulnerability approach highlights the important elements in and modifying conditions which enable positive or negative health outcomes. Therefore, vulnerability is taken as an end aspect of the overall health system and a determination of the specific level of vulnerability will ultimately depend on the effects of the modifying influences as outlined above.

ACTION ON SOCIAL DETERMINANTS FOR HEALTH EQUITY
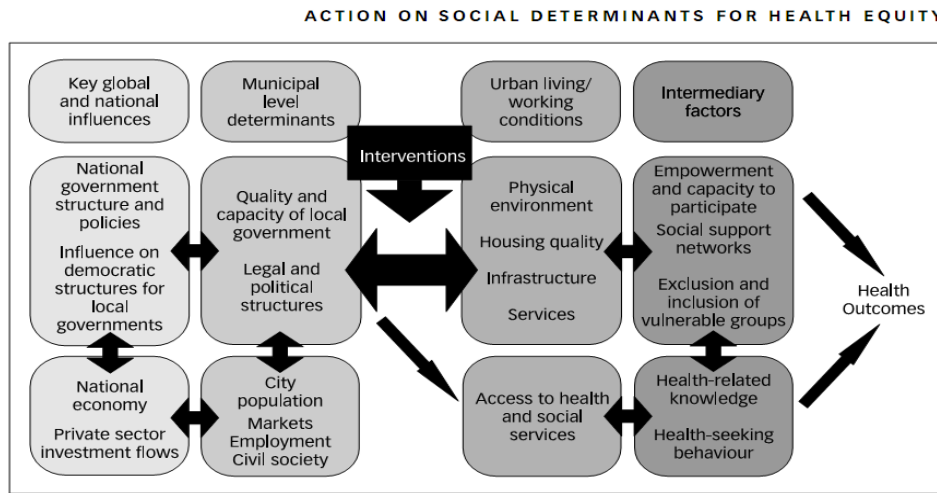
Figure 2- Action on social determinants for health equity

Source: Suggested by Vlahov et al. and adapted for the report by Satterwaite et al. See Vlahov, D.N Freudenberg, F Proietti, D Ompad and S Galea (2007), " A Conceptual framework for organizing determinants of urban health" (thematic paper for the KNUS second meeting), abridged version: Vlahov, D, N, Freudenberg, F Proietti, D Ompad, A Quinn, V Nandi and S Galea (2007), "Urban as a determinant of health", Journal of Urban Health Vol 84, supplement 1, pages i16- i26**.**
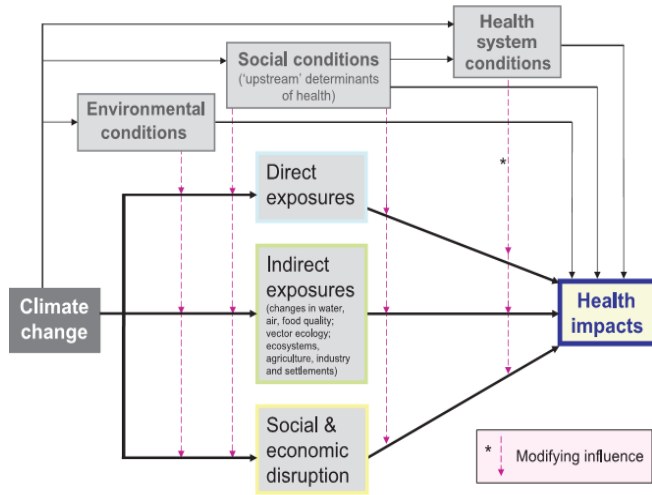
Figure 3 Pathways by which climate change affects health

Source: International Panel of Climate Change. 2007. Chapter 8; 396.

Table 1- Interpretations of Vulnerability

	Scholars	Definition of vulnerability	Elements captured	Purpose of assessment
Hazards approach	White (1945), Burton et al. (1978) Alexander(1993),Cutter (1996),	Natural hazards are main driver of vulnerability	Magnitude, frequency, duration, areal extent and rapidity of onset of hazards create vulnerability	Awareness and preparedness of possible exposures, mitigation of potential hazards
Climate change Approach	Adger(1999), Smit and Bradshaw (2006), Smit and Wandel (2006), O'Brien(2007) Smit and Pilifosova (2003), Fussel and Klein (2006), IPCC (2007)	"The degree to which a system is susceptible to, or unable to cope with adverse effects of climate change, including climate variability and extremes" and taking into account the context and scale for which it is being applied" (IPCC, 2007)	**Starting point (contextual)**- scale, architecture of entitlements theory, determinants **End point (outcome)**- risk of exposure to stress, capacity to cope, potentiality of slow recovery from stress, physical characteristics of place	Human security assessment of regional vulnerabilities by understanding constraining and enabling determinants identifying interacting processes and differential capacities Scientific longer term assessment to reduce climate impacts, and understand key biophysical processes
Risk management approach	Kasperson (2003) and (2006) Ben Wisner (2004	Bio-physical events meet micro level societal structures with interaction being magnified by media and response to events creating vulnerability	Information transfer and disaster response	Assessing probability of risk of hazard, and potential outcomes

Political ecology approach	Biersack (2006), Peet (2007), Armitage (2008)	Interacting influences in social structures and physical environment create vulnerability	Structuration, knowledge systems, scales	Understanding human interactions with natural environment and policy outcomes
Resilience approach	Turner (2003), Walker (2004), Holling (2004), Berkes (2007),	Vulnerability not registered by exposure to hazards alone but also in the resiliency of the system experiencing hazards	Panarchy and feedbacks, anticipating change and providing techniques with which vulnerability can be reduced	Measures how quickly a system recovers from shocks or failures (coupled human-environment systems)
Urban health application	Kristie and Kovats (2006), Confalonieri et al. (2007), Vlahov et al. (2007), Kjellstrom and Mercado (2008).	Highlights the important elements and modifying conditions which enable positive or negative urban health outcomes	Adaptation baseline, coping capacity and adaptive capacity, direct and indirect exposures and modifying influences	Estimating and mitigating potential health outcomes of external drivers (climate change, population changes, health management) on vulnerable populations

2.7   Contextual climate change approach, political ecology and the urban health application

For the purpose of this research, the final conceptualization of vulnerability incorporates the starting point or contextual climate change approach of vulnerability as a nested phenomenon within a wide range of broad scale and local determinants which interact as a reaction to the exposure to elements of local climate change, the sensitivity of the local system to this environmental change, the adaptive capacity of the system and the specific adaptations of the system (Smit and Wandel, 2006). Vulnerability, in this research, pertains to individuals experiencing homelessness. This conceptualization incorporates the idea that all of these elements cannot be measured numerically, but rather that all elements are dynamic and vary by type, by stimulus and they are place-and system specific (Smit and Wandel, 2006). The injection of the urban health concept is an application of more generic vulnerability approaches and it is important because it ultimately takes all aspects of a local community system and goes one step beyond vulnerability as an end result; but it also adds the specific effects on health. However, the scope of this investigation will be limited to an understanding of how the homeless population in Waterloo Region is vulnerable to environmental change (direct exposures) and the specific adaptations that are used. Potential health impacts are shown in Figure 3. For example, frequent and intense exposure to heat could end in heat stroke or even death as a health outcome. However, this research does not attempt to estimate medical risk.

The research presented in this thesis also includes both structure and human agency in understanding our basic research questions. The homeless population does have human agency with which to make decisions, but these decisions are also determined, to a large extent, by the macro structures that are available to them. In the context of vulnerability these structural

elements affect the ability of the homeless population to adapt to environmental stressors and therefore play an important role in illuminating the level of vulnerability of this population.

This research is an attempt to capture the vulnerability of the homeless population in everyday life as they are challenged by changing environmental conditions. Another way to look at this concept of vulnerability is to understand the concept of the critical threshold. The thresholds that homeless people tolerate in relation to their ability to find shelter during extreme weather events will naturally differ between individuals and contexts, but our research will provide a look at what strategies they use to cope with these thresholds. However, defining and measuring thresholds in the context of human capacity is a very difficult task which is individually specific (Meze, 2008).

2.8 Conceptual definitions

2.8.1 Exposures and sensitivities

Exposure and sensitivity are properties of a system and are dependent on the various interactions among different elements of the system. Both of these concepts reflect the probability that the system will experience certain conditions, exposures, and the parts of the system which will most likely be adversely affected by these exposures, thus sensitivities (Smit and Wandel, 2006).

2.8.2 Adaptive capacity and adaptations

Adaptive capacity embodies the ability of a system to cope, recover, or adapt to any hazardous conditions (Smit and Pilifosova, 2003, Smit and Wandel, 2006) without losing options for the future (Folke et al, 2002). Adaptive capacity is context specific and varies between regions and sectors and across time (Yohe et al. 2003, Smit and Wandel, 2006). Smit and

Wandel (2006) eschew the notion of measuring or attempting to establish indicators or determinants of adaptive capacity, at least as a starting point for analysis. Rather, they suggest approaching our understanding of adaptive capacity from the bottom up (ie., in contrast to the top-down approach based on scenarios and modeling) advocating for a dynamic understanding of adaptive capacity at the local level and an emphasis on process. In other words, adaptive capacity is best understood in terms of the various features and conditions through which it is shaped. Adger (2006) adds that adaptive capacity also relates to the ability of a system to expand its coping range in the process of responding to the hazardous conditions. The determinants of adaptive capacity function differently in different contexts (Smit and Wandel, 2006). Adaptations are manifestations of adaptive capacity. They are changes in the system which better deal with problematic conditions. There are a wide variety of adaptations which include: timing (anticipatory, concurrent, reactive), intent (autonomous, planned) spatial scope (local, widespread) and form (technological, behavioral, financial, institutional, informational) (Smit et al, 1999: Wilbanks and Kates, 1999; Smit and Skinner, 2002: Huq et al, 2003).

2.8.3   Coping range and critical thresholds

Understanding the coping range and critical thresholds of a system is an important prerequisite to assessing the likely impacts of climate change and estimating the potential role of adaptation. Coping ranges can, however, be influenced by a range of physical, social and political factors, and therefore may not be easy to define. In some instances, traditional knowledge may be an important complement to other data for improving understanding of coping ranges, as well as overall vulnerability to climate change (Lemmen et al, 2008).
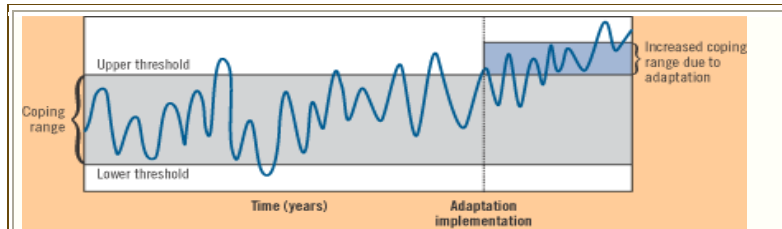
Time series of a climate variable (e.g., temperature)

Coping range: "The variation in climatic stimuli that a system can absorb without producing significant impacts."

Critical thresholds: The boundaries of coping ranges; significant impacts result when critical thresholds are exceeded.

Figure 3-Climate Thresholds

Source: Adapted by Lemmen et al, 2008 from Smit and Wandel, 2006.

Chapter three- Understanding vulnerable populations and homelessness

3.1   Vulnerable populations and climate change

Evidence suggests that the poorest countries and population groups are most vulnerable to climate change impacts (IPCC, 2007; Bartlett, 2008; Jiang and Hardee, 2009). Population growth is occurring most rapidly in the developing world, increasing vulnerability to changes in climate change. Other demographic trends, such as urbanization in coastal areas and encroachment of populations into ecologically marginal areas, can exacerbate climate risks. Areas in which population trends are particularly relevant to climate change vulnerability and adaptation also include areas where water shortages are a problem (Military Advisory Board, 2007). In the developing world, these shortages will be exacerbated further with relation to climate change.

Moreover, the anticipated retreat of glaciers has both direct impacts on populations such as landslides, flash floods, and glacial lake overflow, as well as indirect effects such as the disruption of water flows in rivers. By the end of the century, an estimated 40% of the world's population could be affected by the decline of snow and glaciers in the mountains of Asia (UNEP, 2007). The impacts of extreme weather events and projected sea level rise are particularly significant due to high population density on and near coastlines and low-elevation zones. Low elevation coastal zones cover 2% of the world's land area, but contain 10% of the world's population, and that population is growing rapidly (McGranahan, 2007). In Bangladesh and China, for example, populations living in low elevation coastal zones grew at almost twice the national population growth rate between 1990-2000 (McGranahan, 2007) exposing growing numbers of people to the negative effects of sea-level rise and extreme weather. Climate change will affect populations in highly industrialized countries as well. Recent literature in North

America has also focused on areas where climate change will have the highest impacts on coastal populations and areas most prone to flooding (Kirchen, 2008; Miller, 2008; Stephern, 2008). Adaptation to extreme heat has also been part of emergency preparedness strategies in large urban centers such as Toronto and Ottawa where heat protocols are in place.

Most of the work to date related to climate change in developed countries focuses on adaptation aspects of infrastructure, land use planning, natural resource management and policy related to sustainable development and shifting attitudes to population growth in the most vulnerable areas (Dessai and Hulme, 2007; Mulkey, 2007; Roussel, 2007; Miller, 2008). Very little research has been conducted in relation to vulnerable populations in developed countries and mitigating the impacts of climate change at regional and local levels. Therefore this research is an attempt to fill this gap by investigating regional climate change and the subsequent vulnerabilities of one population which is vulnerable to current and future climate change scenarios in the context of a developed country.

3.2   Vulnerable populations and homelessness

According to the IPCC (2007), in 2005 74 % of the population in developed countries was in urban areas. By 2030, there will be a projected 8.2 billion world population with 60 per cent of that population living in urban areas. Overall, in developed countries a total 56 per cent will live in urban areas, and in the less developed countries 31 per cent of the total 4.9 billion will live in urban areas (IPCC, 2007; 412). The inequalities that exist in urban settings are reflected in the socio-economic living conditions which are lacking for the most vulnerable populations (WHO, 2001a). Efforts have been focused on improving the health situations for the poorest by "leveling up" their living conditions (Dahlgren et al., 2006). However, the deficit between groups of people who lack material and psycho-social resources keeps this population

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powerless and underpins the cycle of poverty and poor and ill health (Kjellstrom and Mercado, 2008). Both technical and social development have driven the growth of urban areas since the industrial revolution and this has had a tendency to allow urban elites to accumulate much of the wealth from this industrialization leaving other pockets of the population to struggle with poor health (Vlahov et al, 2007). A recent quantitative study by Ahern (2008) measured neighborhood socio-economic vulnerability, vulnerabilities and capacities and the distribution of individual income in a stratified sample of communities in New York City. The conclusion was that income levels and distribution patterns, and social control variables such as education levels, employment rates, quality of education, and cleanliness of measured neighborhoods all positively affected the mortality rates of individuals within these specific neighborhoods. However, as Levens and Lopin, 1999 and Ahern, 2008 point out an individual level analysis of health determination can lead to a failure to fully understanding disease processes. This being said the context within which a vulnerable population will be defined in this analysis will not only take into account individual and neighborhood level variables such as those mentioned above but will include a more population focused determination of vulnerability using larger macro-level force such as climate change, and larger socio-economic systems within which populations live.

According to the IPCC (2007, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change) there are seven categories of both scientific and normative vulnerability impacts that can be used to assess the risk of systems (ecological) and populations (socio-cultural). These are: the magnitude and timing of impacts, mostly associated with larger ecological forces such as geo-physical changes to climate and other physically defined systems. The persistence and reversibility of impacts,

also mainly associated with larger ecological systems. The likelihood and level of confidence that an event or multiple events will occur. This estimate is based on the calculation of risk which is measured by the consequence of impact and the probability of occurrence (IPCC, 2007). Finally, the potential for human adaptation to these larger drivers, as well as the distribution of impacts across the population systems and the importance of the vulnerable systems should be assessed. The importance of the systems will vary between and across populations. The systems perspective is a manner for large scale categorization of events determined by the relevance of their inherent natures. The IPCC describes global social systems, regional systems, bio-physical systems, geo-physical systems and extreme events as areas within which specific vulnerabilities can be measured.

In this study, all of these systems have an implicit role in the determination of vulnerability. However, the concept of vulnerability to weather depends on the attributes of the person (people) who are considered to be at risk including where they live, age, income, education and disability, and on the wider socio-environmental factors such as health and social system responses, environmental degradation, and emergency responsiveness of communities (Adger, 2006, IPCC, 2007; 399). According to (Toro, 2007; Kjellstrom and Mercado, 2008; and Levy, 2008) the following groups of people are identified as being more vulnerable than others to being at-risk of homelessness: Aboriginal persons, minority ethnic groups, people with substance abuse issues, people with disabilities, transgendered individuals, women and families. The relative vulnerability of these individuals is also a function of the socio-economic variables described in the quantitative study of neighborhoods, but is intertwined in the more complex variation across socio-economic systems and regional climate scenarios. Since people experiencing or facing homelessness are the most exposed to the elements and climate stressors

such as hot and cold temperatures, and air pollution the hypothesis is that they will be adversely affected by present and future changes to climate scenarios. There is common agreement that the majority of homeless people live in urban areas (Okamoto, 2007; Toro, 2007; Layton, 2008) and since urban areas will continue to be the most rapidly growing and dynamic areas in relation to human populations, it is appropriate to study this population within this context.

3.3   Homeless populations and climate change

There is a scant amount of literature in relation to people experiencing homelessness and climate change in developed countries. A survey of the literature produced numerous news articles which documented single environmental events such as heat waves. An article by homeless advocate Linda Lera-Randle El published in 2006 documented at least 12 homeless person deaths in the summer of 2006 alone in Las Vegas as a direct result of heat stroke. In February of 2009 an article out of Melbourne Australia indicated that there had been 30 homeless deaths, due to temperature increase although it did not indicate over what time period (Raymond, 2009). In Phoenix Arizona, a 2006 article reported that at least thirty-two homeless people had died from heat exhaustion (Mehta, 2006). Again in 2008 a heat wave hitting Adelaide, Australia caused a significant increase in sunburn cases, and heatstroke in the homeless population due to their inability to find shade or maintain fluid intake (Herselman, 2008). A recent study related to the health of homeless people in direct relation to climate change highlights the health effects of heat waves, air pollution, storms and floods, and west nile virus on this population in Toronto, Ontario and calls for more research in this area (Ramin and Svoboda, 2009).

3.4   Homeless typologies

According to the Community Plan for Waterloo Region there are specific groups of people who are at a higher risk of experiencing homelessness than others. These groups are Aboriginal persons, new Canadians, people with substance abuse issues, people with disabilities, transgendered individuals, women and families (Human Resources and Social Development Canada, 2007). The following is an overview of the data that exists in regards to the homeless population of Waterloo Region, with categories derived from existing literature and studies conducted on the topic.

3.4.1   At risk of homelessness

This group of people include those who are at risk when their housing is unaffordable, unsafe, overcrowded, insecure, inappropriate or poorly maintained (Homelessness and Housing Umbrella Group, 2008). This group of people is at-risk due to economic reasons centered on housing to which they have access (Social Planning, Policy and Program Administration, 2007). The numbers are derived from 2001 CMHC data stating that 7,000 households in core housing need to spend 50% or more of their income on housing. Of the 7, 000 households, 71% of these were renter households placing them at greater risk due to lack of housing assets (Human Resources and Social Development Canada, 2007). In 2008, the number of individuals at risk of homelessness in Waterloo Region due to economic variables is 18,830 (Pomeroy, 2007). There are no specific demographic groups associated with this data.

3.4.2   Hidden homeless

This group of people is defined as living in temporary accommodations (e.g., living with family or friends, staying in time-limited residential programs). The Region has not made a count

of this type of homelessness because of difficulties associated with undercounting or duplicating counts (Human Resources and Social Development Canada, 2007).

3.4.3 Short term or crisis sheltered

This population is defined as those people who accessed one of the Region's shelter services. The count in this category may be duplicated as many people have used a variety of shelter services (e.g., informal or formal). The shelters which are included in the count are: Argus Residence for Young People, The Cambridge Shelter, Charles Street Men's Hostel, and Kitchener-Waterloo Out of the Cold, Safe Haven, and YWCA- Mary's Place (Region of Waterloo, 2002). The total number of people regularly accessing these services in 2007 is estimated at 1,792 (Human Resources and Social Development Canada, 2007). However, the Homelessness and Housing Umbrella Group estimate the total at 2,831 (Homelessness and Housing Umbrella Group, 2008). According to the Region of Waterloo data in 2008 the majority of people aged 16 and over in emergency shelters was males (68%). In 2008, there were 63 female-headed sole parent families served at the YWCA (Mary's Place) and Bridges. Youth between the ages of 16 and 24 made up about 5% of the total of Out of the Cold guests in 2008. In the same year 13% of the people accessing emergency shelters were older adults (Social Planning, Policy and Program Administration, 2009).

3.4.4 Supportive housed

The population in this category includes persons with physical disabilities; acquired brain injuries; developmental disabilities; mental health issues and non-specific supportive housing. It does not include senior's supportive living, assisted living, and non-adult long term care or retirement homes. Individuals who used "Region defined supportive housing" are not included

because housing data collection methods used by housing stability providers is not consistent and individuals using this type of housing would suggest there is more housing than there is as there is a high turn-over rate within the housing stability system (Social Planning, Policy and Program Administration, 2007).

3.4.5   Absolutely homeless

The most widely accepted definition of an absolutely homeless person is "A literally or absolutely homeless person is a person staying in shelters, on the streets or in other similar settings such as abandoned buildings, in-make shift structures, and in parks "(Firdion and Marspat, 2007; Philippot, Lecocq, Sempoux, Nachtergael, and Galand, 2007; Toro, Tompsett et al., 2007). The Region of Waterloo provides a definition of absolute homelessness, which is similar to the most widely recognized definition provided in the literature: "Absolutely homeless people are defined as people living in outdoor spaces not intended for living such as in parks, on streets, under bridges, in abandoned buildings, and in cars. It also includes some people staying in short-term emergency shelters (Homelessness and Housing Umbrella Group, 2008). The Region of Waterloo also includes a sub-population of this category and includes people who have experienced homelessness greater than one year which can include cycles of accessing emergency services and/ or correctional facilities. This also includes people for whom homelessness has become the new "normal;" and who have developed skills oriented to survival on the streets rather than in housing. According to the Persistent Homelessness Ad-Hoc Working Group, comprised of all service providers in the Region who work with this group of people, there are at any time between 50 and 70 people who fall into this absolutely homeless category (Ad-Hoc Working Group, 2007). In addition to the above definition, it is important to distinguish among three key subgroups: homeless single adults, homeless families, and homeless

youth. These three subgroups are generally distinct on many dimensions, including service systems that are utilized. Literature has documented differences among these sub groups (Tompsett, Fowler & Toro, 2007). This research focuses on single, urban homeless individuals between the ages of 16 and 70.

3.4.6   Degrees of absolute homelessness

In addition to types of homelessness there are varying degrees of homelessness. These are one-time homelessness, which usually happens as the result of family breakdowns; eviction; employment loss; natural disasters; or house fires. At times, these people may have more economic resources to draw on to enable them to make it through this period. Episodic homelessness includes those people that experience periods of housing stability interspersed with periods of instability and homelessness. Persistent homelessness means that the length of time a person has experienced homelessness is often greater than one year with a pattern of cycling in and out of hospitals or correctional facilities in between periods of time living on the street or in emergency shelters. In addition, homelessness has become the new normal for these people and skills are oriented to living on the street (Social Planning, Policy and Program Administration, 2009).

