

**EXPLORING THE BUILT ENVIRONMENT AND PHYSICAL ACTIVITY IN  
RURAL ONTARIO HEALTH UNITS**

**By  
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## ABSTRACT

The purpose of this thesis was to explore how health units servicing large rural populations in Ontario are integrating the built environment into public health interventions related to physical activity for the purpose of fostering healthy and sustainable communities. Additionally, this research sought to identify barriers and/or enabling structures that rural health units face in addressing the built environment within physical activity programming aimed at chronic disease prevention.

This exploratory research study employed a descriptive qualitative approach. In-depth semi-structured interviews were conducted with a purposeful sample of fourteen public health practitioners and managers from participating Ontario health units serving large rural populations. Participants were health unit staff (public health nurses, health promoters, and managers) identified as those most knowledgeable about program planning, implementation, and policy development in relation to physical activity and the built environment.

Using qualitative content analysis as the approach to analyze textual data, eight major themes and a number of sub-themes emerged describing interventions that health units were employing to address the built environment and physical activity. The types of interventions were: engagement with policy work at a county or municipal level; building and working with community partners, committees and coalitions; gathering and providing evidence; hosting knowledge sharing opportunities; program development and implementation; social marketing, information sharing and awareness raising; and resource development and dissemination. Barriers and enabling processes and structures were identified at an organizational, community, and systemic level. Specific rural contextual enablers and barriers were also identified.

This was the first study to the researchers' knowledge that has examined current practices of Ontario's rural health units related to built environment initiatives. In-depth perspectives elicited from public health practitioners and managers address gaps in the literature and contribute to new knowledge regarding built environment interventions to enhance physical activity in rural settings. Implications of the research findings are outlined for: public health practitioners and researchers; public health organizations; and the municipal sector.

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## **Chapter 1: INTRODUCTION**

### **Research Focus: Built Environment and Physical Activity**

Over the latter half of the 20<sup>th</sup> century, chronic diseases, such as cardiovascular disease and type II diabetes, and chronic disease risk factors, such as obesity have been on the rise. Obesity is one indicator of poor individual and population health and a major public health burden in Canada (Frank & Engelke, 2005). According to 2007-2009 Canadian data, one-quarter of adults are obese and obesity is becoming more severe (Public Health Agency of Canada [PHAC] & Canadian Institute for Health Information [CIHI], 2011). Rates continue to rise as obesity has almost doubled among adults and youth between 1981 and 2007-2009 (PHAC & CIHI, 2011). It is expected that today's children will have a shorter life expectancy than their parent's generation for the first time in history (Chief Medical Officer of Health [CMOH], 2004). Hence, interest in the determinants of obesity and how to modify these determinants has become a major focus in public health. Determinants of obesity include physical activity, diet, socio-economic status (SES), ethnicity, genetics, and environmental factors (PHAC & CIHI, 2011). This thesis focuses on one of these determinants - physical activity - and how rural health units in Ontario are interpreting and integrating the built environment into their public health interventions.

Physical inactivity has been most strongly correlated with the number of cases of overweight and obese Canadians at the population level after adjusting for age and other health behaviours and social determinants (PHAC & CIHI, 2011). In Canada, physical activity levels are decreasing among all age groups (PHAC & CIHI, 2011). In rural Canada, the problem of physical inactivity and obesity is even more severe. Rural residents have been found to have significantly higher obesity rates and lower physical activity rates than their urban counterparts (CIHI, 2006a). This is concerning, as depending on how rural is defined, anywhere from 19% to 30% of Canadians were living in a rural area in 2006 (Bollman & Clemenson, 2006; Health Canada, 2008). It is hypothesized that the high rural obesity and physical inactivity rates may contribute to the higher mortality rates and increased prevalence of diabetes in rural areas (CIHI, 2006a).

To address physical inactivity and obesity, public health practitioners are increasingly looking to complement individual and family level interventions with more population-based or community level interventions targeting determinants of health to improve population health (Brownson, Haire-Joshu & Luke, 2006; PHAC & CIHI, 2011). The built environment is one such environmental determinant of health. The built environment includes all of the physical structures of human-made environments such as housing, schools and commercial centres; parks and public spaces; transportation infrastructure such as streets and highways, paths, sidewalks and transit systems; and neighbourhoods (Alberta Health Services [AHS], 2008; Frank & Engelke, 2005).

Strategies to modify the built environment are increasingly viewed as an upstream, population-based approach to address physical activity levels and obesity.

There are multiple connections between the impacts of the built environment and public health. Current empirical evidence suggests there are associations between the built environment and air and water quality, climate change, physical activity, nutrition, and health outcomes such as obesity, asthma, diabetes, mental health, and injuries (Lawrence Frank & Co. [LFC], 2008; Perrotta, 2011). In the past decade there has been an explosion of interest within the public health sector regarding the potential contribution of built environments, particularly land use planning and transportation, on levels of physical activity and obesity (Brownson, Hoehner, Day, Forsyth, & Sallis, 2009).

Both physical activity levels and obesity are chronic disease risk factors which may be exacerbated by the built environment (Lavin, Higgins, Metcalfe, & Jordan, 2006). Addressing distal risk factors for chronic disease, such as the built environment, may provide the greatest potential for chronic disease prevention (CDP) (Haydon, Roerecke, Giesbrecht, Rehm, & Kabus-Mattews, 2006). Dr. Sheila Basrur, the former CMOH, reported “we are now living in ‘obesogenic’ environments, communities, workplaces, schools and homes that actually promote or encourage obesity...we have made our generation the most sedentary in history” (CMOH, 2004, p.2-3). The term ‘obesogenic’ is a term commonly used by public health practitioners to describe the relationship between built environment features and its potential influence on physical activity levels and nutrition (Barton, 2009; Haydon et al., 2006). Interventions aimed at addressing the obesogenic environment may include trail and bike path development, creating zoning and land use policies, and designing communities that encourage physical activity (Brownson et al., 2000). Enacting changes to the built environment may benefit the entire population by creating systemic change, which may have longer term outcomes than individual behavioural approaches to health (Brownson et al., 2006).

The Ottawa Charter for Health Promotion outlines the importance of creating supportive environments for health, with the protection of natural and built environments a necessity in any health promotion strategy (WHO, 1986). In Ontario, the important link between the built environment and healthy communities has been recognized in the recently released Ontario Public Health Standards (OPHS) (Ministry of Health and Long-Term Care [MOHLTC], 2008a). Public health units are now legislated through the OPHS to incorporate the built environment into their Chronic Disease Prevention and Environmental Health Hazard Programming.

Much has been written about the built environment and its effects on physical activity in urban settings; however, there is a paucity of information related to the built environment in rural settings. Furthermore, the large proportion of Canadians living in rural areas, their high physical inactivity and obesity rates, and the unique challenges in addressing the built environment in rural settings was the impetus for investigating this topic in rural contexts.

## **Purpose of the Study**

The purpose of this study was to explore how health units servicing large rural populations<sup>1</sup> in Ontario are integrating the built environment into public health interventions related to physical activity for the purposes of fostering healthy and sustainable communities. In particular, this research sought to identify barriers and/or enabling structures that rural health units face in addressing the built environment within physical activity programming aimed at chronic disease prevention (CDP). For the purposes of this study, ‘interventions’ was defined by the author as any public health activities, interventions, initiatives, program planning and delivery, and policies related to the built environment.

This was the first study to the researchers’ knowledge that has examined current practices of Ontario’s rural health units related to built environment initiatives. The in-depth, rich perspectives elicited from public health practitioners and managers address gaps in the literature and contribute new knowledge regarding built environment interventions in rural settings and the Ontario health units serving rural populations.

The following chapter provides an overview of the literature related to the built environment and physical activity. Following this, chapter 3 outlines the research questions, ethical considerations and study methodology. Chapter 4 presents the findings, followed by chapter 5 which concludes with a discussion and presents implications of the research, methodological strengths and limitations of the current study, and potential knowledge translation strategies.

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<sup>1</sup> Herein referred to as rural health units.

## Chapter 2: LITERATURE REVIEW

The purpose of this literature review was to explore existing theoretical and empirical literature regarding the built environment and its relationship to physical activity and obesity. The built environment may affect air and water quality, climate change, healthy eating, physical activity and the prevention of injuries (Perrotta, 2011). However, for the purposes of this study, the focus was solely on the effects of the built environment on physical activity and the possible effects this may have on body mass and weight.