This research focuses specifically on interview respondents who had experienced in the past year or were currently experiencing absolute homelessness in urban Waterloo Region based on the most widely accepted definition outlined above, in order to understand how they are affected by environmental change and what they do to cope with this change.

Chapter four- Study area

4.1   Study area

This study was conducted with the urban absolute homeless population in Waterloo Region, Ontario. At 478,130 inhabitants (2006 Census), Waterloo Region is Canada's 11th largest urban area and encompasses the Kitchener-Waterloo-Cambridge Census Metropolitan Area. By 2031, the Region's population is expected to grow to 729,000 (Regional Municipality of Waterloo, 2009). The Region consists of the four townships of Wilmot, Wellesley, Woolwich, North Dumfries and the three urban municipalities of Waterloo, Kitchener and Cambridge. The Region is 1,382 square kilometers in size and its regional seat of government is in Kitchener. The Region is climatically termed "humid continental," and enjoys four distinct seasons with fairly predictable weather patterns.

As outlined in Schröter (2005) determining the study area with the stakeholders is an important aspect of vulnerability assessments. In this research, the Social Planning Department of Waterloo Region assisted in the decision to include the City of Kitchener and the City of Cambridge in the study area. The City of Waterloo was not included as there were no formal services for people experiencing homelessness in that area. Kristie and Kovats (2006) also suggest that a regional focus is a valid and appropriate study area in climate change assessments.

Map 1- Waterloo Region

Maps provided by the Region of Waterloo GIS department.

4.2   Study population:

In all of Canada the total number of absolutely homeless is approximately 150,000 at the last count in 2004 but most experts estimate the number at approximately 300,000 (Pye, 2005). In addition, there are at least 891,000 people at risk of homelessness at any time in Canada (Laird, 2007). The estimated cost to service 150,000 people experiencing homelessness for one year is approximately 4.5 to 6 billion dollars (Laird, 2007). These costs include health care, criminal justices services, social services and emergency services (Laird, 2007). In 2007 it is estimated that there were approximately 2,800 people who accessed short term emergency shelters in Waterloo Region at any one-time and another 18,000 households were at risk of homelessness (Pomeroy, 2007; HHUG, 2008)

4.3 Climate data

The following section will outline the climate data for Waterloo Region as both a comparison to the long term mean from the Canadian climate normals (1971- 2000) and the years 2006-2006-2007-2008-2009 as well as a comparison between each of these years. The past five years were chosen to represent a small sample of climate data in recent history. The specific categories reflect those types of exposures which the interview respondents considered the most problematic; cold and snow in winter, heat and rain in summer and overnight temperatures in summer.

Graph 1- Waterloo Region winter temperature comparison (Jan-Feb-Mar)
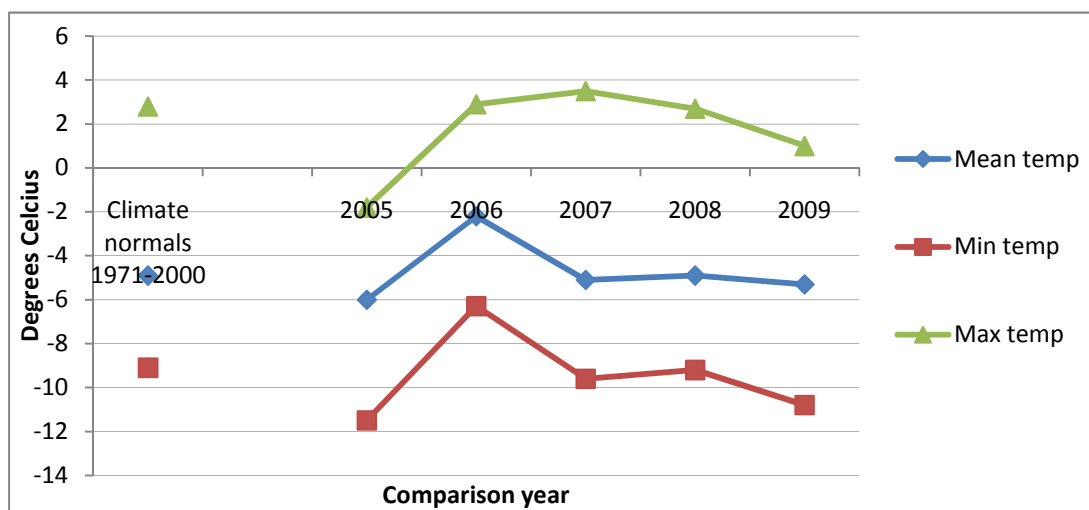
*Environment Canada. 2010. Climate Data

The graph shows that maximum winter temperatures for the climate normal period as well as each of the five comparison years have become slightly warmer. The mean winter temperatures for each of the comparison years has remained constant at approximately -5° C except for 2005 when the temperature dropped to -6° C and 2006 when the mean temperature rose to -2° C. The minimum winter temperatures also remained constant through the comparison years except in 2005 and 2006 when the Region experienced a colder and warmer winter respectively.

Graph 2- Waterloo Region snowfall comparison (Jan-Feb-Mar)
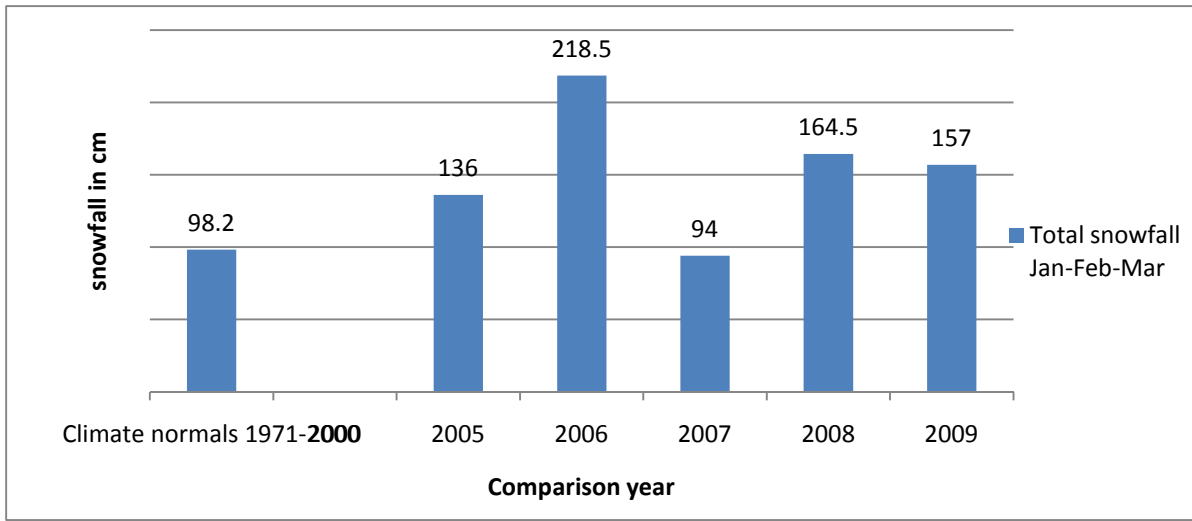
Graph 2 shows that in 2006 there was the most amount of snowfall recorded in the time period and in 2007 there was a significant drop in total snowfall, 94 cm, for the three winter months of Jan-Feb-Mar.

Graph 3- Waterloo Region summer temperature comparison (June-July-August)
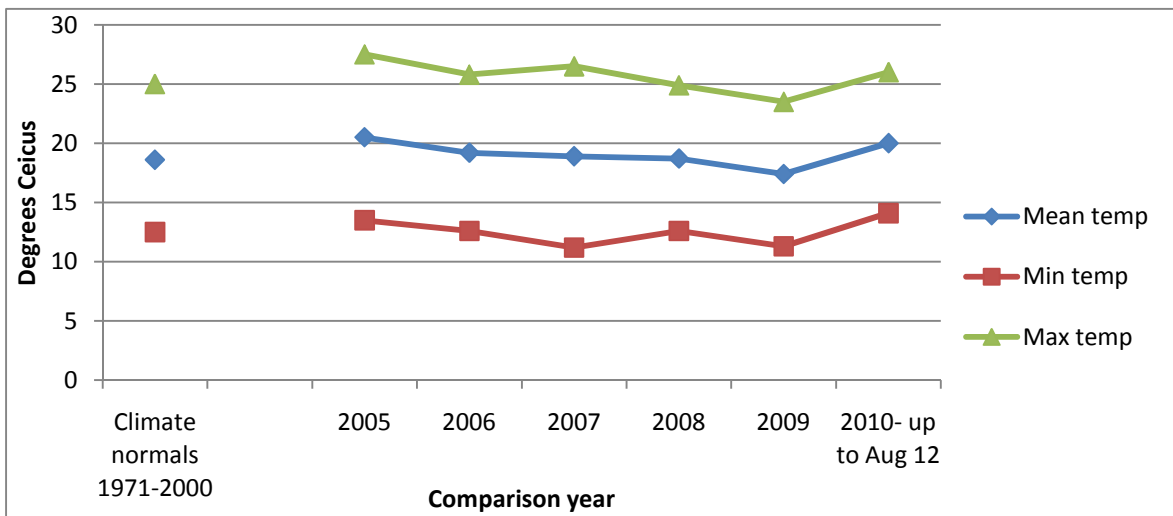
Graph 3 shows that summer temperatures in the Region have remained almost completely constant with the maximum temperature being approximately 26°C, the mean temperature being approximately 19°C and the minimum summer temperature being approximately 12° C for the three summer months. However, the months of June, July and mid-August, 2010 show that the mean and

minimum temperatures have been the highest over the past five years as well as during the climate normals period.

Graph 4- Waterloo Region summer rainfall comparison (June-July-August)
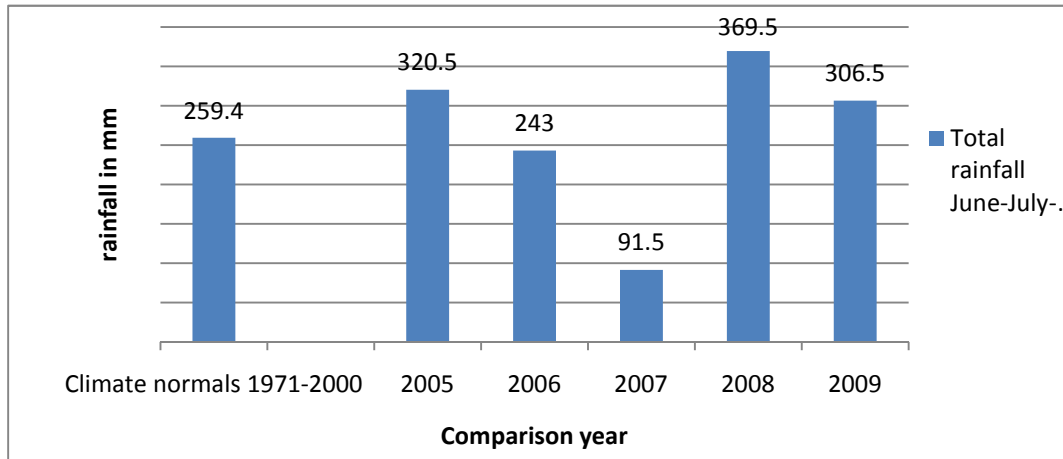
*Environment Canada. 2010. Climate Data

Graph 4 shows that the most amount of rainfall fell in the summer of 2008 at 369.5 mm and in the same three months of 2007 the Region experienced the least amount of rainfall at 91.5 mm.

Graph 5- Number of summer (June-July-Aug) overnights (11PM-6AM) with temperatures in each category
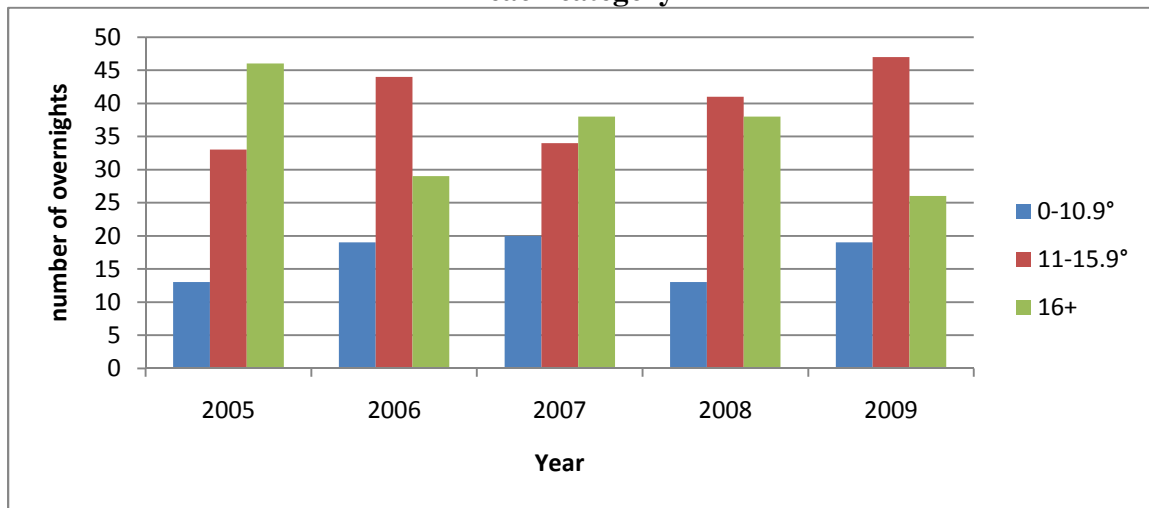
*Data from Hourly Climate Data (dry bulb reading) from Waterloo-Wellington Airport.

Graph 5 shows that most summer overnight temperatures in the 2005-2009 period were between 11- 15.9°C with the exception of 2005 when most of the overnight temperatures were above 16°C. 2007 and 2009 had the most amount of overnights when the temperatures were between 0-10.9°C.

Overall the above climate data shows that Waterloo Region has a relatively constant climate for the categories cold and snow in winter, heat and rain in summer and summer overnight temperatures for the years 2005 to 2009 and including the climate normals 1971-2000. The winter temperatures from 2007 to 2009 have become slightly warmer while there has been more snow in each year except 2007 when the Region experienced a very dry winter with snow almost comparable to the amount from any average year in the climate normal period. The summer temperatures have remained relatively unchanged for each of the mean, minimums and maximums except for the summer of 2010 when up to August 12 there were nine days of extreme heat (over 30°C). In each year from 2005 to 2009, except 2007 there have been 4 instances of extreme rainfall days during June-July and August, meaning rainfall over 20mm (Environment Canada, 2010). Most overnight temperatures in the 2005 to 2009 period were in the 11° to 15.9° C range.

4.4   Climatic thresholds and the regional alert system

The idea of societal thresholds which are defined in terms of social, economic and other conditions represent the state of society that will result in that society reacting to a given climate stimulus. The driver of response is the variation or evolution of socio-economic conditions which determine whether a climactic stress is problematic or not. An example of a societal threshold might examine why a particular rainfall deficit leads to hardship in a society in one year, while a similar deficit in another year does not (Meze, 2008). This concept is very important in the research in that governing bodies may find it increasingly difficult to determine when to call a cold advisory or a heat advisory for a variety of reasons such as availability of resources which may be run on a volunteer basis or transportation systems which may not operate at certain times of day. Although this area is under researched, the National Collaborating Centre for

Environmental Health has published work relating to the effectiveness of programs during heat episodes and provides a foundation for further research around when, what and how to call an alert (National Collaborating Centre for Environmental Health, 2008).

In Waterloo Region an air quality advisory (smog alert) is issued by the Ontario Ministry of the Environment when smog conditions reach dangerous level (i.e., Air Quality index exceeds 50). Since 2005 there have been a total of 96 days with smog advisories, with well over half of these being issued between May and August (MOE, 2010). A humidex advisory alert is issued by Environment Canada when heat, humidity and other weather conditions together can be very dangerous with the humidex rising above 40° C (Regional Municipality of Waterloo, 2009).

In Waterloo Region, a cold weather protocol was adopted in 2001 and is issued by Public Health when information is received from Environment Canada. It is in effect from November 1 to April 15 each year. The following criteria are used in the issuance of an alert. The temperature is forecasted to be -15°C or lower and there is a special warning from Environment Canada regarding wind chill and/or freezing rain (Regional Municipality of Waterloo, 2002). The protocol outlines how the Region can assist emergency shelters in times when the protocol is in effect. However, the individual emergency shelters are responsible for their own internal policies regarding identification and response to extreme cold and hot weather. The protocol also outlines timeframes when extreme weather is most likely to cause health problems, such as frostbite and hypothermia, as well as ways to identify symptoms. There is currently no heat protocol in place in Waterloo Region but an extreme heat event is called when Environment Canada calls an advisory. The advisory is in effect when the temperature is above 30°C with a humidex above 40°C (Social Planning, Policy and Administration, 2009). Compared with no days above 30° in 2009 in Waterloo Region, July, 2010 saw seven days, including a three-day

heat-wave at the beginning of the month (Anderson, 2010). In July 2010, the City of Kitchener released an overview of their new cooling centre policy which was implemented the same month. The cooling centers include pools, community centers, arenas, libraries and other City facilities which would act as reception areas where community members can cool down and have access to drinking water. The cooling centers are in effect whenever a heat alert is issued by Environment Canada (City of Kitchener, 2010).

4.5 Regional emergency management

The Regional Emergency Management Plan specifies that each of the seven municipalities within the Region of Waterloo is responsible for supplying the initial response in an emergency. The mayor of an affected local municipality may request assistance from the Region of Waterloo by contacting the Regional Chair. This may be done without activating the Regional Emergency Alerting System. However, when the resources of a local municipality are deemed insufficient to control the emergency, the Mayor will request that the Regional Chair of the Regional Chief Administrative Officer, the Regional Police Chief or the Regional Fire Co-coordinator activate the Regional Emergency Alerting System in the Region of Waterloo Emergency Response Plan. This will be carried out by the Duty Office of the Waterloo Regional Police Service. The Regional Emergency Alerting System will also be activated, and a Regional Emergency is declared by the Regional Chair when; a) the emergency affects a large portion of inhabitants of more than one local Municipality; or b) the emergency requires extraordinary actions or expenditures of monies by one or more regional services for the protection of property, health, safety and welfare of the inhabitants of the community (Regional Municipality of Waterloo, 2009).

In the case of flooding, it is the Grand River Conservation Authority which is responsible to forecast flooding and to help reduce flood damages. It does this by: monitoring weather conditions and river flows, issuing flood messages (advisories and warnings) to municipal flood coordinators and to the public through the media and the Grand River Conservation Authority website, operating a network of seven reservoirs to hold back water and reduce flood peaks, by owning and maintaining dykes to protect low-lying urban areas and by controlling development in flood-prime areas to reduce potential property damages. There are three types of messages that the Grand River Conservation Authority issues. These are high water safety bulletins (the Grand River Conservation Authority is tracking weather conditions to assess the potential for flooding when rivers, streams and ponds may be unsafe for recreation and other activity); flood advisories (flooding is possible and Municipalities and individuals should prepare); flood warnings (flooding is occurring or is about to occur, Municipalities and individuals should take action to deal with flood conditions). This may include road closures and evacuations. The warning may include forecasts of how high water will rise and the time of the peak. The messages are communicated through municipal flood coordinators and police services throughout the Grand River watershed. These coordinators work with municipal staff, such as fire chiefs and public works managers who are familiar with flooding conditions in their community and can mobilize staff and resources to implement the local flood response plan. They will notify properties most likely affected by the flood. Warnings are also sent to radio stations, television stations and newspapers in the Grand River watershed and surrounding areas. Media outlets will frequently post these messages on their websites (GRCA, 2009). The main problem with all of this communication is that the hardest to reach people experiencing

homelessness may not be notified in a timely manner thus increasing their risk to both property loss as well as the hazardous conditions affecting their health.

4.6   Housing service inventory

The purpose of this section is to provide a better understanding of the formal services related to homelessness in Waterloo Region. First, an overview of Provincial support programs is provided. Second, an extensive summary of Regional housing programs is provided with the main goal to highlight the unique programs that enable people experiencing homelessness to pursue the motto of "homelessness to housing stability" and to provide a better understanding of the significant institutional and cultural importance placed on homelessness issues. Institutions, especially governance institutions, in effect make adaptive capacity real (Adger, 2004) by providing both a context and a process through which adaptations can take place. The housing system for homeless individuals in Waterloo Region is divided into five categories. These are emergency accommodation, street outreach, shorter-term housing, and transitional housing and longer term housing. The following section will provide an overview of each service offered within these groups.

4.7   Social service system overview

The Social Assistance Reform Act, 1997, created two separate statutes, the Ontario Works Act (OWA), 1997, and the Ontario Disability Support Program Act (ODSPA), 1997. The OWA was proclaimed May 1, 1998, replacing the General Welfare Act (GWA). ODSPA was proclaimed June 1, 1998. People with disabilities and permanently unemployable people under the Family Benefits Act were transferred to the Ontario Disability Support Program on June 1, 1998.

Ontario Works provides employment assistance and financial assistance to eligible persons in temporary financial need. The municipalities and First Nations communities deliver Ontario Works. Basic assistance and benefits are cost-shared with Consolidated Municipal Service Managers and First Nations Delivery Agents. The Government of Canada covers the 20 percent First Nations share.

The Ontario Disability Support Program (ODSP) provides income and employment supports to people with disabilities. The province delivers ODSP and the program is cost-shared with municipalities at a rate of 80/20. (International Covenant on Economic, Social and Cultural Rights, 1999).

4.7.1 Ontario works (OW)

There are three scenarios for receiving Ontario Works. The first is if a person is unemployed and living at a fixed address. For a single adult this amount would be $585 per month. The second is a person who is living on the street and is not accessing any shelter services. The amount for this person would be $221 per month and this is called a street allowance. Third, a person who is using a shelter service would be assigned a caseworker in the shelter who would determine the per diem rate that the person must pay for accessing the services there. The per diem rate at any of the shelters or domiciliary hostels in the Region is $41.75 per day.

4.7.2 Ontario disability support program (ODSP)

In 2009 the maximum amount that a single adult could receive from this program was $1042 per month. This amount is intended to cover their basic needs such as food, transportation and shelter. The program will pay for a person with a disability living in a shelter or having any

other type of lodging and they will receive $736 per month. The shelter or other lodging arrangement would take the per diem rate out of this amount. A person without an address can receive ODSP and they would pick their check up at the ODSP office in the city which they are living.

4.7.3   Personal needs allowance

For people using a shelter service who are eligible for the per diem they may also receive a Personal Needs Allowance which, throughout much of 2009, was set at $121 per month or approximately $4.04 per day. People may also be eligible for other benefits under the Ontario Works (drug card, clothing allowance). Often when people stay at a shelter the staff there will give the individuals the $4.04 every morning before they leave the shelter.

4.8   Housing programs in Waterloo Region

The role of the Regional Municipality of Waterloo (the Region) with respect to housing stability is attributed from three different sources: The Federal Government, the Provincial Government and the local community. Each source has its own set of expectations and/ or funding portfolios. The total amount of funding from the Region thorough the Social Planning, Policy and Program Administration division toward housing stability programs and administration approaches is $7M per annum. From the Federal Government, the Region has taken on the role of Community entity for the Homelessness Partnering Strategy (HPS) and the role of Community Coordinator for the homeless Individuals and Families Information System (HIFIS). As the community entity, the Region is responsible for facilitating local planning and the administration of HPS funding. As the HIFIS Community Coordinator, the Region champions the implementation and assists with the on-going activities associated with the HIFIS

database (Social Planning, Policy and Program Administration, 2009). The Federal Government does not currently have a long term strategy in the area of housing stability although the British Columbia New Democrat's Bill 304 was debated in the House of Commons and as of July 2010, had passed first reading.