Information gathered for this review included systematic reviews, non-systematic literature reviews and evidence summaries, primary studies and grey literature such as agency reports and government publications describing the impact of built environment characteristics on physical activity and the potential impact on obesity. The search for the literature included key terms that were deemed relevant to the topic of interest, which included ‘obesity’, ‘overweight’, ‘physical activity’, ‘walking’, ‘cycling’, ‘biking’, ‘active transportation’, ‘built environment’, ‘physical environment’, and ‘environment’ and ‘rural’. Computer based searches were completed for these terms in a number of combinations in the Cumulative Index to Nursing Allied Health Literature [CINAHL] and Medline databases. Reference lists from articles and publications were also reviewed for sources. Abstracts were then reviewed for relevance. Relevant organization position papers and publications were also searched, such as the World Health Organization (WHO), Public Health Agency of Canada (PHAC), and health units and health agencies. The search includes literature and articles published in English between 2000 and 2012.

The review is presented as follows. First, how the built environment is associated with physical activity is discussed, which includes examining land use patterns and development, transportation systems, design and accessibility issues. Since most literature to date on the built environment and its influence on physical activity is based on research conducted in urban areas, the review will begin with urban or mixed urban-rural studies and conclude with literature related to rural settings. This section also reviews the relationship between physical activity and health, the relationship between obesity and health, and examines the influence of the built environment on obesity. The review then proceeds to describe existing policies, legislation, and best practices regarding the built environment both in Canada and internationally. Following this, rural concerns are highlighted by exploring health concerns, physical activity levels, and interventions to improve physical activity in rural settings. A brief overview is included on the important and historic relationship between planning departments and public health. Lastly, limitations and gaps in the literature will be outlined.

## **Built Environment and Physical Activity**

Evidence from systematic reviews, literature reviews and grey literature examining the relationship between built environment characteristics and physical activity levels in children, adolescents, adults and older adults will be included in this literature review. See Appendix A for a synopsis of included literature. Quality assessment ratings are provided exclusively for systematic reviews based on the AMSTAR tool, an instrument developed to assess their methodological quality (Shea et al., 2007) (see Appendix B for quality assessment ratings for systematic reviews).

Much of the literature examining the relationship between physical activity and the built environment is in the form of non-systematic evidence reviews, literature reviews and agency reports. In addition, a number of systematic reviews have been conducted. Overall, this literature scores poorly when assessing its quality using a rating tool such as AMSTAR. Most authors do not: 1) clearly present the process to conduct the review; 2) include a list of included and excluded studies; 3) assess the scientific quality of studies that they cite; and 4) report whether publication bias was assessed. Hence, the rigor for some of the systematic reviews and most of the non-systematic reviews and reports is weak.

It is important to note that the majority of evidence in this review demonstrates *associations* between the built environment and physical activity and does not demonstrate *causality* due to the cross sectional designs of most studies (Barton, 2009; Feng, Glass, Curriero, Stewart, & Schwartz, 2010; Transportation Research Board [TRB], 2005). The conclusion of most reviews is remarkably similar, despite being conducted in various countries, cities and neighbourhood's worldwide (Gebel et al., 2005). However, caution is necessary in drawing definitive conclusions based on the poor to moderate quality of the systematic reviews, literature reviews and primary studies conducted to date. Most reviews conclude that built environment characteristics and policies may encourage, provide opportunities, present barriers or constrain physical activity and active lifestyles, as it can influence whether a person engages in physical activity and the frequency in which they do so (Bergeron, 2009a; Chronic Disease Prevention Alliance of Canada [CDPAC], 2006; Feng et al., 2010; Frank & Engelke, 2005; Jackson & Kochtitzky, 2010; Pruss-Ustun & Corvalan, 2006; TRB, 2005). Modifiable built environment characteristics included in this review include land use patterns and development; transportation infrastructure and systems; design or urban form; and accessibility.