4.8.1   Emergency accommodation

Emergency shelters have been defined in Provincial legislation as the provision of board, lodging, and services to meet personal needs of people experiencing homelessness on a short-term, infrequent basis (Social Planning, Program and Administration, 2009). The role that the Federal government has taken in relation to emergency shelters includes data collection as well as limited funding support, largely for one-time capital projects. The Provincial Government funds formal emergency shelters through the Ontario Works Act (1997). A maximum per diem (set by the Province) is cost shared 80% by the province and 20% by the Region. In 2009, the per diem funding to the shelters from the Province and the Region was $47.75 per day effective April 1, 2009 (Social Planning Policy and Program Administration, 2009). Since 1999, the Region has served as the service system manager for homelessness. However, the Region has held agreements and provided per diem emergency shelters since 1973 when the Region came into existence. Before this a per diem agreement was held between the City of Kitchener and the House of Friendship dating back to January 13, 1971 (House of Friendship, 1973). Under the Social Housing Reform Act a signed service agreement between the Region of Waterloo and the housing providers is necessary in order to enable them to continue performing the functions of income testing, wait list management, and/or selection functions of social housing. The earliest reference to a purchase of service agreement between the Region and the YWCA is from 1975 (Regional Municipality of Waterloo Council, 1975). Currently, YWCA-Mary's Place, Charles

St. men's hostel (The House of Friendship), the Cambridge Shelter Corporation (Bridges), Marillac Place and Cara's Hope Maternity House each has a purchase of service agreement with the Region. Through the purchase of Service Agreements, shelters provide services outlined within the Region's Emergency Shelter Guidelines (2009). Shelters that have a purchase of service agreement with the Region and follow the Emergency Shelter Guidelines (2009) provide formal emergency shelter services within Waterloo Region (Social Planning, Policy and Program Administration, 2007). The emergency shelters also have access to motel units in cases when internal overflow capcity has been reached and the Region's Referral Protocol for Emergency shelters is not applicable (Social Planning, Policy and Program Administration, 2009). In 2008, 2,783 individuals accessed emergency shelter services in Waterloo Region (3% decrease from 2006). Between 2000 and 2008 the total number of emergency shelter beds used in shelters increased by 9% on average (Social Planning, Policy and Program Administration, 2009).

Table 2- Emergency accommodation in Waterloo Region

Name of shelter	Length of Stay	# of beds	Meals served	# of people served 2008	Age of clients	Gender	Daytime hours	Funding
Argus, Cambridge	3 months	10	All	173	16-24	Male	Closed 9:00AM lunch Reopen 5:30PM	United Way Family and Children Services
Bridges, Cambridge	Minimum 28 days	49	Breakfast Dinner	661	Any	Both	Open all day	Region of Waterloo

House of Friendship (Charles St. Men's Hostel), Kitchener	Minimum 28 days	39	Breakfast Dinner	862	16+	Males	Closed 9-11AM Reopen 11AM	Region of Waterloo United Way
Mary's Place, Kitchener	2 months	60	All	428	Any	Female	Open all day	YWCA United Way
Haven House, Cambridge	8-12 weeks	30	All	588	16+	Female	Open all day	Region of Waterloo
Anselma House, Kitchener	8-12 weeks	28	All	588	16+	Female	Open all day	Region of Waterloo
Safe Haven, Kitchener	1-10 days	10	All	115	12-16	Both	Open all day	Region of Waterloo
Out of the Cold Program, Kitchener	One night at each church	55-90	Breakfast Dinner	544	16+	Both	Closed 8:00AM Reopen 5:30PM	Individual church donations

*Data from (Social Planning, Policy and Program Administration, 2009).

There is much more support for emergency accommodation in Kitchener than Cambridge, as Cambridge has only one overnight shelter (Bridges) which serves both men and women. Therefore, if a person does not like the services or staff at Bridges there is no alternative place to sleep, either in the winter or the summer. At first glance there seems to be more services geared towards females, yet at each of these women only shelters the client must be, or have been in an abusive relationship. The Out of the Cold Program which runs in Kitchener is the only shelter available to both men and women in the winter months and only allows people 16 years and over.

4.8.2   Street outreach services

Street outreach includes fixed drop ins and mobile services, both offering a variety of supports designed to improve the quality of life for people experiencing or at risk- of homelessness. Programs may be used sporadically over a longer period of time and people tend to return for service again at some point in the future. Street outreach is the initial and most critical step in connecting a person to housing, health, social and income support services. It is viewed as a process rather than an outcome, with a focus on relationship building and, eventually, engaging people in the services they need and will accept (Social Planning, Policy and Program Administration, 2009).

Table 3- Street outreach services

Name of Program	Services	Hours of Operation	# of people served 2008
Welcome Aboard **Cambridge Shelter Corporation**	Literacy Counseling, Medical clinic, Foot clinics, Needle exchange, Anger management, Job placement workshops, Referrals and more	24 hours per day in some form	1698
AIDS committee of **Kitchener/Cambridge**	Education programs, referrals, needle exchange	Weekdays	518
House of Friendship Men's Drop-In, Kit.	Caseworker support, shower access, toiletries, used clothing	Daily 11:00- 5:00	1036
Opportunity Centre **Kitchener**	Serves individuals with brain injuries, cooking classes, movies, music, referrals	Daily	13, 000 visits
Ray of Hope (OASIS-Kitchener)	Groceries, blankets, clothing, 1:1 support, laundry, supper meal	Mon-Sat 2-5PM and 7-10PM	1400 visits
Reaching Our Outdoor Friends (ROOF) Kitchener	1:1 counseling, laundry, cooking classes, , computer lab	Mon-Fri 1-5 PM and 7-10PM Sat-Sun 2-5PM	1590 visits youth -16-21 only
The Working Centre Kitchener	Mental Health Care, ODSP arrangement, health counseling	Daily by appointment	400
St. John's	Two meals serves daily, clothing, tent and sleeping bag vouchers,	Mon-Sat 7:00- 1:30	Up to 1,100

Community Kitchen Kitchener	psychiatric outreach, ODSP assistance		
The Working Centre (Bridgeport Café) Waterloo	1:1 support, light snacks, income and support resources	Daily 2-4	Only established at end of summer 2009- Numbers N/A
Canadian Mental Health Association Cambridge	Mental Health services, 1:1 support, referrals	525 hours per week	261
Kitchener Downtown Community Health Centre	ID replacement services, medical treatment, chiropodist services, tent and sleeping bags given out each year	Mon-Fri 9-5PM Thurs- 4-8PM	429

*Data from (Social Planning, Policy and Program Administration, 2009).

There is a wide variety of street-outreach services for people experiencing homelessness as well as possible concurrent conditions such as mental health issues. However, most of these services are operating in Kitchener primarily, with only one very small service operating in Waterloo and two services in Cambridge. Similar to the emergency accommodation, the Bridges Shelter in Cambridge serves as the primary outreach facility and therefore if people choose to avoid this agency, there is only one other option at the Canadian Mental Health Association.

4.8.3   Short-term housing stability programs

Shorter term housing stability programs assist people with building skills and gaining resources that help them to find or maintain housing. These programs tend to be accessed over a shorter period of time. The pattern of use differentiates programs from the longer term housing stability programs, where the intention is that people will use services continuously over a longer period of time (Social Planning, Policy and Program Administration, 2009).

Table 4- Short-term housing stability programs

Name of Program	Services	Hours	# of people served 2008
John Howard Society, Cambridge	Subsidized Housing and low income housing services	Daily	980
St. Joseph's Health Centre, Kitchener	Services for patients discharged from Health Care in London	Vary	80
Shelter to Housing Stability Program Bridges, Cambridge	One year support for transition to longer term housing	Vary	10
Shelter to Housing Stability Program (House of Friendship), Kitchener	One year support for transition to longer term housing	Vary	5
Shelter to Hosing Stability Program (Mary's Place), Kitchener	One year support for transition to longer term housing	Vary	6
Canadian Mental Health Association, Cambridge	Counseling services, assessment, conflict resolution	24 hour crisis support	37,023 visits
Kitchener Downtown Community Health Centre (Peer Support Program)	Emotional support, referrals, problem solving skills	Vary	204
Lutherwood- Kitchener	Housing services, referrals, computer access, employment help	Housing Desk Mon-Fri-1-3PM	1014
Mennonite Central Committee of Ontario (Circle of Friends), Kitchener	Women over 16 with problem solving and conflict resolution skills	Vary	8
Reaching Our Outdoor Friends Housing and Community Program, Kitchener	Self-Help, education, recreation activities	Vary	163
The Working Centre Housing Desk, Kitchener	Housing services, ID replacement services, employment counseling	Mon-Fri Daytime hours	690
Street to Housing Stability Program (The Working Centre), Kitchener	Services singles and couples experiencing homelessness to gain accommodation	Vary	21
Waterloo Regional Homes for Mental Health, Kitchener	3-6 month housing support for people with mental illnesses	Vary	300
Women's Crisis Services of Waterloo Region, Kitchener	1:1 support through troubled relationship issues	Vary	1254

There are 3 short-term housing stability programs in Cambridge and 11 operating in Kitchener. There are none in Waterloo. The programs with the highest number of clients were the housing desks which help in locating individual housing units. In addition, housing services for women coming out of abusive relationships were accessed quite heavily in 2008.

4.8.4   Transitional housing

Transitional/time-limited housing serves to promote housing stability for people experiencing homelessness. The residential programs offer individuals and families in transitional situations the opportunity to build the necessary skills, resources and support networks to fully integrate in the community (Social Planning, Policy and Program Administration, 2009).

Table 5- Transitional housing programs

Name	# of units	Length of program	Gender and age served	# of people served in 2008
The Working Centre Integrated Supported Housing	25 units	12 months	Both 16+	56
Lutherwood Families in Transition Program	2 houses in Kitchener and 1 house in Cambridge	3 months	Families	67
Saint Monica House Inc.	I house in Cambridge and 1 house in Kitchener	2 years	Single mothers 16-22 with up to 2 children	165
Marillac Place Kitchener	10 people	12 months	Females 16-25 New mothers with children under 12 months	49
Salvation Army New Directions Kitchener	28 beds	3 months	Men	84
Ray of Hope (Welcome Home) Kitchener	11 units	1 year	Refugee men, women and families	17
K-W House Church Assembly Inc.	26 people	10 months+	Government sponsored refugees	278
House of Friendship Kiwanis House	6 people	11 months	Men 16-19	19

There are two transitional housing services in Cambridge and six in Kitchener. There are none in Waterloo. The length of stay in these programs was less than one year. In 2008 Saint Monica House Inc. for single mothers with children and K-W House Church Assemble Inc. for government sponsored refugees had the highest amount of clients using the services.

4.8.5   Longer term housing

Longer term housing programs meet the needs of people who require ongoing assistance to maintain housing. Some programs serve only a particular population, while others serve a variety of groups. The intention is that people will use these services continuously over a longer period of time. The following section will outline only the non-specific longer term housing programs (will not include mental health, brain injury, physical disability specific housing) (Social Planning, Policy and Program Administration, 2009).

Table 6- Longer term housing

Name	Services	Length of Program	Gender and age	# of people served in 2008
Cambridge Shelter Corporation Trustee Program	Assist clients with money management	No time limit	Both 16+	50
Waterloo-Wellington Community Care Access Centre, Kitchener	Shopping, light housekeeping, laundry, childcare for clients in low income range	Varies	Both 16+	234
Waterloo Region Community Housing Workers, Kitchener	Residents in rental units, provides, referrals and advocacy	Varies	Both 16+	625
Argus and Kiwanis Housing Support, Cambridge. Kitchener	Housing support in separate rental units	Varies	Men 16-21	22
House of Friendship (Cramer House), Kitchener	Assistance with substance abuse issues and daily living activities	No time limit	Men 16+	9

House of Friendship (Eby Village), Kitchener	64 self contained units with minimal support	No time limit	Single men and women	70
House of Friendship (Charles Village), Kitchener	22 one bedroom units	No time limit	Single men and women 16+	22
YWCA Lincoln Road Apartments, Kitchener	Life skills training, conflict resolution, access to food and loan programs	No time limit	Females 16+	85
Cambridge Shelter Transition program	20 apartment units with minimal support for people recovering from addiction	Up to 2 years	Both 16+	31

*Data from (Social Planning, Policy and Program Administration, 2009).

Both of the longer term housing programmes in Cambridge operate out of the Bridges Shelter. All of the longer term housing programs in both Cambridge and Kitchener serve people over 16 years of age which means some younger youth may be missed. However, the services that do exist for longer term housing are varied and include a wide range of programs which benefit people for unspecified time limits. This open time limit may allow people a strong support network and may increase the chances of longer term housing stability.

Summary- Overall the housing system in Waterloo Region is well developed. However, there are gaps in service provision for youth under 16, especially in the winter as they cannot access the Out of the Cold Programme. There is also more specific housing available for women experiencing abuse. The street outreach services operate consistently in Kitchener, but are only beginning to operate in Waterloo and Cambridge. Short term and transitional housing is also geared more towards women experiencing abuse, and single mothers with only a few services operating for men overcoming drug and alcohol addictions. Finally, longer term housing is not easily accessible for youth under 16 years old.

Chapter five- Research methods

This research is an exploratory case study in which the participants described their lived experience of homelessness through narratives. As outlined in Yin (2008) the case study approach allows for data to remain holistic and meaningful in character when describing real life events. It also allows for the possibility of generalizing results into other settings (Yin, 2008). Therefore, the case study approach is an exploration of how the *members of a homeless population* experience environmental change in Waterloo Region. The overarching methodology is participatory action research borrowed from community psychology and the conceptual framework used in this case study research is the contextual vulnerability approach to climate change.

5.1   Participatory action research methodology

A working definition for action research is a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview (Reason and Bradbury, 2007). It brings together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities (Reason and Bradbury, 2007). Action research has its base in a pragmatic view of the world in that it produces knowledge that is useful to people in everyday life in order to increase their well-being, economic, political and psychological, spiritual in an aim at promoting more sustainable relationships within the ecology of the planet (Reason and Bradbury, 2007). The principle of PAR research presupposes that all people's ideas are equally significant as potential resources for creating interpretive categories of analysis. It strives to avoid the skewing

of credibility stemming from the prior status of an idea-holder (O'Brien, 2001) and has the goal of leading to change (Reich et al., 2007). It seeks to democratize knowledge production and foster opportunities for empowerment by those involved. "Within human geography, it offers a politically engaged means of exploring materialities, emotionalities, and aspects of nonrepresentational experience to inform progressive change" (Kindon et al., 2008). In this research, a collaborative approach was used between University researchers, the community partner, the Social Planning Department of the Region of Waterloo, and community services agencies. In action research situations, the researcher's role is primarily to take the time to facilitate dialogue and foster reflective analysis among the participants, provide them with periodic reports, and write a final report when the researcher's involvement has ended (O'Brien, 2001). In addition, when specifically researching homelessness, it is recommended that a highly collaborative approach should be followed with a wide variety of stakeholder involvement in order to gain highly diverse perspectives (Berry, 2007).

5.1.1   Collaborative sample frame development

The research was planned throughout the months of April to June with the names of agencies and contacts derived from an inventory of services developed by the Region of Waterloo Social Planning Department. This list was exhaustive in its inclusion of all agencies that service people experiencing homelessness in the Region. Similar to the vulnerability approach Smit and Wandel (2006), participatory research engages the community at all stages of project development. After the Social Planning Department of the Region of Waterloo became a formal partner through a detailed term of reference, thirty-three invitation letters were sent out to the social service agencies seeking assistance with participant recruitment, as well as space provision to conduct the interviews. Of the 33 invitations sent out, 15 agencies responded and

expressed interest in the project. Upon contacting these agencies to set up face to face meetings 10 agencies made the decision to become project collaborators and agreed to facilitate the interview process.

Once the social service agencies were contacted, and initial meetings set up, the two University partners engaged in meetings with representatives from these agencies to determine how to construct an appropriate sample. Together with the agencies, sampling began when members of the homeless population were identified as possible candidates for the research. The service agencies chose people based on the following two criteria; had to have experienced homelessness in the past year or were presently experiencing homelessness and had to be either a youth between the ages of 16 and 25 or an adult between the ages of 25 and 70.

Preparation also included the hiring of two peer researchers, who themselves had experienced homelessness, to accompany the researchers in the field while conducting the interviews. The possible candidates for this position were recommended by four different agencies and a total of four people were interviewed- three men and one woman. Each participant was interviewed with the idea of choosing the person who could most effectively gain access to the hard to reach people experiencing homelessness, as well as being able to articulate the interview themes. One female and one male were chosen. The purpose of hiring the peer researchers was to gain support from the interview participants by enabling a person with similar experiences to probe for information in a non-threatening environment as well as to bridge the gap between the researchers's knowledge and lived experiences involving homelessness. In addition, the peer researchers helped to find interview participants in both Kitchener and Cambridge as both had many contacts with people who had or were experiencing homelessness. This made the sampling more effective as both peer interviewers had valuable insights into

where to find people.

5.1.2 Sampling

The research used a combination of three types of purposeful nonprobability sampling. A snowball type sample was used through conversations with the service agencies as well as individual members of the homeless population in the study area. In this way a service agency referred a specific interview participant and this interview participant recommended another interview participant whereby the snowball occurred.

Opportunistic sampling occurred when the researcher flexibly followed new leads during fieldwork and took advantage of the unexpected. For example, the researcher was referred to a particular person but during the interview saw the opportunity to interview someone else due to specific experiences that were crucial in gaining a wide understanding of the exposures and management strategies. This happened particularly often when the researchers were not conducting interviews at agencies but rather used "float days" to walk around the communities and find people who were currently, or had experienced homelessness to interview. One point about this method was that three times possible interview participants refused to be interviewed and all three of these cases were women. In addition, this method was somewhat awkward because making a determination of whether a person was homeless or not was very difficult. In fact, the only way that the researchers could possibly tell was if they were carrying a pack with them, which did not necessarily mean that they were homeless. However, this type of sampling was beneficial in that a couple of the participants were pointed out by the peer researchers as people who, had, in fact experienced, or were experiencing homelessness.

Convenient sampling occurred when cases were found on the basis of access (for example- viewing homeless people on the street). However, according to Hay (2005) this is the

least reliable source of information because it may produce information-poor cases. Out of 48 interviews there were nine instances of both opportunistic and convenient sampling which occurred spontaneously in outdoor spaces.

5.1.2 Collaborative data collection

The stakeholders in this project were the people who had or were currently experiencing homelessness in Waterloo Region as well as community service agencies and local Regional Government bodies. The primary stakeholders, people who were or had experienced homelessness, were recruited through the service agencies in the community which had been invited to participate in the project. In order to capture how environmental change was affecting them and how they coped with it, semi structured, qualitative interviews which were content focused and dealt with pre-determined research themes were used. The interviews followed an ordered but flexible questioning. The researchers, one research assistant from Wilfrid Laurier and one primary researcher from the University of Waterloo, redirected the conversation when necessary in order to remain as close to the interview themes as possible. The interviews followed a guide which outlined seven specific themes. These themes were: housing and shelter information; problematic conditions; how problematic conditions were handled; barriers to management of problematic conditions; use of existing service resources; existing networks; and climate justice issues (See Appendix 1 for Interview Guide). Probes were also used to guide the interviews to stay within the presenting themes, and open ended questions were used to encourage a narrative approach from the interviewees. Each interview participant was provided with 15$ compensation at the end of the interview.

Table 7- Interview participant characteristics and overview of data

	City	*Gender*	*Age*	*Ethnicity (only three categories represented in sample)*
Participant characteristics	Kitchener/ Cambridge	Male/ Female	16-25 years/ 25-70 years	White/ Black/ Aboriginal
Participant data overview	31/17	38 male/ 9 female/1 tsgd	8/40	45/ 1/2

The preparation for the project was structured in a very intensive data collection plan, whereby over the months of July and August a total of 40 interviews were scheduled at the 10 agencies. The interviewers conducted 39 of these 40 interviews at the 10 agencies. In some cases the agencies preferred for the interviews to be set for a specific time which was 35 minutes, while others had no restriction on the time limit for each interview. The main reason for the time limit was to ensure that as many participants were given the opportunity to speak as possible. For example at the St. John's community kitchen, over the two days, 8 interviews were scheduled and each interview was approximately 35 minutes in length. This time restriction was beneficial in that the interviews were very focused with the interviewers not straying from the topics. However, in some cases the time limit restricted an intimate conversation from happening where some very specific and nuanced ideas came out during the more lengthy interviews.

The ten agencies that participated as collaborators were: The House of Friendship (men's hostel); Lutherwood (housing and employment services agency); Reaching our Outdoor Friends (youth drop-in); The Kitchener Downtown Community Health Centre (street health outreach services); ARGUS (shelter for male youth); OASIS (drop-in); Bridges (co-ed short term shelter); The Canadian Mental Health Association (street and housing outreach services); Mary's Place (all

women's shelter-abuse specific); St John's Community Kitchen (street outreach services). In addition to ensuring that the interviews were conducted at a wide variety of service agencies, the interviews were conducted in both Kitchener and Cambridge to ensure that both urban areas were represented in the sample. The agencies that participated in Kitchener were: Lutherwood; House of Friendship; Reaching Our Outdoor Friends; the Kitchener Downtown Community Health Centre; OASIS; St. John's Community Kitchen and Mary's Place. The three agencies accessed in Cambridge were the Bridges shelter, the Canadian Mental Health Association, and the Argus youth shelter. It should be noted that there were no services for people experiencing homelessness in the City of Waterloo and therefore no agencies became collaborators in the project.

5.1.3   Analyzing interview data

This research used two types of analysis. First, developing a preliminary coding scheme for the qualitative interviews required understanding the main themes of the overall research. This was found from literature, past findings and memos and log comments made throughout the data collection. At this stage it was determined that the most appropriate themes for this segment of the research would be focused on the overall theoretical concepts related to the vulnerability approach to environmental change. Therefore, environmental exposures, management strategies, enabling factors and constraining factors were the four parent themes initially utilized. Second, by using the parent themes mentioned above the researchers coded three interviews each into these four themes. Finally by using the retrieve function of the NVivo8 software a report on the themes was produced.

Table 8- Chart of themes and sub themes of data

Theme	Sub-themes
Environmental **Exposures**	-heat -extreme cold in summer -extreme heat in summer- winter -extreme cold in winter- slush -freezing rain- ice- snow-dew- rain –wind-dampness -rainstorms- humidity- snowstorms
Adaptive **Strategies**	-organizations -prescription medication -street drugs - alcohol - emergency exits -underground parking -weather appropriate clothing -tents -tarps -Mennonite blankets -sleeping bags -public buildings -abandoned buildings -stay in same place -walk around -take bus - riding bus – outdoors - trucks -cardboard - stay hydrated - cars -go to jail - go to hospital -stay with family -stay with friends -watch news -watch weather channel –hear about weather from friends
Constraining **Factors**	-no psychiatric help –drug addictions –alcohol addictions –stereotypes –safety issues –police –teenagers –some gear not good –social service system –too expensive to buy bus pass –bus tickets hard to come by –lack of appropriate housing –limited service use –getting busted –crime makes whole cycle start again –no social networks –not being in a clique –age restrictions –not enough clothing vouchers –not enough proper footwear – being a women –being a man –being transgendered –having children – being in a relationship –staff attitudes –corrupt services –mold in housing
Enabling Factors	-psychiatric help –P and A allowance- Ontario Works-ODSP-trade stuff for gear- sell bus tickets- sell medication –bush areas outside of city –get clothing vouchers –staff connections –public fountains –no fences around private yards –good relationships with family – good relationships with friends –willingness to commit crime – volunteering at organizations –good relationships with police – good relationships with staff
Health Outcomes	-arthritis –sleep apnea –dehydration –frostbite –hypothermia – foot rot –cold –flus –asthma –stress –depression –suicidal ideation –chills –phobias –cancer –heat exhaustion –heat stroke –paranoia –live disease –mental illness

The coding followed a line by line format whereby the researchers read each interview transcript and then coded each line according to the main concepts in the content. If a new sub-theme was introduced the researchers added this to the code book and informed each other about the addition. Then a new code book was produced to reflect the addition. Once both the primary

researcher and the assistant researcher had decided on the children nodes, the interviews were coded accordingly and the results were presented in chart form. Once the coding themes were developed, and initial reports were generated in Nivo8, an assessment of current vulnerability was developed. This assessment was also based on literature reviews related to other vulnerability assessments, mainly in the Canadian Arctic context (CIEH, 2009; Ford et al., 2008). A wide range of categories were used in the development of the adaptive capacity section which included; human thresholds, freewill and activism, health, demographics, social networks, institutional limitations, and exogenous and endogenous factors such as regional civil society and internal perceptions. A determination of current vulnerability was made based on these factors.