### **Land Use Patterns and Development**

Land use planning determines how communities will function and appear, such as the location of houses, schools, parks, and businesses (Ministry of Municipal Affairs and Housing [MAH], 2005). Land use patterns and development refer to the spatial

distribution of human activities and includes: land use mix<sup>2</sup> and density<sup>3</sup> (Handy, Boarnet, Ewing, & Killingsworth, 2002; TRB, 2005; Yee-Man Wong, Faulkner, & Buliung, 2011). Many systematic reviews (Durand, Andalib, Dunton, Wolch & Pentz, 2011; Heath et al., 2006; Renalds, Smith, & Hale, 2010; Saelens & Handy, 2008; TRB, 2005) and literature reviews (Badland & Schofield, 2005; Bergeron, 2009a; Pruss-Ustun & Corvalan, 2006; Williams & Wright, 2007) concur that land use planning and development policies and practices are positively related to physical activity.

Positive associations have been demonstrated between increased diversity of or mixed land use and increased physical activity levels (Brennan-Ramirez et al., 2006; Brownson et al., 2006; Dunn, 2008; Durand et al., 2011; Frank & Engelke, 2005; Gebel et al., 2005; Heath et al. 2006; LFC, 2008; Pruss-Ustun & Corvalan, 2006; Raine et al., 2008; Renalds et al., 2010; Saelens & Handy, 2008; TRB, 2005). Two systematic reviews concluded proximity to diverse land uses such as employment, retail, and services was associated with increased walking rates (Durand et al., 2011; Saelens & Handy, 2008). Single use development has been found to discourage physical activity and active transportation<sup>4</sup> (Frank & Engelke, 2005). The TRB (2005) reported there is preliminary evidence that indicates land use mix (e.g. density, diversity of uses) may affect physical activity levels. The authors conclude that preliminary research provides some evidence suggesting land use mix is related to certain types of physical activity (destination-oriented travel or recreational physical activity), but a causal relationship has not been determined (TRB, 2005). Van Cauwenberg et al. (2011) found that the significance of the relationships between physical environmental characteristics and physical activity varied based of the age of the population and type of physical activity (total physical activity, total walking and cycling, recreational walking and transportation walking). Statistically significant positive associations were found with land use mix diversity for total walking and cycling and recreational walking, but many non-significant relationships were found with land use mix diversity and total physical activity and transportation walking (Van Cauwenberg et al.). The strength of the associations was not reported.

Consistent associations have also been reported between high population density neighbourhoods and improved walking and/or cycling rates (Brennan-Ramirez et al., 2006; Brownson et al., 2006; Dunn, 2008; Fraser & Lock, 2011; Gebel et al., 2005). Non-systematic reviews have indicated that residential density is also a significant factor in determining physical activity levels, particularly walking (Dunn, 2008; Frank & Engelke, 2005; Raine et al., 2008), and three systematic reviews have concluded that this association is statistically significant (Durand et al., 2011; Renalds et al. 2010; Saelens & Handy, 2008). However, Durand et al. (2011) and Saelens & Handy (2008) reported only

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<sup>2</sup> The diversity and proximity of different land uses, such as residential, commercial and industrial (TRB, 2005).

<sup>3</sup> The amount of activity in a given area and can include population, residential/dwelling, building and employment density measured per square mile (TRB, 2005).

<sup>4</sup> Active transportation is defined as any mode of transportation that requires the use of human power, such as cycling and walking (Gebel et al., 2005).

the direction of the association and not the strength of the association. Renalds et al. (2010) did not provide the levels of association. The degree of urban sprawl<sup>5</sup> has been cited to be related to physical activity levels, as suburban growth has led to an increase in vehicular dependency and has contributed to decreasing physical activity (CIHI, 2006b; Jackson & Kochtitzky, 2010). Conversely, compact development patterns are associated with increased walking rates and physical activity (Durand et al., 2011).

### **Transportation Systems**

Transportation systems are a second frequently cited built environment characteristic associated with physical activity levels (Handy et al., 2002; Pruss-Ustun & Corvalan, 2006). Transportation systems refer to all of the policies and infrastructure that provide links or connect human activities and include roads, public transit, and routes for active transportation (AHS, 2008; TRB, 2005).

Transportation infrastructure includes street and roadway connectivity<sup>6</sup>. Street connectivity includes features such as block size, road length and width, route directness, intersection density<sup>7</sup>, and street pattern (grid<sup>8</sup> versus cul-de-sac) development (Feng et al., 2010; Yee-Man Wong et al., 2011). Grid street design creates great connectivity between streets and more direct route choices for pedestrians (Williams & Wright, 2007). Neighbourhood design today often consists of superblocks, road hierarchies with collector streets, and curvilinear street design (cul-de-sacs), which decreases community connectivity, lengthens and discourages pedestrian routes and is geared towards the automobile (Williams & Wright, 2007).