5.2 Vulnerability approach to climate change assessments

The vulnerability approach to climate change used in this research reflects the conceptual framework of Ford and Smit (2004) and Smit and Wandel (2006) in that vulnerability is a function of exposure and adaptive capacity. Vulnerability at the local level includes social, economic, political and climatic conditions and processes operating at different scales over time and space, which affect community exposure and adaptive capacity (Ford et al., 2008).

The conceptual frameworks for engaging vulnerability assessments are varied and include the eight step approach by Schröter (2005), the adaptation assessment policy framework by Lim (2005), and the analytical framework presented by Lemmen (2008). The Smit and Wandel (2006) framework is illustrated in Figure 5.0 below. This research assesses current vulnerability in chapter six while chapter seven speculates on future Regional climatic conditions.
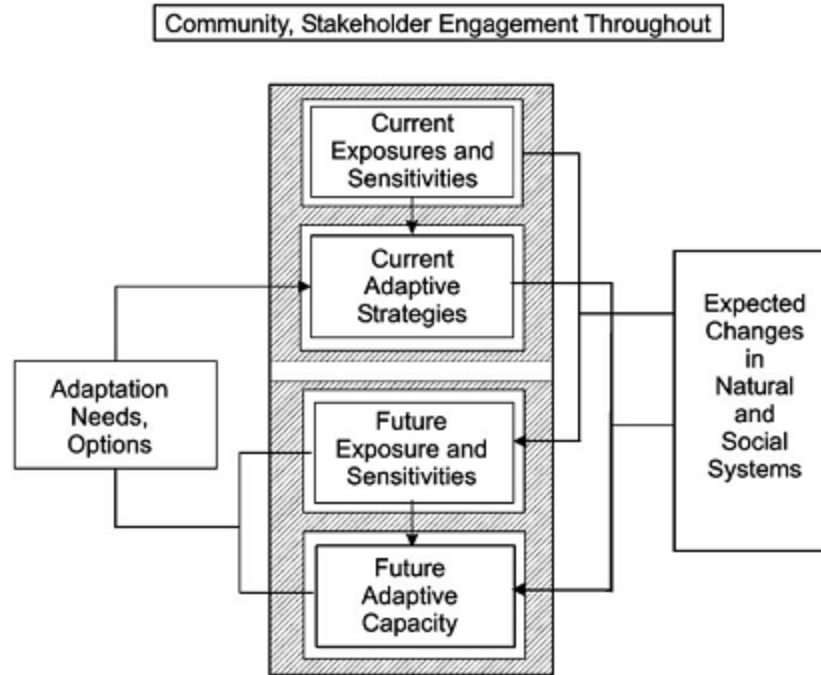
Figure 5: Conceptual framework for vulnerability assessment and mainstreaming

From Smit and Wandel (2006)

5.2.1 Engaging stakeholders

The research engaged stakeholders throughout its entirety. Members of the absolutely homeless population were not only interviewed but were consulted at the end of the project through the member checks. There were two peer interviewers hired who assisted in the recruitment of interview participants as well as helped conduct the interviews themselves. These two people had themselves experienced homelessness in the past. The community partners, The Social, Policy and Program Administration of Waterloo Region as well as the 10 collaborating social service agencies were also consulted through the project progression.

5.2.2 Current exposures and sensitivities

The exposures and sensitivities were determined from the in-depth qualitative interviews that were conducted and they were listed in a chart as the most frequently cited by the corresponding number of sources (respondents) for each exposure.

5.2.3 Current adaptive strategies

The current adaptive strategies used to deal with the aforementioned exposures were determined by line by line coding in the NVIVO8 software and ranked as the top ten most cited adaptations by using the NIVOV8 software. The strategies reflected each problematic condition and included example strategies such as making shelters, finding shelters in old buildings, using loading docks and awnings, using social service agencies, and staying with friends. In most cases there was overlap between the different exposures and the corresponding strategies and this was reflected in the analysis section.

5.2.4 Estimating future environmental conditions

Estimating future conditions was accomplished by understanding the climate data categories which were cited as the most problematic exposures by the interview respondents. These categories included, rain, extreme cold in winter, extreme cold at night in summer, extreme heat and winter conditions. Graphs of climate data using the most problematic exposure categories were developed by using both historical and raw bulk climate data from Environment Canada. Future conditions for the South Sub Region of Ontario where Waterloo Region is located were also developed from literature found in the *Impacts to Adaptation: Canada in a Changing Climate, 2007* document as well as climate projections for the North Eastern Region in the International Panel for Climate Change Assessment, 2007, Chapter. 11. Socio-economic scenarios such as future employment markets and regional cultural attitudes also provided an estimation of future non environmental conditions.

5.2.5 Estimating future adaptive capacity and vulnerability

At this stage, when all elements of adaptive capacity and climate scenarios were taken into consideration, a determination of future vulnerability was made.

5.3 Triangulation and member checks

In order to ensure preliminary validity of the initial qualitative analysis three service providers were contacted and went over the coded sub-themes with the primary researcher. The service providers consulted were Doug Rankin from the Downtown Community Health Centre, Jon Hill from OASIS drop in and Mike Voisin from the House of Friendship. This allowed for research triangulation and the addition or deletion of anything that they found to be important in the initial coding and analysis. The data analysis was also shared at two open public forums. This step of the research, called a Member Check, took place on April 16, 2010 at the St. John's Community Kitchen in Kitchener and on April 19, 2010 at the Bridges Shelter in Cambridge. The Member check is when the researcher goes back to those participants at the completion of the study, and asks them if the results are accurate or need correction/elaboration on constructs, hypotheses, ect. (Ratcliff, 2003). At this time, participants were able to ensure that their lived experiences had been well-represented and that the data had high validity. At both St. John's Kitchen and the Bridges, the Member Check participants were recruited by Outreach workers. There were nine people who attended the Member Check in Kitchener and three of those ten people had been interviewed for the project in July 2009. The information gathered from the Kitchener session verified the main environmental stressors outlined in the research findings. There were seven people in attendance at the Member Check in Cambridge and none had been interviewed previously for the project. There were no service providers consulted in Cambridge with the initial data analysis and therefore at this Member Check there were significant factors

that came up from the consultations such as the shelter remaining open all day as of the Fall of 2009 as well as heightened security. These results were added into the results section of the research.

5.4 Community report

At the end of the research portion of the project, a community report was developed in collaboration with the Region of Waterloo, the University of Waterloo, Wilfrid Laurier University, two peer interviewers and one representative from both the Kitchener Downtown Community Health Centre and the Bridges shelter in Cambridge. The community report presented the main findings of the research in a published document titled: *Homelessness and Global Climate Change in Waterloo Region: Are We Ready?* The report will have wide distribution to service agencies, local government bodies and will be made available on the web.

5.5 Potential limitations and their resolutions

Patton (1990) outlines specific ways in which the validity and credibility of the research can be enhanced. First, a comparison of observations can be made in relation to what the researcher sees as opposed to only what they hear from participants. In this research, the sample shared the characteristics of absolute homelessness (Maxwell, 2004). However, participants differed in their experiences with this characteristic based on a wide variety of personal characteristics. Therefore, in order to establish theory triangulation, that the homeless population is vulnerable to environmental change in very specific ways, using data from the perspectives of various stakeholders was crucial. For this reason, a total of 48 interviews were conducted. Second, comparisons of what people said in public were made to what they said in private. This was accomplished by the ability of the peer researchers to understand the nuances and underlying meaning of what was being said as well as to add to this through their own experiences and with

their relationships to other participants. Third, comparing different perspectives of people from different points of view was important. This included staff views, funder views, and client views, as well as people outside of the project altogether. To accomplish this, the service providers were asked for feedback at all stages of the project. By checking information against program documents and other written material in order to corroborate evidence, triangulation and validity was also enhanced. Fifth, by establishing situational authenticity and interpersonal credibility, the researchers also understood the interactions between the researchers, the people using the research, and those participating in the program (the interviewees). By using multiple sources to triangulate the research results, as mentioned above, the research increased its ability to be transferable to new situations through very pragmatic, utilitarian generalizations.

Conducting a study of this nature has limitations. Primarily, the social service agencies were chosen from a pre-existing inventory of services which was compiled by the Social Planning Department of the Region of Waterloo. It was the assumption of the researcher that this list was exhaustive. Second, there may have been sample bias from the partner agencies in deciding who would be appropriate participants. In order to address this potential bias, a wide cross section of agencies with varying mandates was chosen.

Once the peer interviewers were chosen with the assistance of the social service agencies, issues such as transference, and assumption needed to be addressed. At times, there were transference issues between the people experiencing or facing homelessness and the people who were no longer homeless and were acting as peer interviewers. The on-the-street homeless in some instances seemed overwhelmed by the fact that someone who had obtained housing was interviewing them and this may have put unnecessary stress on them. However, in most instances it was beneficial as the people experiencing absolute homelessness felt more comfortable

discussing issues with the assistance of the peer interviewers. There were also practical considerations in a study of this kind. Some people who we wished to interview may have had difficulties in meeting at a pre-determined time and place. This happened only twice in the field work when interviews were set up and the participants did not show up. In actuality, more people contacted the primary researcher who wanted to be interviewed. The invaluable help that the human service workers provided in the coordination of interviews facilitated the project in many ways, and the eagerness to which they responded to the project further enhanced the ability of the researchers to conduct work. The fact that this population is highly mobile made it difficult to locate some people on the "float days" and having access to spots where they were not visible was enhanced by the peer researchers who knew where to look. This happened on nine occasions when people were interviewed spontaneously in parks, libraries, and malls.

In addition, similar to other populations being interviewed, the interviews captured the interviewees in one snap shot of time during their life. Finally, the fact that the interviews took place during the summer of 2009 at a time when there was significant amount of rain and the temperatures were colder, most likely affected the interview responses. Rain was the most problematic condition reported by respondents, and this may have been a reflection of the weather occurring at the time of the interviews.

5.6   Ethical Issues

The research project has undergone a rigorous ethics review procedure through the University of Waterloo Ethics Board certification ORE 101, and has gained acceptance as an ethical project. For example, no youth under the age of 16 have been interviewed. In addition, every interview participant was made aware of their rights to privacy and the right to refuse any questions. This informed consent was conducted at the beginning of every interview.

Chapter six- Current and future vulnerability

6.1   Environmental exposures

This section will provide an overview of the types of environmental stressors that were reported by respondents as problematic. Exposure and sensitivity are properties of a system and are dependent on the various interactions within different elements of the system. Both of these concepts reflect the likelihood that the system will experience certain conditions, exposures, and the parts of the system which will most likely be adversely affected by these exposures, thus sensitivities (Smit and Wandel, 2006).   The data collected from the qualitative interviews showed that the ten most cited conditions for people experiencing homelessness were rain, extreme cold in winter, winter, and extreme cold in summer, rainstorms, snowstorms, extreme heat, dampness, snow and wind. The Graph 1 shows the number of respondents who referenced each response category. In addition to these ten most frequently cited conditions, respondents also cited summer (general category), slush, dew point, dampness, ice, and freezing rain as problematic conditions.
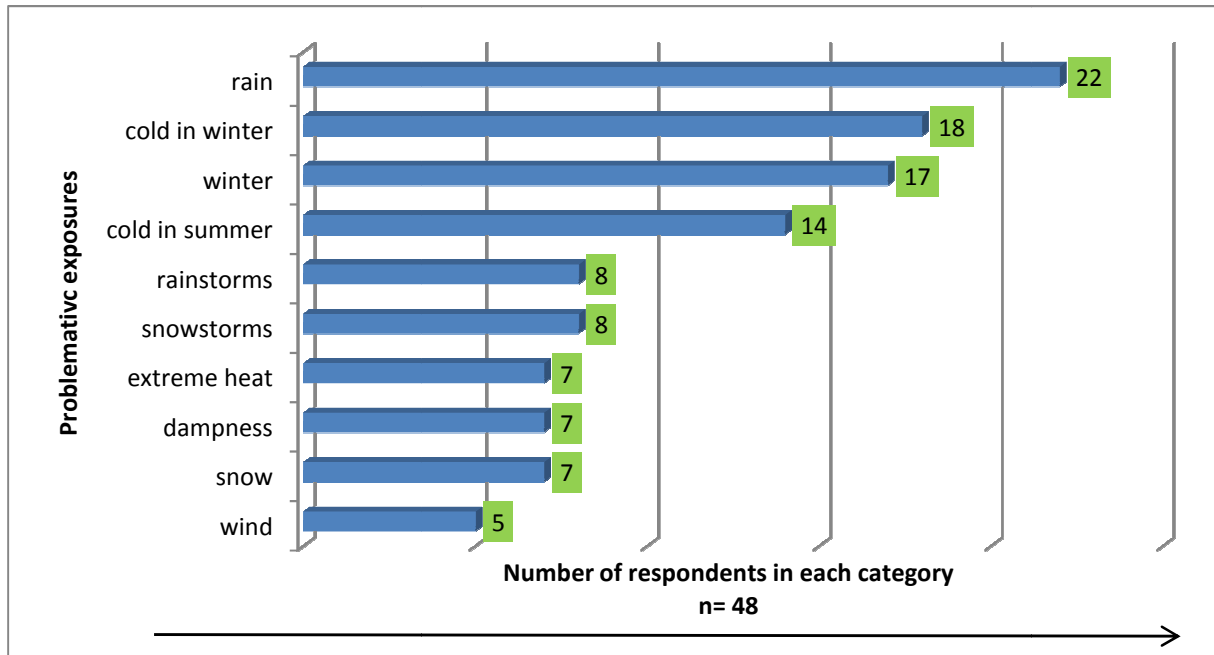
Graph 6- Environmental exposures

An overview of each exposure type and how it is problematic for the target population follows.

Seasonal summer conditions

Rain

Rain was referenced by just over 45% of people. The Rain was problematic for people because it caused gear such as tents and sleeping bags to get wet and most people did not have waterproof gear. Rain also created the problem of flooding and this was mentioned several times throughout the interviews. "It was one night when it was raining loud and we were tenting near the Grand and it was more or less rising up, but there more or less was flooding" (Joey D., line 59). "Like I remember one time I was camping out pretty close to Ottawa and Fisher Hallman area and uh... there was a severe rainstorm, and my tent was flooded the next day I got pretty wet" (Jorden, line 37). It also caused people to have wet feet which they reported led to trench foot, colds, flus and pneumonia. "Especially when shoes are free and half the time you get the

closest ones that will fit. Half the shoes have holes in them, and you get foot rot and everything it is pretty gross. Now I actually have a foot doctor here" (Shayne, line 132). People also cited the rain as a major factor in becoming depressed. "Sometimes I catch a really bad cold, and it is kind of stressful. It kind of puts you down emotionally when you are sitting in the rain or sitting underneath a bridge, and you say I could do better than this, and you think about it sometimes I have suicidal thoughts" (Jorden, line 80). An additional problem with rain was that once the gear was wet; there were very few free places people could go to get it dry. This meant that they would have to carry wet gear around with them on their backs. The laundry facilities that were available at OASIS and St. John's community kitchen were only available once every week and were on a first come first serve basis. "So it was like a knapsack full of wet clothes, dressed in wet clothes, walk to the Laundromat dry half your clothes, take off your wet clothes, throw them in the dryer" (Richard C., line 83). "Like if I get wet, if I get to change I have to put my wet clothes in a bag with my dry clothes and they are going to get all smelly. We don't have the luxuries to go home and put them in a dryer" (Echo, line 95). "But yeah how good is that sleeping bag when it is pouring down rain and how great is that back pack when it is not weather proof and you don't have that tarp to put over. These things are not thought of in the homeless society" (Echo, line 98).

Extreme cold

Extreme cold in summer was cited by 29% of respondents. This exposure was problematic because most people did not have access to warm gear in the summer and were not expecting it to be a problem in this season. It was reported that these conditions created problems such as flus, pneumonia, chills, and colds. "It was summertime at the time, I was fortunate I did not stay homeless for more than couple of months, um it was summertime, but it was really

interesting, because up until that time I would have swore that in the summertime you would be fine at night I mean it's summertime- I nearly got hypothermia one August night. The temperature had gone down I think it was maybe in the low teens like it was not cold by any stretch of the imagination but I had no blankets I was sleeping on a piece of cardboard and I ended up waking up at 5:00 AM and I was dizzy and completely disoriented, and I knew it was just too damn cold" (Wes, line 62). Some people had gear such as sleeping bags in the summer, but often this gear was taken away by police when they would sleep in illegal places. Once the gear was gone, it was very difficult to get more. "Yeh they have to be because you can't put a tent up in Victoria Park because the cops even take your tent which is stupid and they take all your stuff and then you are back to nothing and it is impossible to get another tent voucher" (Shayne, line 72). "I get it from the downtown community outreach, and they are actually pretty good- they give you a sleeping bag and a tent, and it usually lasts about a season, but by the end of the season, if the police don't chop it up you pretty much need a new one for the next year" (Diane, line 67).

Rainstorms

Rainstorms were cited by 17% of respondents. Similar to rain, people expressed problems related to themselves and their gear getting wet. One difference in the responses for rainstorms was that people mentioned that unpredictability, for example of rain and thunderstorms, caused a problem for finding shelters. "I would, well in a rain storm I have a poncho, usually on me all the time" (Blair, line 187). This respondent was the only person who mentioned having rain gear on him all the time. "But it is nice to have it in your pocket a freak storm, like in the fall, if you get caught in a freak storm, you don't care if you use them only

once" (Keith, line 167). This respondent was referring to emergency blankets which could only be used once as they were disposable.

Extreme heat

Extreme heat was also cited by 15% of respondents. The reported problems with extreme heat were sun stroke, heat exhaustion, dehydration, and not having enough places to go to get relief. "They should have a place; a lot of people get sun stroke they should have a house on days like that" (Debbie, line 178). "I don't know I think it is even more detrimental to your health to be out in the sun and you are out in the sun now for 10 minutes and it is not good. If the homeless do not get the help that they need they are going to die off easier when the world gets more polluted because people themselves that do have the money are going to find it harder to survive so…" (Nick, line 199). "A few times when I was bordering on heat exhaustion" (Wes, line 67). "And you know different places to go and find drinking water but I find that not many parks have drinking fountains because not a lot of people have the money to buy water or a drink but that should be available to them" (Chantel, line 72). "Yeh I keep myself hydrated on a hot day" (Jorden, line 304).

Dampness

Dampness was also cited by 15% of respondents. Dampness was referenced in relation to the effects it had on hands, feet and inside people's bodies. "Or if your feet get wet, you are cold, of if your hands are cold, your cold-type thing" (Blair, line 325). "And it gets more worse and sometimes water seeps through the concrete and sometimes it drops on you when you are sleeping and you are all wet and cold in the night. It is pretty severe" (Jorden, line 194). "No I don't get sick very often, like right now my lungs feel like there is moisture in them, and I think that is because the dampness in the last couple of days" (George, line 80). "In the summer time

when there is dampness in the air that is when it bothers me the worst like today is really bad like it is throbbing like a tooth ache, plus I carry it in my right shoulder (the backpack), because I can't carry it on my left shoulder all the time" (Richard P, line 81). Dew point was a problem for two respondents. One respondent found the problem related to gear and the other found the problem related to dew on their body. "A dew point is invisible really and it's not like you would actually feel it, when it sticks you just, if you get wet, you get a sudden chill and once you get chilled, you can't get chilled it doesn't matter in the wintertime if you get wet you got to get immediately dry otherwise you are going to freeze you can get frost bite or hypothermia things like that. But as long as you stay dry you have a change of clothes or bedding, you know you keep everything dry. But dew point is one of those things that you can't run away from... it doesn't matter what kind of a shelter you got dew points hits like last night, it practically wet my sleeping bag out this morning" (Keith, line 44). "Yeh that is part of why it was cold, you know because the dews settles and it feels nice on your face in the morning at 3:00 in the morning, but the pavement gets cold fast" (Wes, line 225).

Humidity

Humidity was cited by of 5% of respondents. The main reported problem with humidity was for people's health. "For me it's rain and humidity. I have chronic bronchial asthma and I am allergic to the rain and humidity I can't breathe when it is out there" (Valerie, line 5). "But the humidex we were very lucky this year you know it struck 3 or 4 times but not like previous years when it was a continuous problem"(Keith, line 30). "But when it is humid and you find it a little harder for breathing and you can feel it in your bones, like your bones, like your bones ache a little bit more cause you can feel the humidity and the temperature is building and you know it is going to storm, after two or three days of humidity and you end up with a week's

worth of weather like this when you got a lot of moisture in the air. I can feel it right through my bones, through my shoulder, through my ankles" (Richard P, line 58).

Seasonal winter conditions

Extreme cold in winter

Extreme cold in winter was cited by 38% of people and the main problems with this exposure were people reported getting flus, colds, pneumonia, and hypothermia. Many people talked about knowing that the cold was coming because of their bones and feeling it deep inside their bodies. "Yeh too rapid of a change so… but anytime that any type of chill goes into the bones, it doesn't matter it goes into the bones and penetrates through the skin and moves through the flesh right up to...it's an awful thing to shake" (Keith, line 39). "Yeh being sick and getting cold. Pneumonia stuff like that, kidney and bladder infection, from the cold and wet" (Rob, line 49). People also talked about depression in the wintertime. "Well sometimes I don't have energy so I can't deal with it. Plus in the winter I get this thing- I get depressed in the winter…my body is lacking vitamins and so definitely the winter is very tough for me. It is hard to get up and want to do something" (Chantel, line 124). "Dead of winter, January, February, cause it is so cold then, and unpredictable too, it could be -10 one week and then -30 the next week and that shift in temperature is definitely going to give you a cold, right?" (Rick, line 132). "Um the uh, cold sucks especially when it gets really cold and you are outside for a long period of time and then you start to sweat on the inside and now it's wet inside" (Blair, line 167).