Many non-systematic reviews indicated there is evidence to support increased street and path connectivity, as it is strongly associated with improved physical activity and active transportation (Brennan-Ramirez et al., 2006; Brownson et al., 2006; Frank & Engelke, 2005; Lavin et al., 2006; LFC, 2008; Raine et al., 2008). However, these non-systematic reviews are generally weak in rigour. One systematic review conducted by Saelens & Handy (2008) found sidewalks and route connectivity were correlated with higher levels of recreational walking. Another systematic review by Renalds et al. (2010) found a statistically significant association between block size and increased walkability. A third systematic review reported there was preliminary evidence that transportation infrastructure, including grid patterned streets and sidewalks, may affect physical activity levels (TRB, 2005). Hou et al. (2010) conducted a sixteen year duration longitudinal study and demonstrated significantly more self-reported leisure activity (walking,

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<sup>5</sup> Sprawl refers to areas characterized by low density areas, segregated land use, and disconnected hierarchical road networks, typically seen in suburban areas (Feng et al., 2010).

<sup>6</sup> Refers to the directness and availability of transportation linkages and alternative routes between destinations (Frank & Engelke, 2005; Handy et al., 2002)

<sup>7</sup> The number of intersections in an area, which corresponds closely with block size.

<sup>8</sup> Grid pattern street design refers to the traditional grid pattern of city planning where with streets run at right angles from one another creating a grid pattern.



cycling, jogging) in areas with better connectivity (more streets, less cul-de-sacs, smaller blocks and more intersections in less urban areas). Increased intersection density (approximately 15 additional 3 or more-way intersections per 1 km<sup>2</sup>) was associated with an approximate 5% increase in walking, jogging and cycling frequencies. Increased density of local roads was positively associated with walking, jogging and cycling frequencies in men in low urbanicity areas (Hou et al.). This relationship was not significant in high urbanicity<sup>9</sup> areas (Hou et al.). This study did not examine active transportation or transportation for commuting purposes.

Active transportation friendly communities that incorporate infrastructure such as sidewalks, bike lanes, trails, and paths that connect the larger community are often cited as being associated with higher levels of cycling and walking (Dunn, 2008; Fraser & Lock, 2011; Gebel et al., 2005; Lavin et al., 2006; LFC, 2008). ‘Walkable communities’ refers to neighbourhoods that include continuous and connected sidewalks, walking paths and trails, parks, and crosswalks (Pruss-Ustun & Corvalan, 2006). Suburban designs often are less walkable, contributing to declining physical activity levels (Jackson & Kochtitzky, 2010). Conversely, people who live in ‘walkable communities’ tend to drive less than those who live in car dependent communities (Gebel et al., 2005). The review by the TRB (2005) found that the presence of sidewalks correlated with increased walking and non-motorized travel. Gebel et al. (2005) concluded in a non-systematic review that improved and increased footpaths reduced automobile use and increased active transportation. The review did not report on the degree of automobile reduction or the increase in active transportation. Brownson et al. (2000) also demonstrated that walking trail development in rural communities improved walking rates, particularly among women and persons in lower socio-economic groups.

Cycle friendly features of neighbourhoods includes: bike lanes and paths; and bike rack availability (Fraser & Lock, 2011; Pruss-Ustun & Corvalan, 2006). One strong systematic review looking at interventions to promote cycling found improving infrastructure for cycling in urban environments had the potential to increase cycling by modest amounts (e.g. proportion of all trips made by bicycling increased 3.4 percentage points and a net increase of 100 metres per person per day in the intervention area) (Yang, Sahlquist, McMinn, Griffin & Olgivie, 2010). The authors cautioned further controlled evaluative studies incorporating more precise measures are required, particularly in areas where there is not an already well established cycling culture. Another systematic review, although weak in rigor, similarly concluded that cycling infrastructure such as bike lanes and bike parking, can increase bicycling to a small extent (e.g. each additional mile of bike lane per square mile was associated with an increase of approximately one

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<sup>9</sup> Urbanicity was defined using a combination of urban boundary data (using census urbanized areas) and population density. Census tract-level population density was further categorized into tertiles representing low (including rural), middle and high urbanicity. The average population density was 1087/km<sup>2</sup> and 7348/km<sup>2</sup> in low and high urbanicity areas, respectively. Only 5% of participants were from rural areas (Hou et al., 2010).

percentage point in the share of commuter bicyclists) (Pucher, Dill & Handy, 2010). A recent systematic review of 21 primary studies found that 11 studies identified a significant positive association with cycling and objectively measured environmental factors, such as the presence of dedicated cycle routes, separated cycle paths and proximity of cycle paths (Fraser & Lock, 2011). Although the strength of the association was not noted, the authors concluded that policies promoting cycle lane construction appear promising (Fraser & Lock, 2011). Additionally, this review found that projects promoting 'safe routes to school' for children were positively associated with cycling rates (Fraser & Lock, 2011).

A systematic review of moderate strength looking at intervention studies on active transportation to school found most interventions showed some improvement in active transportation (3-64%), of which three had a large or very large effect size (Chillon, Evenson, Vaughn & Ward, 2011). Interventions included promotion, policy, and physical interventions, such as sidewalk improvements, path construction, and traffic signal improvements (Chillon et al., 2011). The authors cautioned that heterogeneity and weaknesses in study methodology limited their ability to provide clear conclusions regarding the most effective interventions.

One rigorous systematic review (Heath et al., 2006) and one non-systematic review (Brownson et al., 2006) concluded that there are too few studies and insufficient evidence to suggest that transportation policies and practices, such as roadway design and active transportation infrastructure, improve physical activity levels. Similarly, a moderately rigorous systematic review by Ogilvie, Egan, Hamilton, & Petticrew (2004) examined six studies of engineering methods to improve active transportation such as improving and extending cycle route networks, and implementing auto restricted zones and traffic constraint schemes. The authors found that these engineering methods had little to no population effect on shifting to active modes of transportation, but found targeted programmes can change behaviour at a population level (Ogilvie et al.).

## **Design**

Building, street and community-scale design are also associated with increased physical activity levels, particularly in the urban environment (Bergeron, 2009a; Brownson et al., 2006; Heath et al., 2006; LFC, 2008; Pruss-Ustun & Corvalan, 2006). Design features include the aesthetic, physical and functional qualities of the built environment such as the proportion of streets with sidewalks, the maintenance and condition of sidewalks, and landscaping and trees (AHS, 2008; CDPAC, 2006). Evidence indicates neighbourhood aesthetics and street facades have been positively related to walking rates by affecting how people perceive the environment (Frank & Engelke, 2005; MOHLTC, 2008b; Saelens & Handy, 2008).

Design also includes safety features such as lighting, crosswalks, width of sidewalks, and traffic calming measures. Sidewalk presence, sidewalk continuity, improved street

crossings, crosswalks, and improved lighting all have been found to improve perceived and objective pedestrian safety and to improve physical activity levels (Brennan-Ramirez et al., 2006; Brownson et al., 2006; Dunn, 2008; CIHI, 2006b; Craig, Brownson, Cragg, & Dunn, 2002; Heath et al., 2006; Renalds et al., 2010). This is important as perceived safety can play a major role in one's decision to engage in active transport for all ages (CIHI, 2006b, MOHLTC, 2008b; Saelens & Handy, 2008; TRB, 2005).

Traffic calming measures as a way to reduce vehicular speeds and improve safety include design interventions such as: decreasing speed limits; road narrowing; sidewalk widening; traffic circles; speed bumps and raised intersections; minimizing on-street parking; medians for pedestrians; and adding trees and sidewalks (Badland & Schofield, 2005; CIHI, 2006b; Elvik, 2001; LFC, 2008; TRB, 2005). Wider roads lead to higher traffic speeds and volume, which may result in an increased number and greater severity of traffic collisions (LFC, 2008). For instance, the pedestrian fatality rate is 5% if struck at 30 kph, 45% if struck by a vehicle travelling 50kph, and 85% if traveling 60 kph (LFC, 2008). A methodologically moderate strength meta-analysis of 33 primary studies evaluated the safety effects of area wide traffic calming measures in urban areas and found traffic calming interventions decreased traffic related injuries on neighbourhood streets by 25% and 10% on main roads (Elvik, 2001). There is evidence to support traffic calming measures as a means to improve physical activity, as people will perceive the neighbourhood to be safe and are more likely to engage in physical activity (Heath et al., 2006; Lavin et al., 2006; LFC, 2008). For instance, Fraser & Lock (2011) found both perceived and objective traffic danger was negatively associated with cycling.