Winter

Winter as a general category was cited by 35% of respondents. It was problematic for a variety of reasons. First, the cold was difficult. Second, the sidewalks were often not shoveled and the snow was a problem for walking between service agencies. Third, the wind chills associated with winter were problematic for people who spent a large portion of their time outside. "the weather was a big deal, the winters were hard. Oh yeah it takes its toll on you" (Jason, line 51). "The wintertime is rough and walking in that deep snow just drags you down I used to walk on the road" (Brenda , line 33). "It was really hard with clothing I was, when I was out in the winter I was wearing the same clothes for days and days, I felt so disgusting" (Bruce, line 83). Jerry "finds winter, cold damp and depressing" (line 11). "In the winter too it sucks because you are usually wearing every piece of clothing you can find and you can't sit on the concrete because it is cold and wet a lot of people kick you out after a couple of hours" (Shayne, line 105). "Uh, I'd probably say winter, everybody would, winter is pretty bad" (Blair, line 28). "I would walk up there sometimes, but in the winter it's ridiculous when there is a ton of snow and you are just lifting your feet up and it takes you like an hour and half just to get up there" (Blair, line 163). "Yeh it is hard to walk around in the deep snow" (Brenda, line 33).

Snowstorms

Snowstorms were cited by 17% of respondents. Similar to responses related to rainstorms, people found the unpredictability of snowstorms bothersome. Respondents who cited snowstorms did not specify what type of health affects would occur. "In one of the big storms we had in the winter like the big blizzards or whatever…I lost my tent" (Bruce, line 180). This was the only respondent who mentioned using a tent in the winter. "Well rainy days, snow, when we had that snow storm we were still out on the street. They wouldn't open the

doors for a long time" (Debbie, line 74). "No one likes to go outside when it is snowing and

 hailing or whatever" (Joey D. line 207) .

Slush

Slush was also mentioned. It was problematic for one main reason. This was in relation to footwear. Respondents agreed that because of slush, their footwear would be wrecked, which increased their chances of getting foot rot or trench foot. "Homeless people I see guys walking around the street and you think they are wearing reverse flip flops because the fronts of their shoes are torn so much in half they are clapping. Like footwear is a very serious problem and that is the number one problem for a homeless person right now, you got to realize that if your feet get wet and they stay wet you are going to get sick, people suffer with cracked feet, sores on their feet and like I said, it is just because men don't give away their clothes" (Echo, line 84). "The snow, if there is lots, especially melting snow and slush everywhere, and I am going to get wet somehow or another because I did not have the greatest boots on or whatever " (Blair, line 167).

Ice and freezing rain

Ice and freezing rain were mentioned once each by the same respondent. Her issue was related to trying to walk on the streets with ice and freezing rain. "Yeh and falling on the ice. The freezing rain is really bad. Have you ever fallen in the freezing rain- it's not easy. It is hard to stand up on it and the boots they don't make them good today" (Brenda, line 232).

6.2   Existing coping strategies and adaptations

Adaptations are manifestations of adaptive capacity. They are changes in the system which better deal with problematic conditions. There are a wide variety of adaptations which include; timing (anticipatory, concurrent, and reactive), intent (autonomous, planned) spatial scope (local, widespread) and form (technological, behavioral, financial, institutional, and informational) (Smit et al, 2000: Wilbanks and Kates, 1999; Smit and Skinner, 2002: Huq et al, 2003). The next section will provide an overview of the adaptations for each of the problematic exposures outlined in the section above.

Seasonal summer conditions

Adaptive strategies that people used to face summer weather conditions focused around the use of services which would remain open at different times in the day. It also included accessing structures outside that would not normally be used for shelter such as awnings and car ports. Overall, summer conditions were problematic for people as the adaptive strategies of choice were not available consistently. For example, many of the outdoor structures exist in the area because of the manufacturing sector and are slowly being gentrified for new housing developments. This will significantly reduce the available options for people experiencing homelessness to gain relief from the elements. Further, relying on strategies to gain relief from heat such as drinking from people's hoses or going into water fountains often has repercussions from police and could further enhance a person's vulnerability.

Rain

Rain was the exposure which was the most problematic for people. During times when it would rain the primary way for people to gain relief was to use organizations such as the food

bank and the second hand store at St. John's community kitchen. It was often stated that people would volunteer at these places to get shelter from the elements. "It was fun; I got to know people, its easy work. I am either in, helping people stocking shelves, sorting out food in emergency uh, getting people like emergency food that would come in for that" (Blair, line 55). "There is always something to do at Mental Health, and I used to go to Sam's club all the time and pick up supplies and then you get your points. You get two grocery bags for 9$ a month and they got a clothing room in there" (Glenda, line 98). The shelters were also used; Bridges, the House of Friendship, the OASIS drop-in and St. John's community kitchen were attended on a daily basis. Public buildings included accessing public restaurants, libraries, coffee shops and malls. This category had the second highest number of responses with only formal organizations, as explained above, having more. The fact that most respondents had the Personal Needs Allowance ($4.04) every day meant that they could use a public coffee shop or restaurant to get out of the elements. Panhandling was a way that they could also get more money in order to utilize these public buildings. The library was a place that many respondents in Cambridge used, more so than those in Kitchener. However, both groups spoke of the accommodating nature of the libraries and that they rarely had problems in using this service provided that they were not under the influence of drugs or alcohol. Malls proved to be a somewhat different story. Those respondents that referred to malls as a management strategy to get out of the elements also made reference to the fact that security often kicked them out of these places as they were not paying customers. A few respondents also said that the mall was a place where they could steal merchandise and then sell it to get money. These people also stated that they had been caught doing this and were banned from these areas.

Buildings outdoors included trucks, cars, awnings, emergency exits; loading docks, and bridges (See Pictures 1 and 2 below). The main buildings that were used in this category were bridges, loading docks and awnings. Loading docks were important because they provided temporary shelter from the elements and were not subject to high security. "Right now I am sleeping on a loading dock. I got a four inch piece of foam, I am more or less doing night security for this one place. Well last year I stayed there for four months and they had a key there for me to use to go and make sure all the loading docks were closed and locked and I slept there" (Richard P, line 21). Bridges were also used except that there were often problems with flooding when storm water management was in affect and this caused some problems with gear getting wet as well as reported health conditions from the chills and dampness. "Like, it was, not this summer, last summer, it got really dark and I was down by Fairview, on Kingsway and Montgomery bridge, there? And I, I could see that it was gonna start any minute, and there was a bus shelter there, and, and the bridge, I says, well, I think I'm gonna stay under this bridge, 'cause I don't wanna get caught at the bus shelter a couple hundred metres that way", and sure enough, it comes down right away, and I was under the middle of the bridge, I got soaked anyways, both sides of the bridge the water came in" (Daryl, line 570). Due to the high amount of abandoned manufacturing facilities in the Kitchener area, awnings were often cited and going inside these areas were strategies that were often utilized. Wearing weather appropriate clothing was another adaptation but only one person actually mentioned having a rain poncho. One person mentioned using a garbage bag as a poncho. "Yeh glad. You know you pull it out of your bag and you pop a couple of holes in it and in goes your arms and your head and even that only protects you from 80% of what you are getting hit with. So yeah as crude as it may sound you just do what you got to do" (Echo, line 102). Having good gear was mentioned numerous times

and people differed in their experiences with gear. Some people stated that they had good tents and the water would not seep through, while the majority reported being flooded out due to tents that were not waterproof "Hope that your tent doesn't leak. If it does leek then get some money together take your clothes and your sleeping bag to the laundromat. I remember the one- time, I bought a tent and it said it was waterproof and every seam in the tent leaked. The material in the tent didn't leak but the seams did, and it was a thunderstorm and I was soaked" (Richard C, line 82). Tarps were mentioned many times and everyone who mentioned camping outside also mentioned using a tarp to keep their tent dry. "Well, see, my tent has a fly, and then I, I have an extra tarp that I can put over top of it, right" (Daryl, line 138). One woman used skids to put her tent on to keep from getting flooded. "Not as of yet, but I am up on boards like I am up on skids that keeps you grounded, and you put like a tarp to double up on the bottom and lift yourself about this high. I had one year where I was in a gully and woke up in this much water. Did not do it again" (Diane, line 61) (See Picture 4 below). Gear also included having appropriate footwear. "You can't exchange footwear not when they are rotted to nothing. I would go to Value Village on Sunday nights, because a whole bunch of people drop of their stuff before they take it to sell so I would do that or I would even go to people's houses and go like" Do you guys have any extra shoes, because I am hurting, like I am pretty much going sock feet here in the winter and it's not the greatest feeling" (Blair, line 248). A homemade shelter along the Grand River in Cambridge shows that people experiencing homelessness can be inventive. The shelter could keep three or four people out of the rain or wind for short periods of time and in conditions without significant intensity. (See Picture 3 below).

Picture 1- Truck docking area (Kitchener Summer 2009)

Picture 2- Sterling St. bridge (East Kitchener, Summer 2009)

Picture 3- Shelter along Grand River, Cambridge (Summer, 2009)

Rainstorms

Rainstorms were dealt with in basically the same ways as rain. The only difference was that people mentioned freak storms happening a lot in the interview summer (June-July-August 2009) and that they were completely unprepared for them. Trying to get to shelters such as awnings, truck ramps, and under bridges was not as easy when one had no warning that the rain was coming. This point was discussed in the way of knowing when and how weather events were going to strike and the majority of people said they did know about the weather ahead of time. "Well like everyone reads the newspaper they all know if, oh it is supposed to rain. Mostly all of the homeless people always check the newspaper or always find a way and tell everyone, news travels fast around here" (Jorden, line 506). However, with sporadic rainstorms, planning was not helpful. One respondent talked about using emergency blankets to cover himself from the rain during storms. "But it is nice to have in your pocket for a freak storm, like in the fall, if you get caught in a freak storm, you don't care if you use them only once" (Keith, line 173).

Dampness and dew

Dampness was dealt with by making fires under bridges or other deserted areas. "Um if you were lucky you could maybe find somebody who had a fire on and they were almost like campfires" (Wes, line 345). "We would stand around barrels with fires in them" (Bonnie, line 41). The main strategy to keep from getting dampness into the bones was to avoid wet areas, and keep you up off of the ground when camping. One respondent also talked about the necessity for appropriate clothing. "Well warm boots, you go to the salvation army and they say go back to your workers and get a voucher, but we shouldn't have to, we should have a clothing place for people to get boots what they need is jackets, hats, and gloves. Like being outside five hours a day it kind of

goes through your bones and because of the dampness and coldness I got bad nerves. It causes anger, frustration, and cancer" (Bret, line 123). Dew point was a condition that affected one respondent in particular. He mentioned it numerous times throughout the interview. His strategy for dealing with the dew point every night when he would be sleeping outside was to jump up and get into some warm place before it penetrated his sleeping bag. "A dew point is invisible really and it's not like you would actually feel it, when it sticks you just, if you get wet, you get a sudden chill and once you get chilled, you can't get chilled it doesn't matter in the wintertime if you get wet you got to get immediately dry otherwise you are going to freeze you can get frostbite or hypothermia or things like that. But as long as you stay dry you have a change of clothes or bedding, you know you keep everything dry. But dew point is one of those things that because dew point you can't run away from... it doesn't matter what kind of a shelter you got dew points hits like last night, it practically wet my sleeping bag out this morning" (Keith, line 39).

Cold in summer

Adapting to extreme cold in summer was accomplished by having good gear or getting relief in public buildings, and organizations. One respondent mentioned that the best way to keep warm was to have a quilt made by Mennonites wrapped very tightly around you. "A little light top blanket for a regular bed, but the Mennonite blankets that are all sewn together..." (Keith, line 50). Another respondent mentioned that when sleeping in the back of abandoned transport trucks he would make sure he had many wool blankets wrapped around him. Sleeping bags were also a common factor in being able to stay warm in the summer, and these were often obtained from the Kitchener Downtown Community Health Centre (See Picture 4 below). "They ran out this year early because a lot of people were drinking did not know and the thought you had to go

there and they went there and they said you have to go to the soup kitchen and get your piece of paper and go back but then a lot of people missed out" (Dragon, line 172). Similarly to rain, public buildings were used such as coffee shops, and libraries as well as organizations such as the OASIS drop-in, St. John's community kitchen and the House of Friendship.

Picture 4- Abandoned campsite, Cambridge (Summer, 2009)

Heat in summer

When discussing extreme heat in the summer, respondents reported a variety of strategies. These included soaking t-shirts in fountains to stay cool, finding shade, going into public fountains to cool off, and riding the bus to stay in the air conditioning. "Well in the summer it is actually a good way to keep cool. At first I went on it just to see the scenery and I left Conestoga mall it actually was fairly early in the morning and I got off at the market and then jumped on another bus and I wanted to go someplace anyway and I got on this bus if it was a 7 bus or another one. But anyway, I jumped on it and it started going to places I have never seen before" (Keith, line 225). "Well most of the time you got to keeps from overheating. And then about for a week or two when we had that hot spell, I wasn't paying attention and my feet got burned on the pavement inside my shoes. I didn't realize it until I got back that I had done it"

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(Keith, line 377). One factor that many respondents talked about was the necessity to stay hydrated. "I almost died out on the highway without water. I never let it happen again. If you don't have water you are going to hurt. I walked so far I didn't know where I was. I think you only need to go without water once" (Ron, line 239). "Water is a necessity, you got to drink" (Debbie, line 210). Staying hydrated was accomplished in a few different ways. One way was to drink from people's hoses. "You know, a lot of people just leave and turn their hoses off and they leave the water on" (Jim, line 494). Another strategy was to go into public places and ask for water. This was not favorable, however, and most of the time people could not get water this way. One respondent mentioned that the Subway restaurant had been providing people with cold water for their water bottles and were even putting in ice cubes. "City hall or subway has a promotion where you can go in and they fill it for free with water and ice" (Diane, line 11). "And you know different places to go and find drinking water but I find that not many parks have drinking fountains because not a lot of people have the money to buy water or a drink but that should be available to them" (Chris, line 245).

Seasonal winter conditions

The adaptive strategies used to deal with winter conditions also focused on the use of service agencies and this was, by far, the most effective strategy. The Out of the Cold Programme provides temporary overnight relief but is not accessible in the day. This means that people experiencing homelessness need to find their own shelters in the daytime. Going out into a snowstorm is very dangerous and can cause significant health problems such as pneumonia, trench foot, frostbite and hypothermia especially since most respondents did not have adequate winter clothing and gear.

Cold in winter

For the majority of respondents getting relief from extreme cold in winter meant using organizations such as the Out of the Cold program, and public buildings. However, other adaptations were using cardboard to sit on when one was panhandling or sleeping temporarily outside. "Basically got a piece of cardboard and lay it on the snow, so you don't get cold, you know what I mean?" (Jason, line 76). Riding the bus was cited by one respondent as a way to stay warm for short periods of time in the day. Wearing weather appropriate clothing was cited by many people and it was often referred to as having many layers of clothing "It sucked because half the time we would only have one change of clothes, so if it was raining we would all be soaking wet, and in the winter too it sucks because you are usually wearing every piece of clothing you can find and you can't sit on the concrete because it is cold and wet a lot of people kick you out after a couple of hours" (Shayne, line 103). "You dress like an Eskimo. You can go with real light clothing and with the sleeping bag on the outside with the quilt on the inside and you can use the quilt as additional padding on you and try to keep the maximum heat. So you got both layers, a single layer is no good, because the other half is outside there" (Keith, line 64). Staying with friends temporarily was also cited as an important way to get out of the cold. One respondent talked about his time in the back of a condominium stairwell where he spent most of the winter "I stayed mostly in apartment buildings in emergency exits. Yeh I found a real nice place" (Chris, line 77). He got relief from the cold here as it was heated and a cleaning lady brought him coffee and breakfast in the morning. "And the cleaning lady was bringing me breakfast and it was heated and it was in the top penthouse in an emergency exit in a blind spot and nobody even knew I was there as long as I went in late at night and got out early in the morning" (Chris, line 81). The back of transport or moving trucks was also cited a number of

times. "A lot of times we used to sleep in the UHAULS with blankets and blankets" (Doug, line 142). A few respondents mentioned going to rehab for drug and alcohol addictions which provided temporary relief from the elements."Well I would say it was a good 4 years. I would be in rehabs too I would go to rehab, I would go to my parents house, once again, now and then for a couple of weeks and then I would be gone again" (Blair, line 68).

Winter

Winter exposures consisted of snow, snowstorms, slush, ice and freezing rain. The majority of people did not spend time camping outside in the winter. Rather, they stayed in shelters, and/ or with friends. Not many respondents talked about spending time with family although a few did "I didn't used to but now that I am not using I go pretty frequently. My family didn't want much to do with me" (Shayne, line 161). One respondent talked about spending the winter in a man's garage and having to share the space with raccoons. "I was sleeping in a guys garage most of the winter last year. He didn't seem to mind. It got a little cold sharing the rafters with a raccoon. He didn't bother me and I didn't bother him" (George line, 21). The same respondent also stayed in a storage unit. He talked about the fact that neighbors knew he was there and did not cause any problems about it "Well I used to work for this company and they had a bunch of storage units and that is where I was" (George, line 104). A homemade shelter along the Grand River in Cambridge is made of cardboard, and particle board with a small fire pit inside (See Picture 5 below).

Picture 5- Shelter along Grand River, Cambridge (Winter, 2010)

Wind

Wind was dealt with in two ways. The first was to wear weather appropriate clothing, which included layers and layers of warm clothes. "Too it sucks because you are usually wearing every piece of clothing you can find and you can't sit on the concrete because it is cold and wet a lot of people kick you out after a couple of hours" (Shayne, line 105). "Sometimes I would just wear everything I got, or like a lot...sweaters, a couple layers of pants, scarf, gloves the works" (Blair, line 183). The second was to sleep in places which were shelters such as the back of trucks with warm wool blankets. "A lot of times we used to sleep in the UHAULS with blankets and blankets" (Doug, line 142) (See Picture 6 below). Respondents would also make their way to indoor spaces such as coffee shops or day drop-ins to get out of the wind.

Picture 6- Back of transport truck –East Kitchener (Summer, 2009)

Other coping strategies

Mal adaptations- addictions, criminal behavior and self harm

Mal adaptations are those adaptations that could help in the short term but may cause long term vulnerability. In this research, respondents used drugs and alcohol to numb themselves against the elements. "Yeh to cope with being outside, and get out of reality, if you are drinking and doing drugs you want to get out of reality that is why you are doing it on top of the addiction. You need it, you want to get out of reality, you don't want to deal with your life, and think about all the pain and garbage that goes through your life, so you drink or do drugs" (Blair, line 204). "That is the focus point of why there is homelessness, maybe not in every area but in this area there is an abundance of alcohol and drugs" (Dave, line 17).

A survival behavior that was described numerous times was to commit a crime such as vandalism, or sleeping in a private area and purposely getting arrested and taken to jail for a night to get out of the elements. This behavior was an enabling factor for the short term but could cause problems for the long term in having poor relationships with police officers and the law, which could cause further stereotyping and arrests. "Yeh they are better to sit in a jail cell than

sleep in the snow bank or getting caught by someone or getting robbed on the street" (Dragon, line 91). "Like the cops say Oh you guys are a gang, and it's just like I explained to them, I say no it's not a gang, you live on the streets and a couple of us you know we are family and we are going to help each other, if you don't help each other on the street who can help you like..?" (Dragon, line 128).

Self harm was also used to get admitted to the psychiatric ward at Grand River Hospital similar to committing crimes to get arrested and stay in a jail cell for the night. "... like a lot of my friends would go get themselves arrested just to get out of the cold, and other friends would cut their arms open just to get out of the cold for three days.. to get a bed and not have to worry about food for 3 days. Yeah I've done it a couple of times, you cut your arm and they think you are crazy and you get out of the cold for a couple of days" (Shayne, line 189). "Trying to find some place to go we actually got arrested because we went in the Market Square parking lot like just to try to warm up and that and we got charged because it wasn't open and then well it was not a good thing but at least in jail we had a warm place to sleep for the night" (Dragon, line 85).

A few respondents also talked about purposely going to a correctional facility for longer periods of time where they could have relief from the elements. "But even that they give us a hard time because cops keep ticking you off and say you will go to jail and we are going to give you a fine like we're are homeless how can we pay those fines we are just trying to get something to eat, they are like oh no you got to pay or you are going to go to jail..like again it is o.k. if I go to jail I am going to get fed, get clean clothes and have nice bed to sleep in... I am pretty sure it is not good...and that but …" (Dragon, line 102). "People will smash a window and go to jail. Anyplace to get out of the elements" (Doug, line 66).

6.3 Adaptive capacity elements

Adaptive capacity embodies the ability of a system to cope, recover, or adapt to hazardous conditions (Smit and Pilifosova, 2003, Smit and Wandel, 2006) without losing options for the future (Folke et al, 2002). The following section will outline the adaptive capacity of individuals by providing an overview of enabling and constraining factors that either helped or inhibited the ability to use the adaptations described in the section above.

6.3.1 Human thresholds

Smit and Wandel (2006) define coping range as the variation in climatic stimuli that can be absorbed without significant impacts, and thresholds as the limit where response does not work and significant impacts can occur. Physiological thresholds are exceeded when people cannot adapt to climatic stimuli. This type of individual threshold deals with the effects on physiology like sweating, freezing, and thirst. This concept deals with individual genetic and tolerance aspects (Meze- Hausken, 2008). This idea was explored in this research throughout the interview period but no one could provide a definitive temperature when they would consider it too cold, too hot, too wet or windy to sleep outside. Hypothermia is defined as a core, or internal, body temperature of less than 95°F (35°C). Hypothermia can occur in the summer when people would least expect it, between temperatures of 0° and 10°. If a person is wet from sweat or rain the chances for hypothermia are much higher and especially with people who are at higher risk such as the elderly, the young and people with psychiatric disorders. Hypothermia *usually* occurs with a temperature somewhere between 1 and 4 degrees Celsius. Frostbite occurs normally when there is a wind-chill. If a wind-chill measured -25° frostbite would occur in 15 minutes. Both conditions can creep up very fast, and if someone was sleeping outside, under the influence of alcohol or drugs or unaware of their surroundings, these two conditions would be even more

fatal. On the other hand, heat stroke normally occurs with a body temperature of more than 41.1°

Celsius. To create this body temperature, the outside temperature would have to be above 30°

Celsius (Region of Waterloo, 2009). However, as each person experiences temperatures

differently, a person may experience any of the above illnesses at lower or higher temperatures.

Again, depending on vulnerability factors such as substance abuse, age and level of hydration

these affects could happen in more or less time. One additional factor that makes people

experiencing homelessness more vulnerable is if they are taking psychotropic medication for

mental illnesses. The process called thermoregulation is affected by certain types of drugs which

affect the mechanisms involved in heat production and heat loss in the body. Therefore,

hypothermia, sunburn, heat exhaustion and heat stoke could be caused more quickly and more

severely than in others not taking this type of medication (Weihe, 1976).

When adapting to these climatic exposures by staying outdoors there are certain things

that are necessary. The first is normally to plan for anticipated weather. Planning would involve

wearing or having appropriate clothing and footwear depending on the season. It may also

involve telling someone where you plan to go outside in case of danger. Most likely you would

carry your own food and water in a knapsack and you may have extra clothes, a sleeping bag and

tent. These are only the very basic steps to take when being outside. Respondents in this study

were not so dissimilar, yet the majority could only survive for short periods of time outside.

First, most people experiencing homelessness did not plan for the weather, when they were in

between shelters, and actually living in outdoor spaces, they did not have the luxury of choosing

what clothes to wear depending on the weather. Since they could not store their gear anywhere

they would have to carry everything on their back. This was especially a problem when clothes

got wet and/or dirty and there were no places to dry or wash them. "Like if I get wet, I have to

put my wet clothes in a bag with my dry clothes and they are going to get all smelly. We don't have the luxuries to go home and put them in a dryer. Raincoats are not given out to homeless people, like they could help to make a smooth transition into the rainy season, every year when the out of the cold program ended they give you a sleeping bag and a backpack" (Echo, line 94). The OASIS drop-in provides laundry facilities once per week, while the Community Kitchen often has a two week waiting list. Second, not many people carried their own food in their packs with them, as the majority of people accessed food from the shelters on a daily basis. Most people did keep water bottles with water and hydration was cited as a very important issue related to health. Most people also did not tell others where they would be going, as many people lived hour to hour and their routines would often change depending on the weather. The older people tended to have routines which they kept each day, while the younger ones were more sporadic. One older gentleman told me that he would not go alone to bridges or bush areas in case he fell down and hurt himself and no one could find him. However, there were instances of people making their own shelters in bush areas outside of Cambridge. A lean too was built along side of the Grand River and there were three guys staying inside. It was made of small logs, and two old wooden doors. It was effective enough to keep the rain off in the summertime (See Picture 4.0). One respondent talked about creatively finding solutions and said this about getting gear."It never got wet; it had a fly on it and that. It was an expensive tent. Actually I didn't buy it I traded it for something. It was a good tent, it was a mountain tent" (Chris, line 196). "Sometimes you can't really locate the person at the time it is a matter of locating that person (to stay overnight) but if not, I am a survivor. I am from up North and I have lived in the bush a number of times, and I always find a shelter" (Richard P, line 127). "Oh, I was always smart

enough to get a tent and I would go off to a bush and hide. I wouldn't have to collapse it every day or anything like that and only a few people knew about it" (Rick, line 354).

Therefore, the coping range of people experiencing homelessness in this study is quite wide. Although rainy and cold conditions present the most problems, these people can adapt to a wide range of conditions such as wind, snowstorms, humidity and heat. The thresholds of these stressors would be extreme rain, snow, heat or cold for long periods of time or when occurring unexpectedly. During the daytime when access to service agencies may be restricted or when campsites would be continually flooded out would be the time that the upper limits of these climactic thresholds would be the most detrimental if reached.

6.3.2 Health

Health is a major factor in a person's ability to adapt, and therefore, is an indicator of adaptive capacity (Brooks and Adger, 2005). In this research, people reported having recurring health issues such as pneumonia, flus, colds, arthritis, pneumonia, and sleep apnea. "All kinds, bronchitis, pneumonia, my friend had hypothermia one year" (Shayne, line 113). " I don't sleep now, I am always very guarded" (Bonnie, line 35). Bonnie also said she has arthritis in her back and legs from sleeping outside. According to respondents, all of these conditions could be attributed to sleeping and walking around outdoors without proper gear. Health was also an issue when conditions became so severe that people would access hospitals and clinics. The respondents who referred to using these services also made reference to being stereotyped and treated unjustly at these facilities. "They were horrible. They asked me if I served in WW2, they were making a fool out of me. I told them I wanted to talk to the supervisor and she gave her shit because the way I was treated and they had one look at me and took me in a wheel chair and wheeled me in and the supervisor came back to me and said she would be disciplined for how

she treated me. She thought I was a drug addict and I was just a drunk, and asked me pathetic questions about the war. I am not old enough to be in the war. They were just making a fool out of me. She was so belligerent and she took her frustration out on me" (Chris, line 103). This perception of treatment may be a reason why many people experiencing homelessness choose not to get medical attention.

People who had recurring health conditions such as arthritis also said that they knew when the weather was going to change because they could feel it in their bones. Foot rot was a condition which was mentioned many times with interviews conducted at the House of Friendship and the lack of appropriate footwear was the main reason that people would experience this condition. The main reason for getting wet and sweaty feet was that people would be walking around the city for long periods of time. At times, their shoes would be covered with mildew on the inside. This mildew would seep into their feet and they would get blisters, and trench foot. This is such a prevalent condition among people experiencing homelessness that at the Kitchener Downtown Community Health Centre and the Community Kitchener there is a chiropodist (foot doctor) on hand to treat the condition. "I lost a lot of weight, I didn't eat, and I had jungle foot or whatever you call it, foot rot or whatever" (Joey D, line 74).

Mental illness is a condition that many people have. The respondents in this case study mentioned having depression due to their circumstances and some spoke about feelings of hopelessness. "Plus in the winter I get this thing—I get depressed in the winter" (Chantel, line 30). "You get very depressed, you don't have nothing to go home to, you don't have a home to go to, you don't have food. You get depressed, like suicidal depressed, like every other week I was trying to commit suicide you just can't handle it" (Debbie, line 293).

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"I didn't really understand too much and I got suicidal" (Nick, line 226). Despite the fact that many people may have been suffering from mental illness, it was not disclosed many times in the interviews. A few people mentioned paranoia and phobias due to traumas of living on the street, but the topic was discussed more in the way that they knew someone who had a mental illness, rather than they themselves had one. The most probable reason for this is the entrenched stigma around mental illness. "He was probably paranoid- schizophrenic but he wasn't stupid" (Doug, line 87). "I have a paranoia of storms" (Tim, line 3). In a Canada wide study of people experiencing homelessness approximately 52 percent of hospitalizations in 2005-2006 were related to mental and behavioral disorders. A full 76 percent of these people were men and the average age was 40 years old (Canadian Institute for Health Information, 2007).

6.3.3   Demographic factors

Demographic characteristics are also an indication of adaptive capacity (Brooks and Adger, 2005). In relation to demographics, the research demonstrated four things. First, single females rarely stayed on the street. It was dangerous enough for them that they would avoid sleeping on the street at all costs. Sometimes when a woman had no choice, she would get together with a group of men who were camping and act as the cook and fire tender in exchange for protection. In the study there was only one woman, 28 years old, who stayed outside, and she was with a group of three men. "and being a girl is harder than being a guy when you are surrounded by a hundred men, there's like five women" (Diane, line 18). "Well, actually it is harder for women to find a place- A guy will say come to my place and have a drink and then.. Well this older couple, she has a walker and that he is... she can't cook so I go in and spend a couple of nights there" (Glenda, line 189). Second, some single men felt that at times they were discriminated against at service agencies and that there were a lot more services for women than

for themselves. It was mentioned that unless a man had children or was abused they could not access services as quickly or as frequently as women. Third, for older people experiencing homelessness, environmental stressors were more of a problem. Not having the capability of walking long distances, having health conditions such as arthritis and being alone made this group of people much more vulnerable to harsh conditions. One young man mentioned the idea that there should be a place where older people could go in the day so they were not exposed to the elements. "Yeah I find it a lot different like with the older folks like not being mean or anything but they have a hard time just like especially in the winter just trying to get around so we just try to help out as much as we can, because it is cold and I don't want to see anyone out there" (Dragon, line 177). Fourth, for younger people there were drop-in services such as Reaching Our Outdoor Friends (ROOF) but there was a lack of overnight facilities which catered to them. The Out of the Cold program was an especially problematic service for youth, because the organizers did not welcome them, especially if they were under the influence of drugs or alcohol. "That's good because they don' let anybody in if you are under 18 they don't even let you eat which is stupid" (Shayne, line 34). Similarly, at Bridges in Cambridge, younger respondents spoke about needing a different facility for youth as it was not conducive for them to be around older people who would often offer them drugs. "Yeh ask Craig I was panicking, and people are absolutely ruthless, still people know that I am trying to get clean and I am pregnant, and I am trying to do all this stuff and they still ask me if I want dope. They say Tina have some free dope, cause they know the cycle that once you have one, then you have another, and spend the whole day with them and spend all your money and that's just the way it is. Unfortunately this is open to everybody, and it's good because people should get what they need to get, but when you are in recovery, you are oh my gosh..." (Tina, line 280). Individual personalities also

played a large part in people being able to access certain facilities and at times, people were kicked out for extended periods of time. "And ROOF, I can't go there anymore either cause I am kicked out of there too for a conflict situation with someone in which I never did anything. He is the one that started it like I was over exaggerating and I told him to step outside and now I am kicked out practically for life" (Jorden, line 273).

6.3.4   Social networks and volunteerism

According to Levy (2008) people experiencing homelessness do often consider themselves a community. Through this research, there were two distinctly different perspectives regarding community and social networks. First, many respondents referred to themselves as part of a downtown family of people who were experiencing homelessness. These people mentioned spending time with each other, accessing similar resources, and often helping each other when necessary. "Yeah, it is. And, and the people that are on the streets, they, they stick together, they, they stick up for one another" (Daryl, line 319). These people also placed much importance on a selective group of people with whom they would spend their time and with whom they had mutual trust. This friendship network also involved staying at peers' houses for short periods of time when necessary. On the other hand, there were respondents who made it explicit that they did not like other people experiencing homelessness and avoided them and the places that they frequented. "I don't like the atmosphere or people that use the services. A lot of people really don't care about themselves or others it's like you know" (Jason, line 57). Some people would purposely not become involved in "dramas" or other issues which were not affecting them. However, both groups of people were in agreement that good and supportive relationships with front-line workers at agencies was very important and that these staff connections often enabled them special privileges such as an extra tent or sleeping bag or more time in the shelter. "I think

if it is that cold out, there are some people that will let you stay in if it is that cold out- especially on the weekend" (Blair, line 289). "Oh yes, but those resources are there you just got to look for them. Like I never heard of this place, and I said Tim there has got to be another way and I got in the van. He told me about the respite (Haven House) and it is a beautiful home with five bathrooms, they cook the meals for you, laundry, computer, and if you come out of the hospital on meds they monitor you and all that. I went there because mine was a safety issue" (Glenda, line 59) "Yeh I would do anything for the people that work here" (Nick, line 193) "With the help of certain people in this shelter now I am doing the best I can to turn things around" (Doug, line 11). "Everybody who works here is willing to go the extra mile for you. As long as you have a positive attitude and you don't go in there demanding- I mean you get more flies with sugar than you do with salt, that kind of deal" (Eric, line 110).

However, staff attitudes were also seen as a constraining factor when the respondents did not get along with individual staff members. Rather than positive relationships with these people, a negative relationship could make a person end up being banned from a shelter or other punitive measures. "They usually get kicked out and then they can't come back kind of thing. It is kind of tough when you get kicked out of a hostel, but it does happen. Especially when they had the out of the cold programme you notice a difference" (Ted, line 226). "Yeh I definitely would change something about Mary's Place I mean like the staff there a lot them they are not very nice. A lot of them are very ignorant, and I can't quite figure out if they are there to actually help people or they are there for the money" (Chantel, line 158).

6.4   Exogenous factors contributing to adaptive capacity

Exogenous factors are those *external* factors that can influence the adaptive capacity of individuals or communities in adapting to environmental stressors or any other sensitivity that may occur within the individual level system in which they function (Centre for Indigenous Environmental Resources, 2009). In this chapter the seven exogenous factors are; civil society, hours of operation and distances between agencies, amenities, structural and systemic factors, local employment markets, the transportation system and the concept of entitlements.

6.4.1   Regional civil society

Civil society is conceptualized as a wide range of organizations and associations that are organized around values and visions that mobilize social energies (Brown, 2008). As evidenced by the Out of the Cold program and the OASIS drop-in centre which are run completely on a volunteer basis, there is a definitive regional civil society culture regarding homelessness. In addition to these two programs, a volunteer network exists called the Homelessness and Housing Umbrella Group (HHUG). This organization (HHUG) is a non-partisan group consisting of concerned individuals, agencies and groups committed to preventing and reducing homelessness in Waterloo Region. The HHUG takes an "active part in calling for housing development proposals to address persistent homelessness, capital projects that sustain, enhance and increase the capacity of longer term housing stability programs and projects that address and/or prevent youth homelessness, either capital or time-limited projects" (HHUG, 2007). Although the individual groups that form HHUG do not provide the final decision on projects it acts as an information body reporting to Regional Council. In addition, it provides updates regarding the improvement of housing services in the Region and most importantly, it produces a Report Card for the Region, acting as a monitoring group for housing and homelessness initiatives. The

HHUG is an example of an effective civil society mechanism and greatly enhances the effectiveness of housing and homelessness initiatives in the Region of Waterloo (de Gomez and Bullock, 2009). In 2010, the Region received a B- for its housing and homelessness policies which was the same mark it received in 2009 (HHUG, 2010).

An aspect of the civil society concept presented here, however, is that often when organizations and programs are based around a central nervous system of volunteers, and charity, they are also in a tenuous and often precarious position. This idea was pointed out by one of the Front Line Workers from the House of Friendship when he explained that the Out of the Cold Program could not run one night in November 2009 as there were not enough volunteers. The overnight facilities used during this night were local hotels which were paid for by the Regional per diem system. This situation resulted in significant costs to regional subsidies.

6.4.2 Distances and hours of operation

The short distances between each of the service agencies, within a few city blocks of each other (See Map 2), allows people experiencing homelessness a support network that is easily accessible. In Kitchener, the hours of the service agencies are staggered so that people can access various services at different times of the day. St. John's Kitchen opens at 8:00 until 1:00 and then OASIS opens from 1:30 until 5:00. At 11:00, the House of Friendship runs a drop-in, and at 5:00 residents from the House of Friendship or the Out of the Cold Program can return for the evening. There are a minimal number of hours during the day that service agencies are not open which reduces the time period that the target population is exposed to environmental stressors. At the time that the interviews were conducted in the summer of 2009 the only overnight shelter in Cambridge (Bridges) closed at 11:00 and did not reopen until 5:30. However, upon returning

to the shelter in the spring of 2010 to conduct the Member Check, it was discovered that it now remains open all day and is accessible to anyone, not only people residing there. In addition there are now two other formal places for people to go in the day. This is a significant change as it greatly decreases the amount of time that people would be outside during the day. These are the John Howard Society and Lutherwood, Cambridge. In the qualitative interviews, a number of people from Cambridge spoke about volunteering at the Food Bank and other day time service agencies to get out of the elements. In Cambridge, although the collaborating service agencies used in this project are also located only a short distance from each other (See Map 3 below) the fact that there is only one overnight shelter (Bridges) may deter some people from staying there if they do not like the rules.

Map 2- Collaborating service agencies in Kitchener
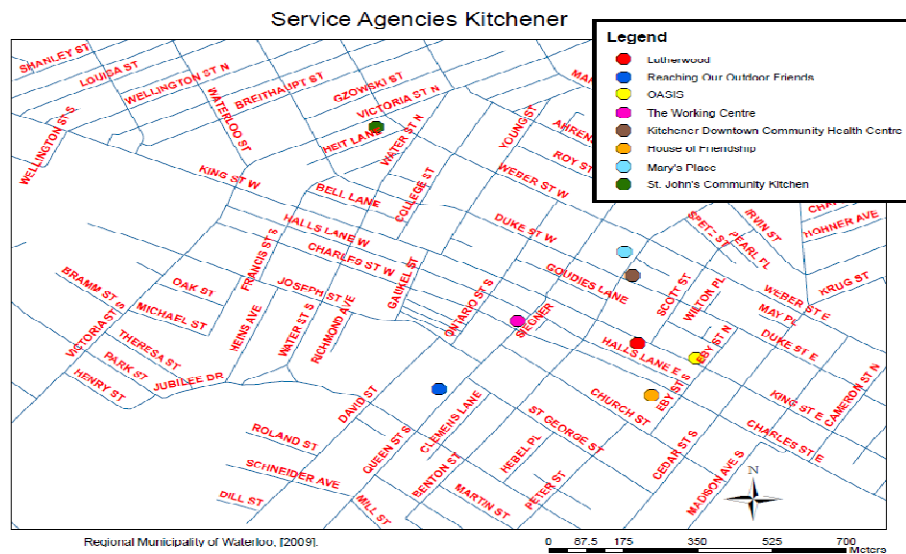
Map - Collaborating agencies Cambridge

Cambridge Agencies

Regional Municipality of Waterloo, [2009].
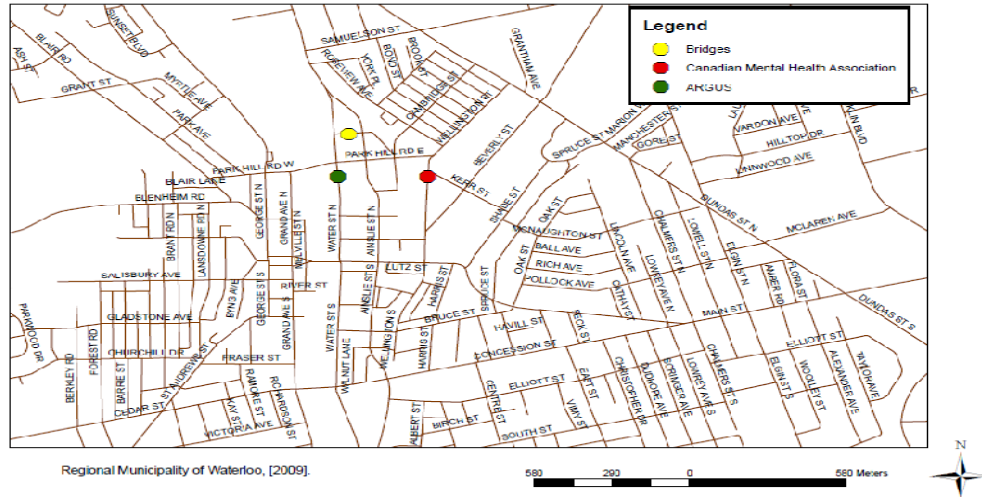
6.4.3 Amenities

The House of Friendship and Mary's Place provide lockers for residents, which enhances people's ability to change clothing and access their own belongings if they are residing at the Shelters. However, access to these lockers is not available if a person is not residing at the agency. At Bridges in Cambridge, however, a person can access lockers inside of the shelter even if they are not residing there. They must buy their own lock and the cost for the lockers is 5$ for three months. Each of these shelters provides meals, hygiene products and various types of assistance with social service applications and counseling. There is no time limit for residents to stay in these agencies except if the person is not making any efforts towards bettering their own situation. There is also no time limit to the number of times a person can return, which enables people experiencing chronic homelessness access to a place to sleep. There are no formal limitations on drug use at the shelters, except recently added rules at Bridges about drug usage and solicitation which may dissuade some people from using the services if they have addiction

issues themselves. It may also enable people with drug addiction issues a safe place to begin recovery. The Out of the Cold program does not allow any kind of substance abuse and this may be a constraining issue for those people that experience this problem. One significant aspect of each of the three main shelters is that they have caseworkers on site who can assistant people with Ontario Works and Ontario Disability Support Program applications as well as health and counseling issues. Something discovered upon interviewing two of these caseworkers was that the time and program limitations when using the shelters in the Region were not based solely upon rules and guidelines. Rather, individual circumstances were taken into account when making these decisions and the human element of this type of human service work made it necessary to look at each person on a case by case basis. This idea is considered the grey area of social service work (Voisin, 2009). The Out of the Cold Program does not provide these caseworker services, although these services would still be available at other agencies such as the Cambridge Mental Health Association or the Kitchener Downtown Community Health Centre.

6.4.4   Structural and systemic factors

Public buildings included public restaurants, libraries, coffee shops and malls. In Kitchener, most of these places were relatively close to the downtown core where the homeless they would also be using overnight facilities. In Cambridge, however, malls were quite far from the core and were not frequented by many. Coffee shops such as Tim Hortons' were used more frequently in Kitchener than in Cambridge. The downtown areas of Kitchener are becoming increasingly developed. Many of the new public facilities are more upscale and many places may place significant stereotypes on people experiencing homelessness which would dissuade them from trying to get relief in these places. The similar gentrification trend is occurring in the downtown core of Cambridge, leaving fewer places for people to go in the day. However, in

2010, Cambridge began building a new low income housing development which will have 82 units upon completion. This development could significantly reduce the problem of homelessness in the downtown core.

6.4.5   Buildings outdoors

Buildings outdoors included trucks, cars, awnings, emergency exits, loading docks, and bridges. The main buildings that were used in this category were bridges, loading docks and awnings. Loading docks provided temporary shelter from the elements and were not subject to high security. Bridges were also effective except that there were often problems with flooding when storm water management was in affect and this caused some significant problems with gear getting wet as well as reported health conditions from the chills and dampness. In Cambridge, the areas beside the Grand River were highly vulnerable to flooding and indicators of past floods on a downtown bridge provide evidence that property damage and injury risk is increasing each time there is significant flooding (See pictures 7.0 and 8.0). Due to the large amount of abandoned manufacturing facilities in the Kitchener area, awnings were often cited and going inside these areas were strategies that were often utilized. The back of transport or moving trucks was also cited a number of times and this strategy often provided relief from the wind, rain and snow. "Well sometimes I go to City Hall or the library but sometimes I go down to the loading dock where I am staying and sleeping because there is a very big overhang- so it is covered from the rain. And I read you know... if I got nothing better to do, or if I go and collect enough empties before the rain hits I will go and buy a can of beer and I will sit there and have a can of beer and read" (Richard P, line 37).

6.4.6   Outdoor space

Outdoor space was important in that bush areas outside of the city enabled urban campers to put up tents and have fires to keep warm and cook food. Of the 48 interviews conducted there were approximately 12 people who considered themselves to be urban campers at some point in their homelessness experiences. There were significantly more urban campers in Cambridge than in Kitchener, and this can be attributed to the higher number of overnight facilities in Kitchener than in Cambridge. If a person did not want to access the Bridges shelter in Cambridge, they would not have any other place to stay. Evidently, the status of being an urban camper changed over time when different opportunities presented themselves to these people. However, there were more bush areas closer to the downtown core of Cambridge where people could stay, make shelters and access food services at the Bridges shelter than in Kitchener.

6.4.7   Transportation system

The transportation system of an area can have direct effects on the adaptive capcity of individuals to respond to environmental change (Kjellstrom and Mercado, 2008). The bus system was referred to in the interviews, although not often. Riding the bus to get out of the elements was used as a management strategy by a few respondents, but free bus tickets were hard to come by. Unlike Toronto and Ottawa, free rides on extreme heat days were not part of the Waterloo Regional transit system. Those respondents that had a bus pass used the system more often, and many people were not aware that they could access subsidized bus passes if they were on Ontario Disability Support Program of if they had medical appointments to attend. Bus passes were also given to people at reduced rates if they volunteered at service agencies such as the community kitchen. The bus system was used less often by respondents in Cambridge than in Kitchener. "I have seen the bus drivers when they just let the homeless person on whether that is an unwritten

rule or not I don't know, but I have seen them do it before. The GRT is really good and they have a good system down there" (Dave, line 112).

6.4.8 Entitlement

The concept of entitlement has been extensively debated and its usefulness depends on which academic circles one is writing in. However, the basic concept conceptualized by Robert Nozick is that a social distribution is just if it is arrived at through legitimate acquisition and transfers. Original acquisitions of property will be just if they violate no rights of others, if the goods are not already owned or claimed or if their appropriation does not leave others in a worse position (Goldman, 1976). The idea that people experiencing homelessness are entitled to certain rights which include the right to have shelter, the right to eat and the right to have appropriate clothing, must be understood in terms of the larger political social and economic forces which are at work in the underlying issues of homelessness. According to Adger and Kelly (1999) "the extent to which individuals and groups or communities are entitled to make use of resources determines the ability of the population to cope with and adapt to stress." (256) For example, most of the respondents said that everyone should be entitled to food, clothing and shelter, and many noted that medical help should also be a right for everyone. According to Watts and Bohle (1993) "consideration of the availability and distribution of entitlements, the means by which entitlement are defined, and therefore, contested and changed over time and the wider political economy of the distribution makeup the architecture of entitlements" (45). In Waterloo Region, each of these rights can be fulfilled through the support of the community. These rights can be fulfilled without infringing on the rights of others or leaving others in a worse off position. There is awareness among people experiencing homelessness in Waterloo Region that there is no way someone could starve here because there is so much access to food at the service agencies. The

recognized definition of food security is "Food security exits when all people, at all times, have physical and economic access to sufficient and nutritious food that meets their dietary needs and food preferences for an active and healthy life." (World Food Summit, 1996). Therefore, food security currently exists in Waterloo Region for people experiencing homelessness. While the concept of entitlement is concerned primarily with command over commodities, the concentration has to be basically on human capabilities…It is in fact possible to see poverty as a basic failure of capabilities (Watts and Bohle, 1993, Adger, 2006). Therefore we would say that the condition of being homeless could be a basic failure of capabilities, not merely with those people experiencing homelessness but with systemic capabilities. Yet, the entitlement to commodities such as food, clothing and shelter in Waterloo Region is seen by the community as a whole as a huge part of enhancing the capabilities of people experiencing homelessness to maintain survival.

6.5   Endogenous factors

Endogenous factors are those *internal* factors that can influence the adaptive capacity of individuals or communities in adapting to environmental stressors or any other sensitivity that may occur within the individual level system in which they function (Centre for Indigenous Environmental Resources, 2009). In this analysis the endogenous factors that contribute to the adaptive capacity of people experiencing homelessness in Waterloo Region are: internal perceptions, social capital, and freewill and activism.

6.5.1   Internal perceptions

People experiencing homelessness in Waterloo Region were very perceptive of their individual vulnerabilities. They were aware that not having the proper clothing and footwear was a huge problem, and they were aware that staying outdoors during winter, the rain and extreme

cold in summer resulted in both health issues as well difficulties with their gear. Providing an open ended opportunity for participants to tell their stories resulted in consideration of many aspects of their homelessness experiences. Participants also discussed systemic problems such as too little money from Ontario Works, unequal distribution of appropriate clothing, and shelters taking their whole check even if they only stayed for a couple of weeks. Many respondents discussed the fact that they just did what they had to do, and, in general, people experiencing homelessness were reasonably adaptable and resilient.

6.5.2 Social capital

Another dimension of vulnerability/ adaptive capacity that has been identified is the motivation or attitude of individuals to act or get involved or how much control individuals feel they have over their lives to influence change around them. (Centre for Indigenous Environmental Resources, 2009). Social capital contributes to a group's ability to act collectively, which has been described as an important factor in determining vulnerability (Adger, et al, 2004). Social capital has been described as consisting of those features of social organizations- such as networks of secondary associations, high levels of interpersonal trust and norms or mutual aid and reciprocity which act as resources for individuals to facilitate collective action (Adger et al., 2004). One important part of social capital is the idea of volunteerism. In both Kitchener and Cambridge, it was evident in the interviews that homeless people engaged in volunteer activities quite frequently, both because they wanted to keep busy in the day and because they received free bus tickets, extra clothing and shoes, and it provided them a place to get out of the elements. People volunteered at the Community Kitchen, at a second hand store in downtown Kitchener, Bridges, and the food banks. One respondent went with staff from the shelter to buy supplies at COSTCO. There was also a heightened awareness that they wanted to

give back to the agencies which helped them. In addition to high rates of volunteerism, there were respondents who reported being community leaders among their peers. One woman reported being a clothing distributer for other people experiencing homeless, and one man reported being a sort of tour guide of new people to the city who needed to access services. These aspects of social capital could greatly reduce the vulnerability to environmental change not only because of the physical benefits of getting out of the elements while volunteering, but also by increasing both the internal awareness of potential opportunities within homeless society as well as by increasing the awareness of the larger external issues of homelessness.

6.5.3 Freewill and activism

The values and the individual meaning of climate change affect the perception and goals of climate change adaptation in individuals and organizations (O'Brien and Wolf, 2010). The aspect of activism was very evident in the interviews and many people discussed feeling that they did not have enough control over decisions that were made on their behalf. Respondents also talked about the fact that they were glad that people were finally interviewing them and getting their opinions and ideas for issues that concerned them. "I think it would be good because then I know a lot of people who try to help out but it is also a lot harder because o.k. what does homeless feel like. I am not homeless what do I think they want well food, a little bit of money. But if you get to talk to the homeless people like what you guys are doing, what can we do to help you guys" (Dragon, line 234). They also had ideas about having a mobile outreach van which could help people in times of severe weather as well as centralizing the outreach services so people could stay in one area of the downtown and access everything that they needed. One very vocal respondent talked about wanting to set up a shoe and boot warehouse to help people access appropriate footwear which could be donated from the large retail stores. There was a

definitive social justice movement around the ideas of self-determination and independence. This sense of activism seemed to enable some people to speak up for themselves and there was a movement in the downtown area of Kitchener for people experiencing homelessness to get involved in issues that were directly related to their own needs. "I would be interested in committees and workshops" (Jerry, line 47). "It seems like the people who are on those boards are the ones that are not from the area. The wrong people are sitting there. Why don't you ask the guy on welfare who has been sitting downtown for 20 years to sit on that board, because you know that he is the one cleaning it up? I have seen guys in 2000$ suits drop their coffee cups on the ground even though they are ten feet away from the garbage can, but what they don't see is that guy on the street who goes over and picks up the coffee cup and puts it in the garbage and giving him a dirty look- flipping him off. People think that that guy is just spouting off, he is not spouting off the guy threw garbage down on the street which is his home, that's his home and they throw garbage down on the street like it is nothing. And you see a business man screaming on the street and you see some homeless man screaming at him and they don't listen to him. And I say I am sorry I didn't know I was sitting in your living room. I do that to people, I am sorry I will chase a guy right down the street and grab his arm, excuse me officer, Mark you at it again, damn you pig, I am walking across the street and getting a jay walking ticket but do I see him getting a littering ticket?" (Echo, line 453).

6.6   Factors limiting adaptive capacity

6.6.1   Drug addictions

In the study respondents referred to the use of drugs such as crack, crystal meth and oxy-contin. Although none went into detail about which drugs have what effects, each of these drugs

cost considerable amounts such that often people did not enough money to make the rent. For example a hit of crack cost 40$ and the effects would last about 15 minutes, after which time more and more crack/cocaine would be sought. The drugs had the affect of numbing them to their surroundings, especially of being outside and exposed to the elements. "Yeh I get 4$ a day here too, it's huge. That's a good idea really because a lot of people that are homeless do drugs or drink and uh for 5$ I can get a five piece" (Blair, line 198). "just the drugs you can deal with it being cold, at least I can deal with it being wet and rainy if I am high. I would rather deal with it being warm but for years I didn't" (Echo, line 195). "People are soaked they are frozen they are hungry and a lot of drinking or drug abuse happens to escape a little bit from what is really going on in your life- it helps" (Rick, line 193). Drugs were cited numerous times as the reason for becoming homeless to begin with and many people had a very clear understanding that this is what led them to the street. "But I know like when I was here we had to be out of here at a certain time, and when I left it was either o.k. go sit at the library for a couple of hours or I went and used and then when I came back here it was kind of like a viscous cycle. Like there was nothing for us, there was nothing to do. It was either one or the other" (Tina, line 62). Drug addictions also increased their ability to socialize with others who were in similar circumstances and often drugs were used at the service agencies, such as the community Kitchen, OASIS and the House of Friendship. "Our whole structure was around drug addicts" (Ron, line 187). Drugs also acted as a means to make extra money for some people who sold them. "But if you are like myself I am a recovering addict what do I do when I need shelter that night, and some guy asks me to get him some drugs and I will say yes. Why, because I will profit out of that transaction in order to go to somebody's house in order to stay at somebody else's house and boom, I am back in the drug element again" (Mark, line 204). An interesting point was highlighted in the research

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regarding drugs addiction. One of the urban campers explained that he purposely returned to the streets at certain points in his life after he had gotten his own apartment. The reason for this was that when he had his own place he would eventually bring more and more people in to do drugs and then he would be at risk of overdosing because he had no ability to put up boundaries for himself. "Well like in London, an apartment is like a death trap for me, because I invite other addicts in, and I increase my chances of overdosing because of the availability of the drugs and they are coming in because they have no other place, and I stop paying the rent cause I see very shortly I am going to die, so I sabotage my own situation and then I am out on the street" (Ron, line 218). When he knew he was at risk of overdose he would either get kicked out on purpose or he would leave his apartment and go back to the streets where he had to only worry about getting food and a place to sleep every day. Another person said that when he had his own place, he rented it out by the half hour for prostitutes who needed a place to conduct business. Although well over three quarters of the respondents mentioned drug addictions in their interviews, all had an understanding of the harmful effects and knew that they would not be able to gain housing stability for long periods of time unless they overcame their addictions.

6.6.2   Alcohol

Alcohol was another factor that came up often in the interviews. However, alcohol was used not only to mentally numb people from their surroundings of being outside, but was also used as a means to keep warm in the winter and in the cold of summer. The two most cited types of alcohol were cooking sherry and rice wine, both of which were sought after due to the low cost. The people who cited alcohol also knew that when they abused it they would not have access to certain services such as the library, some service agencies (Out of the Cold Program), malls and other public places. Alcohol was also used as a social networking tool and often

people would gather together in the evening to drink in a group under bridges. "Most of the time we were downtown at 5:00 in the morning so nothing was open and we would still be drunk from the other night, because that is pretty much all you have to spend your money on. What are you going to do with 20$, buy your food and get drunk because it makes being downtown a little more fun" (Shayne, line 91). Respondents also referred to rehabilitation programs as a way to get off of the street for longer periods of time, and then continuing the rehabilitation through programs such as Alcoholics Anonymous (AA). "Well I would say it was a good 4 years. I would be in rehabs too I would go to rehab, I would go to my parents house, once again, now and then for a couple of weeks and then I would be gone again. Like I would get my own place, and I would lose it because of drugs, I wouldn't pay rent that would go toward my habitat and then my parents would take me back again. But there are only so many times that you can go back to your parents house finally, you're done, right?" (Blair, line 68). When people experiencing homelessness attend programs such as AA they can also access bus tickets for free. This was a very big incentive for some people.

6.6.3 Police and lack of safety

The police in both Kitchener and Cambridge were referred to as both positive and negative influences on people's vulnerability to the environment. On the one hand, people referred to instances when certain police officers had encouraged them to seek shelter on a particularly harsh winter day or when the rain was problem. "I was sleeping outside in a car. The police told me to go to the shelter or you are going to freeze to death. I said I am o.k. I am fine. It is someone's choice. You can't put them in here if they don't want to come" (Doug, line 157). Often they would provide rides to nearby agencies and on more than one occasion people

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referred to times when the police had offered them to stay overnight in a jail cell to avoid the elements. However, the majority of people who were urban campers, stated that the police and city workers were not at all helpful and in fact, would take all of their gear away and throw it in the trash. This was a very big problem when only one tent and sleeping bag were given out per person in each summer season. People also mentioned that they were often vulnerable to teenagers who would burn their tents or gear. "There is nowhere that you can really put it that it would be safe, because if somebody finds it they are just going to go through it and the same thing I was saying before. A couple of my friends have had their tents burnt down" (Richard P, line 106). Many people experiencing homelessness felt that there was a general lack of safety in downtown Kitchener and that they always had to be on the lookout for themselves and their gear. "You can't even go hang out in a park because the cops kick you out and like give you a ticket for trespassing which is stupid because it is a public area and you are not allowed to be there after 11:00 either. So that is why we moved out of town. We can't afford it or whatever" (Shayne, line 106). "It was all good but the police would give you a hard time. Throw it away, slice your tents whatever" (Diane, line 47) "And that's another thing even if you have a tent, the police come along and tell you can't stay there. So where is it that we are allowed to go to? You can't afford to go to a campsite and pitch a tent there because they don't give you any money" (Valerie, line 122). Upon conducting the Member Check at the Bridges shelter in the fall of 2009, it was discovered that security cameras had been installed and a strict set of rules around alcohol and drug use was being enforced. The first time a person was caught doing or selling drugs they would be banned from the Shelter for 30 days. The second time they were caught they would be banned from the Shelter for 60 days. The third time a person would be banned for 6 months. During the Member Check meeting people expressed that the increase in security and

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enforcement was beneficial for people recovering from addictions and that it enhanced the well-being and safety of people using the shelter.

6.6.4 Stereotypes

An additional problem that constrained some people from using services was negative stereotypes. This was most evident in public places when they would access spaces to get out of the elements. Some found that stereotypes were enough to completely turn them off of using any formal services. In these cases, people would camp in outdoor spaces or stay periodically with friends. "I can't repeat that on tape. A very negative attitude. I even had a driver who drives the recycling truck jump out of this truck and drive up on the curb; he grabbed my bag and everything. So I lay in front of his truck for half an hour and said you mean you want to go somewhere? Run me over and then you will have a law suit" (Ted, line 72). This respondent was talking about a recycling truck driver being upset that he was collecting the bottles from the trash. "Just automatically looking at you lower than them and you ask for extra change for the bus, and they automatically think that you are a lesser person, and you are just fortunate enough to not have a job or a house- it's a lot harder to get a job when you are on the streets" (Bruce, line 10). "Just try and get a washroom between here and King St. just try and find a washroom other then city hall, between say Ottawa, you go all the way down to Victoria St. to try to find a washroom now multiply that by someone who is coming in a hurry. Like I said it is so subtle that no one understands it and it is very hostile when you walk in- very hostile" (Keith, line 331).

6.6.5 Local employment markets

Local employment markets and economic wealth are also important parts of adaptive capacity (Brooks and Adger, 2005). The local employment market which most of the people

accessed was made up of physical labor in temporary agencies around both downtown Kitchener and Cambridge. The types of jobs most people accessed were construction, welding, landscaping, and other trades. The urban campers referred to the time when they would sleep outside, get the Ontario Works stipend and work part-time for temp agencies on the side to supplement their income. The main reasons for using temporary agencies was that they could get paid in cash at the end of each work day and they did not have to have a permanent address. People who accessed the shelters also referred to the time when they could find jobs easily through temp agencies. The unemployment rate in Waterloo Region in 2009 was 10.3% with 28, 300 people out of work. From January to March, 2010 the unemployment rate was 9.2% with 25, 500 people out of work (Statistics Canada, 2010). Many of the traditional manufacturing jobs have left the area and may never return. The temporary agencies have also experienced a significant reduction in employment availability and demand. According to some people, when the recession ends it is anticipated that most of the companies who can re-hire will be looking for a minimum of a grade 12 education with most seeking qualified college graduates (Kelley, 2009). Many people who are homeless do not fit into either category.

6.7   Regional institutional limitations

One way that people experiencing homelessness adapted to changing weather conditions was to utilize the organizations and services outlined in the previous chapter. However, there were certain limitations which prevented people from always accessing these services. These limitations are referred to as regional institutional limitations (CIER, 2009). The following section will outline these limitations.

6.7.1 Mandates and payment

Although each service agency has specific mandates, there is considerable overlap in the provision of services such as assistance with housing, one on one counseling, provision of clothes and employment assistance. The fact that so many agencies exist to help people in a wide range of areas is beneficial. Some people may prefer the organizational culture of one service agency over another and this was brought up during the interviews. Some organizations had a distinctly more hierarchical structure such as Lutherwood, Mary' Place, and Bridges. While other agencies such as the Community Kitchen, the Working Centre, the House of Friendship and OASIS were more fluid and flexible in their service provision. In relation to the mandates of the agencies, there was an underlying current of favoritism when it came to women who were abused and having, or not having children. Also families were given priority over single people in accessing longer term housing stability. In addition to the overlapping and misplacement of mandates in certain circumstances, there were issues with payment when staying at the overnight shelters such as Mary's Place, Bridges and the House of Friendship. "It was quite hard to get approved for welfare and when it ran out it was hard to get verification and that was quite difficult. So there was a time when I just wasn't getting any income at all" (Brian, line 32). The main problem was that when people would come in the middle of a month and would only stay a week or two, the agency would garnish their whole check from OW or ODSP for that month. This situation put many people in a precarious position for the remainder of the time when they were not staying in the shelter. "If you can't pay, you can't stay, and if I hadn't had somebody come and stay with me I would have had to leave my daughter at Safe Haven and I would have been back in my car because of that, they see it as a single individual. And I kept saying to them in your perfect paper world that may be how things go but in the real world things just don't got

that way. So I mean they look at things from a different stand point and that's just how it goes, and you know I don't do drugs or drink, the point is I don't have any serious habits. I was just in a very serious situation and you know they weren't there to actually help. You know the most I got out of it was housing but they even cut me out before I could finish getting that situated. So last Friday when I came back from school and everything there was a letter waiting for me from OW and they disagreed with me not being a single person and that my income level exceeded what they allowed so I either had to come up with the money and pay or be out by 4:30. So I packed up my stuff and left" (Diana, line 105). "430$ off my check for four days and because it was the middle of the month they took it all. Which meant when I got my start up, the 430$ I was supposed to buy a bed with, I only had enough to make first and last and started out with nothing" (Don, line 66).

6.7.2   Volunteers and organizational funding

The per diem funding at each agency from the Region is the same and steady increases have been made when necessary. As described in the individual overviews, the funding for each of these agencies comes from a wide variety of sources. The Out of the Cold and OASIS are run by the churches. This could be a benefit during hard economic times when government cutbacks loom. It could also be a pitfall if these organizations do not have enough funds or volunteers to run the programs. In November 2009, one night a church did not have enough volunteers to run the Out of the Cold program and the Region paid for people to stay in a motel overnight (Voisin, 2009). Each of the other agencies receives funding from outside donors, the community and the Region. An agency like Lutherwood receives more funding from outside donors than St. John's Kitchen which relies mainly on community donations. The fact that most of the organizations rely heavily on funding from the Region could also be problematic if the Regional culture

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towards homeless issues changes. It is unclear how resilient organizations like Lutherwood would be if the significant funding supports were not available. However, the fact that many other organizations such as the Working Centre, OASIS and the Community Kitchen rely on community funds also attests to the fact that a regional civil society does, indeed, exist. The Working Centre, for example, also has its own way of making money through the café that it runs for profit. OASIS also has a similar café which is runs for profit and training purposes. Therefore, in some ways, the community itself has built in self-sustaining mechanisms which help to avoid the potential for precarious institutional service dependence. However, in February 2010, the St. Vincent De Paul second hand clothing store in downtown Kitchener closed and this has left a large gap in places people can go to redeem clothing vouchers.

6.7.3   Low income housing

Low income housing was cited by many respondents as an issue that needed significant and timely attention by the Region. Many people complained that there were not enough clean places where they could live with the small income from Ontario Works or the Ontario Disability Support Program (ODSP). Most people who looked for a place to live ran into the issues of sub-standard housing, inefficient landlords and areas of the cities where there was high drug traffic. "Lots of different things, drinking, addiction, shady landlords. That is one of the worst ones I have encountered lately is shady landlords just don't provide you with what they are paid, they just give you a place to live and it is not even a house…" (Craig, line 20). Respondents stated that the only way to afford a decent place on the meager support was if they had a child or children and would then receive additional income. "Like I said, I've tried to go to rooming houses and got, you know, my full basic allowance and whatever, but it just never works out a month or two in I just gotta get outta there, you know, 'cause it's not your own place, you know

what I'm saying? And then the people that live there, they have their friends coming and going, and, you know, it doesn't work" (Daryl, line 228). The average amount for a room in a rooming house in downtown Kitchener and Cambridge is $350.00. The average income for a single adult on Ontario Works is $585.00. The average amount for a one bedroom apartment is approximately $600.00/ month. Therefore, unless people share a one bedroom apartment or a two bedroom ($850.00), it is not possible to live in a private accommodation in downtown Kitchener or Cambridge when the sole income is from Ontario Works. To illustrate in a different way, in Waterloo Region, a person would have to work full time with wages at $13.88/hour to afford a one bedroom apartment. In order to afford a two bedroom apartment, a person would have to make $16.46 /hour for full time work. The current minimum wage in the Region is only $10.25/hr (HHUG, 2010a).

Waiting to get into social housing was also a huge problem and people were on the waiting lists for years and years. Often while waiting for their turn to come up, people were taken off of the waiting list for a variety of reasons. "At that time I signed up for Ontario Housing and Dean said go down to Ontario Housing and check it out and the lady said we just sent you out a letter in August because a one bedroom came up, but I was at the House of Friendship, and so she said we will give you the urgent needs form and we will get you back on the list" (Doug, line 113). "We are far short of affordable housing. I wish the government could buy up every rooming house that they could give the person the chance to at least get in there. I always thought of first and last, like I always thought that it was a deposit but it is not I guess. It is hard, if you don't have last month's rent you are beat" (Dave, line 201). In Waterloo Region in 2008 there were approximately 3,100 households representing about 9,000 women, children and men waiting for community housing (HHUG, 2008).

6.7.4   Social service system

As outlined in Chapter 5.0, the social service system used by participants in this study is either Ontario Works or the Ontario Disability Support Program. The specific amount from each of these sources is different depending on each case. Each case is considered with factors such as length of person being unemployed, medical and/or psychological conditions, other forms of support, dependents and or spouses and past history. The amount of income received from Ontario Works is not enough for single adults to live in private accommodations by themselves and those who received Ontario Disability Support may have enough for private accommodations but would have approximately a maximum of $200.00 to live on for the rest of the month. The commonly held idea about the social service system is that Ontario Works is meant to be a short-term fix to an employment problem and people are expected to eventually find work and receive more income. The Ontario Disability Support Program is meant for people who will most likely not return to the workforce as they are impaired by a health condition. However, for people experiencing homelessness that may have addiction issues, it is not realistic to anticipate a return to the workforce unless these addiction issues are dealt with. For some people, this becomes a vicious cycle from which they cannot escape because they do not have enough money to appropriately deal with both issues of addiction and poverty simultaneously. "But right now I have not gotten a welfare check in 2 months, for whatever the reason is they are whatever, I have gotten no money in two months but yet I keep myself going" (Diane, line 93). "There are people on welfare who are trying to not go back on it. I have had to use OW a couple of times but it has been on and off and that's it. I want to make my own way in the world. There are people out there who are lifers, but that's not me. So it makes it difficult" (Diana, line 119). "Yeh like here in Cambridge, I was looking at apartments that would cost me about 680$ for a

one bedroom apartment. Like Welfare they don't give you enough money to live. Like they need
more people out there to encourage people to get off the street or help them get a job" (Debbie,
line 305).

Table 9- Overview of current vulnerability factors

Environmental Exposures	rain –extreme cold in winter –winter-extreme cold in summer-rainstorms-snowstorms- extreme heat in summer- snow-dampness-wind–slush-dew-wind-ice-humidity
Adaptations	organizations- personal needs allowance- public buildings-buildings outdoors- riding the bus- staying with friends- good gear- making fires- soaking t-shirts- finding shade- going in fountains- appropriate clothing, **Mal adaptations-** addictions, criminal behavior, self- harm
Adaptive Capacity	**Enabling Factors-** survivor behaviors -health- demographic factors -social networks and volunteerism-civil society-distance and hours of agencies- amenities- outdoor space-transportation system- internal perceptions- entitlement- social capital- freewill and activism **Constraining Factors**- alcohol/drug addictions-police and lack of safety- stereotypes-local employment markets-organizational mandates and payments- volunteers and funding- low income housing- social service system

The current vulnerability of people experiencing homelessness to environmental change
in Waterloo Region is relatively low. This can be attributed to high service levels, as well as low
climatic variation. However, the level of vulnerability is also relative to the number of people
being served in the community and, with the anticipation that the employment sector may not
rebound quickly from the recession, the risk of more people becoming homeless is quite high. If
the numbers of people experiencing homelessness increase this will place strain on the social
service system, and may lead to the reduction of program funding which would increase
vulnerability.

7.0   Chapter seven- Estimating future vulnerability and adaptive capacity

7.1   Anticipated environmental change

According to Environment Canada's 2007 document *Impacts to Adaptation: Canada in a Changing Climate*, Waterloo Region falls into the South sub-Region in Ontario. This Sub-Region has been studied the most in relation to climate change impacts. There are four major climatic trends which are expected to occur in Waterloo Region in the future. The first is an increase in flooding due to higher levels of precipitation. Since the Sub Region is the most intensely urbanized area of the Province, the magnitude and economic costs of infrastructure impacts and disruption of services caused by extreme weather events is significantly higher than elsewhere in the Province. The majority of flood emergencies reported between 1992 and 2003 in this Sub region occurred between the months of January and May and were the result of rain-on-snow conditions (Chiotti and Lavender, 2007). Second, in addition to flood hazards due to increased precipitation and snow thaw, the risk of increased temperatures is significantly higher in our Region. According to climate projections, this area will experience milder winters and warmer summers; this could decrease the incidence of exposure to the winter weather, while increasing the threat of heat related health problems in the summer. According to Cheng 2005, the average number of hot days between 1961- 2000 (a hot –day is when the temperature reaches 30°C or when the humidex reaches 40 degrees) was 8 in Toronto, 8 in Ottawa and 15 in Windsor. In Waterloo Region there were 5 extreme heat days between 2005 and 2009 (Environment Canada, 2010). The total number of heat days is anticipated to more than triple in Windsor and nearly quadruple in Toronto and Ottawa by the 2080's under AIB- high emission scenarios (Cheng and Campbell, 2005). The increased temperature in these areas is enhanced by significantly higher urban heat islands. Third, air pollution is expected to increase in the Region

due to the increase in temperatures which will increase the potential for photochemical oxidant smog formation (Pellegrini, 2007). This will also increase the ambient air concentrations of pollen. Air quality projections for Toronto, Ottawa and Windsor conclude that premature death associated with air pollution could increase 15 to 25% by 2050 and 20 to 40% by 2080 (Cheng, 2005). An increase in temperature could also mean an increase in vector borne and rodent diseases as well as water borne strains. The incidence of enteric infections, such as Salmonella and EColi is sensitive to weather conditions, particularly heavy rainfall and high temperatures (Schuster, 2005; Ontario Medical Association, 2005). Mosquito borne diseases such as West-Nile will also increase with climate change. Fourth, extreme weather events such as floods cause long-term health effects as well, and include illness associated with moulds and compromised air quality indoors that may follow flooded areas as well as the extreme weather events themselves (Mills and Andrey, 2003). The South Sub Region in Ontario has experienced extreme weather over the past 55 years, including Hurricane Hazel, 1954, the Barrie Tornado, 1985, the ice storm, 1998; Toronto snowstorm, 1999 and most recently the urban flooding trend in Stratford and New Hamburg in 2008 and multiple tornadoes in August, 2009.

According to the Intergovernmental Panel on Climate Change (2007) model predictions for this, the Eastern North American Region, show that temperature increases for the winter months (Dec-Jan-Mar) are expected to be 2°C to 6° C with a median increase of 3.8° C with this range taking 25 years to be observable. The winter months will also have an estimated 11% increase in precipitation within an 85 years observable timeframe. The IPCC (2007) report projects a 2.3°C to 5.9°C temperature increase in the spring months with a median value of 3.5°C with this observable pattern happening in a 20 year timeframe. The same months will experience an estimated 12% increase in precipitation within a 60 year timeframe. The summer months of

June-July-August will experience temperature increases from 2.1°C to 5.4°C with a median increase of 3.3°C. This pattern will become observable within 15 years. There is no agreement between the models about how much precipitation change will occur in the summer months but values range from -17% to 13% increases with no observable change until 55 years. Finally, the fall seasons from Sept-Oct-Nov will experience an increase in temperature between 2.2°C and 5.7°C with a median increase of 3.5°C. This pattern will be observable in 20 years. The precipitation will increase by 7% in less than 100 years over these months. At a 95% confidence level it is expected that any given year will become more extreme in comparison to the 20th century. For example summer will become more extremely hot, and the other three seasons will also become much warmer. Winter will become more extremely wet, but there is no agreement on the increase in precipitation over the summer months (IPCC, 2007).

As evidenced above in the climate overview, the two significant problems anticipated for the future are increases in temperature and increased precipitation, although there is no concrete agreement on the range of summer precipitation. These two conditions could increase flooding risks as well as further deteriorate the already poor air quality in the Region. The magnitude and timing of both significant deterioration of air quality and melting snow in the spring could make people experiencing homelessness more vulnerable. For example if flooding were to occur in the Spring as a result of rain on snow conditions, it could prove less hazardous than if the flooding were to happen in the summer because the number of people camping along the river is much higher in the summer than in the spring. The Grand River has a long history of floods. The first floods began in the 1880's to 1890's and caused significant damage. The second was in 1914 when only a short time later in the 1930's there was another flood and soon after the Grand experienced significant drought. So much so, that people could walk across the Grand River at

spots and not get wet at all. Again in 1947 to 1948 there was significant flooding but after this period the Grand River Conservation Authority was formed and floodplain measures were put into effect. These measures significantly reduced the risk of flooding until 1974 when the most serious flood of the century occurred. Although the floodplain management measures were enough to stop the potential risks, human error also played a large part in this disaster as the designated municipal official did not notify anyone that a flood could be expected and went back to bed (Boyd, Smith and Veale, 2000). The significance of the flood was so pronounced that a Provincial Commission Inquiry was established to probe into the causes. The total cost of property damage was over $6.7 million. The lack of appropriate warning measures was a significant factor in the amount of property damage that occurred (Boyd, Smith and Veale, 2000).

Picture 7- Flood lines, Grand River, Cambridge (Picture taken, Winter 2010)

Picture 8 -Historic picture of flooding in 1974- Downtown Cambridge
From the Grand River Conservation Area website-www.grandriver.ca/index/document.cfm

Chapter eight- Discussion and future adaptive capacity

8.1   Discussion

One aspect of the vulnerability approach which requires consideration is the expected changes in the natural and social system of the area under analysis. In this context, if the homeless population continues to grow with the projected population growth in the Region at 729, 000 by 2031 (Social Planning, Policy and Program Administration, 2007) the service system could be stretched to capacity and may not be able to provide as many or as effective services. An additional influx of people experiencing homelessness from other areas could cause social problems as well as problems related to service delivery. For example an influx of newly homeless people could cause animosity and resentment among people who may be experiencing persistent homelessness and have been in the Region for a long period of time. The entitlement to resources may be questioned not only by service providers but by members of the population themselves. This could cause internal conflict in the target population. In addition, with the projected growth rate for this area there will also be an increase in the demand for affordable housing (Social Planning, Policy and Program Administration, 2007). Given that the time period to access this type of housing is already so long, the number of people waiting may increase significantly as backlogs in the system may not able to keep up with the demand. This could also increase the number of homeless people in the area.

Furthermore, a significant factor in the research is the absence of a diverse range of ethnicities in the interview participants. This is very significant because this means that a large portion of people in the Region may have been missed and their lived experiences may be different than those of 48 of the respondents. According to Preston et al. (2009) many immigrants tend to locate in outer suburbs where housing costs are expensive and almost

exclusively geared toward single family detached and owner occupied housing (Bunting et al, 2004). Many of these newcomers suffer "hidden homelessness" as they do not use shelters or other services but rather rely on shared accommodation, couch surfing and social networks to access short term housing (Preston et al., 2009). The shortage of rental housing in the suburbs means that during the first 10 years of living in a Canadian city some immigrants are at risk of homelessness (Preston et al., 2009). Due to the fact that none of the 48 interviews were immigrants, it is possible that new Canadians, who are homeless, do not utilize the service agencies that were used in this project. However, it cannot be concluded that there are no immigrants who are experiencing homelessness in downtown Kitchener and Cambridge. Similarly to the points raised above, about new people coming to the area, a higher rate of immigrants to the Region who may also be competing for social services could cause tension and conflict. As climate change affects populations in other parts of the world, there could be a high rate of environmental refugees who seek support in countries like Canada. In Waterloo Region, among people 15 years and older, 27.2% of the population are first generation Canadians, meaning they were born outside of Canada (Stats Canada, 2006). Although studies show that new immigrants tend not to use the social services as much as other groups, the potential for this population to be "at risk" of homelessness is very high and therefore would need to access the same resources as those people who have been in the area for longer periods of time. This could increase the animosity and tension between these two groups of people.

Further, since many of the service provided in the area are run by volunteers, the dependency on these people is very high and any changes to the number of capable volunteers could have an adverse impact on service provision. For example, as many of the traditional volunteers are either retired or fall into the senior's category, it may be difficult to recruit new

young people to help in the voluntary sector. An absence of volunteers would be highly detrimental to the operational abilities of many of the agencies.

Significant changes to the climate of the area such as an increase in heat days or smog advisories could also cause an increase in health problems which would also stretch the current health system in the Region. However, since people experiencing homelessness are also less likely to seek out formal health services this could mean that the population may be at a higher risk of serious untreated health problems such as respiratory illnesses and even death.

A significant point that was added from the Member Check meeting in Kitchener was that the most difficult season was the time in between the closure of the Out of the Cold Program on April 1 and the beginning of the Sleepless Nights program when the sleeping bags and tents were given out by the Kitchener Downtown Community Health Centre on April 30. Also, since the research interviews took place in the summer of 2009, the Bridges shelter now remains open all day long and is accessible to anyone, regardless if they are staying there or not. This change would decrease the vulnerability of people experiencing homelessness as it would reduce the amount of time they would need to spend outside.

In regards to the action component of the project, there are two outcomes which have developed from the basis of this research. The first is a community reference group which includes representatives from all three partners, Wilfrid Laurier University, University of Waterloo and the Region of Waterloo Social Planning, Policy and Program Administration Division as well as two collaborating service agencies, the Kitchener Downtown Community Health Centre and Bridges Shelter. The two peer interviewers are also part of the group as well as a representative from the Region of Waterloo Public Health Department. This group has steered the development of the community report and is in the process of preparing a Scenario

Thinking workshop in the fall of 2010. This workshop will involve possible scenarios of population growth, climate change and employment market changes to assess the options available for future adaptations in the homeless population of the Region and will include a wide range of participants from government, social service agencies, and the homeless population. The end result of the community reference group and the scenario workshop is to mainstream the issues into the long term planning framework of both the Region as well individual by-laws in the tri-cities (Waterloo, Kitchener, and Cambridge).

8.2   Missed opportunities and future adaptive capacity

The idea underlying missed opportunities is that, in a given environment people have many resources available to them that could be used to achieve a goal, although they miss the opportunity at a given point to take advantage of them. Identifying a missed opportunity requires at least two things: 1) identifying the goal and 2) identifying resources that were either available or were not available and were missed in the achievement of this goal (Leonico et al., 2004). Therefore, it is necessary for people to assess the fundamental variables and branch points that lead to alternative futures. In these situations, scenario exercises are a useful mechanism for building understanding and flexibility toward adaptive change. Working with open institutions is essential for dealing with multiple objectives, uncertainty and the possibility of surprising outcomes. Such emergent governance that creates new institutional platforms for adaptive management is evolving in many places. Adaptive co-management draws on accumulated social-ecological experience and is informed by both practice and theory. It relies on the participation of a diverse set of interest groups operating at different scales, from local users, to municipalities, to regional and national organizations, and occasionally also international networks and bodies (Folke et al, 2002). The following is a chart of adaptive measures at different scales that address

the problems related to direct exposures. The term exposure is a property of the system affected by climate. It refers to the manner and degree to which a system is unprotected from or at risk to some stimulus. The exposure of a particular system to climatic risk reflects the combination of the probability of a particular climactic condition and the occupancy characteristics of the system to the stimulus. Occupancy characteristics reflect social, political, economic conditions. Many of these "determinants" of occupancy are similar to those that enable or constrain a system's adaptive capacity. Two systems which are similar may not necessarily have the same vulnerability because one may have limited ability to cope, manage and react thereby increasing the vulnerability (Smit, Wandel and Young, 2005). The following is an overview of adaptive measures which are specific to the case study in Waterloo Region.

The future weather related vulnerability of people experiencing homelessness in Waterloo Region is quite low if we assume that similar support systems are in place. The anticipated climate changes, apart from the risk of flooding due to rain, will not have large scale impacts on the population. However, this future vulnerability could *increase* if the current service levels are not provided for this population or if extreme weather events occur without warning. The evidence that the City of Kitchener has begun to implement hot weather plans in the summer of 2010 further demonstrates that the need for anticipatory institutional adaptation measures is being recognized by local governments in the Region.

Table 10- Examples of multilevel adaptive measures for environmental change issues and people experiencing homelessness

daptive Measure	Systemic exposures	Adaptations	Outcomes of adaptations
Administrativ			
Legal	Volunteers cannot get to work because of weather	Paid staff at shelters (Out of the Cold)	Less risk of closing the shelter
(Regional)	Limited public places in inclement weather	Day-time drop-ins in Cambridge	Less exposed time outside
	No transportation to pick up people in poor weather	Mobile van to pick people up in bad weather	Reduce ill effects of getting wet and cold
	Lack of private housing	Increase affordable housing	Less people on street
	No places for people to go with addiction issues	Increase public awareness of addiction and negative stereotype issues	Less risk of people avoiding services in inclement weather
	Police insensitivity	Work more closely with educating police about long term consequences of actions	Reduce risk of gear being taken away
	Lack of cooling areas	Provide free bus service during extreme heat events	Reduce Co2 emissions, reduce heat related illnesses
(Provincial)	No temporary work in poor weather	Regulate temporary employment sector	More ability to gain income
(Federal)	Ontario Works not enough	Encourage income supplements	Help pay for basic costs of living when on Ontario Works/ ODSP

	No consistent legislation on main issues	Pass Bill C-304 National Housing Strategy and develop climate change legislation	Consistent guidelines for housing, weather alerts and other issues
	Not significant involvement of Ministry	Increase visibility of Ministry of Family, Housing and Community Services	Decrease systemic animosity
Voluntary	Lack of appropriate footwear	Open shoe warehouse with links to factory outlets	Reduce risk of trench foot, flus and pneumonia
	Dehydration issues	Provide reusable water bottles	Reduce risk of dehydration
	Lack of sleeping bags and tents (Cambridge)	More fundraising for these items	Increase individual capacity
	Volunteering to get out of weather	Provide more volunteer opportunities	Empower and enhance lives
Engineering	Wet and dirty clothes have to be carried in packs	Build key lockers in downtown for belongings	Reduce flus, pneumonia, chills
	Dehydration issues cause loitering	Build more water fountains in downtown	Reduce ill effects of dehydration
Personal behavior	Not enough awareness of weather conditions	More educational campaigns to identify weather conditions and potential risks of substance abuse	Reduce risks of severe ailments
Academic	Disconnect with research and community	Engage in community needs assessments	Enhance local communities

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Chapter nine- Summary of findings and conclusions

9.1   Summary of findings

The following section will provide an overview of findings for each of the research objectives.

Objectives #1 and #2

To gather insight into the role of weather, air quality, and extreme events for the absolute homeless population from the perspectives of the homeless population

and

The second objective is to put the identified exposures into the context of the short and long term climate records and projections for the Region.

The most problematic conditions reported by people experiencing homelessness in Waterloo Region were rain, extreme cold in summer, winter conditions, rain and snowstorms and extreme heat. Although it was expected that air quality would be a significant problem, it did not appear often in the interview responses. People experiencing homelessness had definite adaptation strategies such as using public buildings, outdoor buildings such as bridges, awnings and loading docks, and using service agencies. The use of formal organizations was by far the most prevalent response in the research. However, other informal adaptations such as staying with friends, and building their own structures were also important. The adaptive capacity of people was enabled by good relationships with service staff and other social networks, activist and survival behaviors, good health and being in the middle age male demographic group. Limitations to adaptive capacity were poor health, mental illness, maladaptive behavior such as drug and alcohol abuse, stereotypes and problems with the police. The short term climate data for the Region shows that there is not large variability in winter temperatures, and snow, summer temperatures and rain and overnight temperatures for the climate normal period (1971-2000) and

the years 2005 to 2009 except for 2010, when there were a significantly higher amount of extreme heat days. In the investigated period there was a slightly higher amount of summer rain in 2008 and 2009 as well as more snow and the winter maximum temperatures became slightly colder in 2008 and 2009. Overall, this short term weather data shows that in recent history this region has not been subject to large climatic variations. The longer term climate projections show that there is expected to be a warmer Regional winter climate with increased precipitation (rain) in this season. There is no consistent agreement on summer precipitation projections but it is expected that summers will have more extreme heat days as well as more extreme events such as tornadoes.

Objective #3

To outline existing services and the way in which they are used based on publicly available data, secondary research.

The ability of people experiencing homelessness in Waterloo Region to adapt to environmental stressors is quite high, and this ability is enhanced by the effectiveness of the Regional service system. The Regional culture that exists adds significantly to the ability of people to use services through the day and overnight. However, with the significant Regional economic downturn from the manufacturing sector, the number of people who will be more vulnerable to experience first time or persistent homelessness may increase which will place additional pressure on the service system. In the future, the voluntary sector may have a more central role in this provision. The centrality of this role will depend largely on the availability of staff and donors in the community. Both the exogenous and endogenous factors that contribute to the adaptive capacity of people experiencing homelessness point to the idea that the target population is not only resilient and adaptive, but also introspective, active and aware of changes

that could better serve their needs. Potential adaptive measures that could enhance the ability of people experiencing homelessness in Waterloo Region to adapt to environmental change include legal and administrative changes at the Regional, Provincial and National levels by including these measures in long term planning visions. Other measures include changes to the voluntary and engineering sectors as well as networking with the academic community. Attention also needs to be placed on individual behavior to environmental change so that effective long term changes can be maintained.

Overall conclusions based on vulnerability framework

In conclusion, by following the Smit and Wandel, 2006 conceptual framework to climate change, this research determined that people experiencing homelessness in Waterloo Region are sensitive to the exposures of rain, winter, snow, storms, summer cold, summer heat, dampness and wind. The current vulnerability to these exposures is significantly reduced by using services provided in the urban areas of Kitchener and Cambridge. The current vulnerability is also differential based on individual capabilities and factors such as health status and age. Overall, this population has high short term adaptive capacity as they are resourceful and innovative, yet long term adaptive capacity is dependent on the availability of mentioned social services in the Region. Some mal adaptations such as using drugs and alcohol, and engaging in criminal behavior to cope with the problematic conditions provide short term relief but cause long term cyclical problems which make this population more vulnerable. Future environmental conditions such as increased precipitation in the summer as well as an increase in heat days *could* make this population more vulnerable as they spend much of their time outdoors. However, a warming climate in the winter may be beneficial for people experiencing homelessness as they would not have to contend with winter conditions which proved to be very problematic for them.

9.2   Scholarly contributions

This study contributes to the small amount of literature about urban adaptation to climate change in developed countries. The lack of literature surrounding homelessness and climate change has allowed this study to pioneer many of the issues related to this topic. The information from the in-depth interviews with 48 people from a hard to reach population can serve as a guide for further investigation into other health and lifestyle issues related to people experiencing homelessness. Further, the research method framework developed in the study (collaborating agencies, and partnering with the Region of Waterloo) may serve as a valuable tool for other researchers trying to reach this population. Gaining a better understanding of the Regional climate data allows baseline data from which to conduct future climactic assessments.

The study has also utilized the vulnerability theory in a unique way and provided evidence that this framework can be adapted to include vulnerable populations with varying characteristics. In the future, the vulnerability framework may allow the development of other case studies related to at risk populations in both developed country rural and urban contexts.

9.3   Practical contributions

The information provided in this project will become the baseline for the development of a Regional climate change action strategy related to homelessness. This will directly benefit both future Regional strategic planning as well as people experiencing homelessness by providing both short-term solutions to persistent problems as well as a long term vision for climate change adaptation. By using the Participatory Research Methodology (PAR) this research will be especially important for all stakeholders involved as both the interviews respondents as well as the collaborating service agencies identified early in the research plan that the "action" part was not only important but necessary to conduct research with this vulnerable population. The

research will also serve as an effective example of mainstreaming vulnerability and climate change assessments in the context of the developed world.

9.4 Recommendations for further research

Recommendations for further research include continuing to understand homelessness from a socio-ecological systems perspective which entails analyzing the issues with complex and forward thinking. In this context, interdisciplinary research is the most valuable form of understanding the complexity of the topic, as well as finding creative and pragmatic solutions in the future. In addition, engaging primary stakeholders in the issues directly affecting them should continue to be a priority for any type of planning related to climate change adaptation while continuing to work on effective mitigation strategies for reducing the determinants of the environmental changes. In addition, incorporating important feedbacks of climate change such as increased immigration due to environmental refugees as well as issues related to a shifting manufacturing base in the Region should be given thoughtful attention to better understand future based scenarios. Finally, by understanding the uniqueness of each vulnerable population, blanket assessments and solutions that may be potentially ineffective and inappropriate can be avoided.

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Appendix 1: Interview Guide

Research Themes for the interviews with probes to encourage conversation (the questions are not meant to be asked in order but rather to follow specific theme categories- new questions may arise during the interviews)

<u>*Housing and Shelter:*</u> **information is sought as to how long the individual has been homeless and to what degree, where he/she lived previously, where he/she currently spends the majority of their time, how this varies throughout the seasons**

Could you tell me about how you ended up in the Region?

Do you enjoy living here?

Could you explain how you spend most of your time?

<u>*Problematic conditions:*</u> **information on which climate-related conditions are particularly problematic for the respondent, and how and why these are problematic, what implications they have had. If the conversation does not naturally address all seasons, the interviewer will prompt for these. If particular events are mentioned this will be followed up with the next theme of questions.**

Could you please tell me if there are times when the weather is a problem for you?

Do you happen to remember particularly difficult times?

How were these times difficult for you?

In what ways do weather changes affect you the most?

<u>*How the problematic conditions are handled:*</u> **What has the respondent done to manage these conditions in the past, who and where he/she goes for help, and how effective the strategies were?**

How does you daily routine change when the weather changes?

What types of things do you do you do when bad weather hits?

Do these things work well for you? Please explain

Can you count on these strategies always being available to you?

Barriers to management of problematic conditions: **strategies the respondent may have wished to employ, but could not for one reason or another- e.g. pets not allowed in shelters, and what he/she feels could be done to overcome these barriers**

Are there any places you wish you could go in these events?

Tell me about these places?

Do you always go to the same places?

Are there any reasons why you cannot go to these places?

What would have to change for you to go to these places?

Use of existing service resources: **ideally, this comes up during the discussion of management of previous conditions, but if known social services are not mentioned, the interviewer will ask about these specially- does the respondent know of them, has he/she used them, does he/she currently use them, would he/she use them again, why or why not?**

What types of services do you use in extreme weather?

Do you always use the same ones?

Do these services help you?

How could they be different?

Existing networks: **who the respondent routinely interacts with to manage shelter and weather conditions, including cooperation with other members of the homeless community, family and friendship networks, social service workers, and how these are configured?**

How do you hear about extreme weather events coming your way?

Are you always aware when the weather will change?

Are other people you know in danger to bad weather? Please explain

Do you rely on specific people during bad weather events- Please Explain?

Do you go with friends or other people you know to places to get out of the bad weather?

Perception of inequality: whether or not the respondent considers themselves as affected by the problem of global climate change, whether he/she feels reflected in the environmentalist movement, whether he/she understands that they are disproportionately affected by global climate change.

How much do you feel you know about global warming, and where do you get your information?

Is global warming something that you feel affects you and your life? If so, how?

Who or what do you think is the most impacted by global warming?

When you hear about global warming on television or in awareness campaigns, do you feel like they're targeting you?