Ogilvie et al. (2004) found little evidence that traffic calming interventions had any population effect on shifting to active modes of transportation, but this systematic review did not address actual or perceived pedestrian or cyclist safety.

### **Accessibility**

Accessibility includes the availability of opportunities to engage in physical activity and the proximity to facilities that may encourage activity. The availability of open spaces, parks, recreational facilities, and paths and trails have all been associated with higher physical activity levels, particularly leisure physical activity and walking (Brennan-Ramirez et al., 2006; Brownson et al., 2009; CIHI, 2006b; Durand et al., 2011; Lavin et al., 2006; Raine et al., 2008). For example, Gebel et al. (2005) found that people who had good access to attractive, large parks were 50% more likely to attain high levels of walking. The lack of opportunity or lack of access to facilities, parks and even sidewalks is perceived as a barrier to physical activity and may contribute to inactivity (Jackson & Kochtitzky, 2010; Lee & Moudon, 2004).

There is also a consistent positive relationship between proximity to parks, trails and recreational facilities and physical activity (Barton, 2009; Brownson et al., 2006; CIHI, 2006b; Frank & Engelke, 2005). In neighbourhoods where facilities are not as easily

accessible, activity levels have been found to decrease (Barton, 2009; Lee & Moudon, 2004). Similarly, proximity to school has been found to be associated with active transportation. Saelens & Handy (2008) concluded in their systematic review that proximity to children's schools was positively related to walking rates to school. A high quality systematic review by Yee-Man Wong et al. (2011) found active transportation to school is consistently found to be negatively associated with increased distance between one's residence and school. Therefore, as the distance increases between one's home and school, children are less likely to use active transportation to travel between home and school. This negatively affects school-aged children's physical activity levels, as schools are less convenient and accessible.

### **Built Environment in Rural Settings**

Only one systematic review was found that addressed the built environment and physical activity in rural settings. Both quantitative and qualitative studies were included in this high quality systematic review by Frost et al. (2010). It examined barriers to and motivators of physical activity among rural populations. Based on the qualitative studies, the authors found that traffic, safety and uneven roads were barriers to physical activity. Motivators to improve physical activity in rural environments included: increasing the number and the quality of recreational facilities; improving lighting outdoors; building infrastructure such as sidewalks, tracks, trails and parks; and providing better walking conditions (Frost et al.).

Quantitative studies demonstrated significant positive associations between rural built environment characteristics and physical activity, although the authors did not report on the strength of associations. Built environment elements more frequently measured included aesthetics; safety from crime or traffic; walkable destinations; and presence of recreational facilities, trails, or parks (Frost et al., 2010). Of the 11 built environment characteristics identified in the review, those that demonstrated significant positive associations with physical activity included: aesthetics (four of four studies), safety/crime (six of nine), use of, distance to or access to recreational facilities (five of ten), trail use or presence of trails (four of six), distance to or use of parks (three of six), perceived safety from traffic (four of eight), and walkable destinations (two of five) (Frost et al.). Aesthetics included one or more of the following: reporting a garbage free environment, having a well maintained community, and/or having interesting things to observe. The presence of street lighting demonstrated inconsistent findings, in that significant relationships were negatively associated with physical activity. The presence of sidewalks or shoulders presented mixed results, as four studies demonstrated positive associations with physical activity, but one study with older rural adults found a negative association.

The authors compared the results to urban studies and suggested traffic had fewer significant associations with physical activity in urban studies. They felt this may have been masked by the presence of sidewalks or the decreased speed of vehicles in urban areas (Frost et al.). Aesthetics produced positive associations in both rural and urban

research. Significant positive associations with sidewalks, parks and walkable destinations were found in urban studies, and more positive associations between safety/crime, traffic and trails and physical activity were found in the rural literature. The authors concluded that the built environment elements most relevant to rural settings include aesthetics; safety from crime or traffic; and the presence of recreational facilities, trails or parks (Frost et al.).

### **Mediating Factors**

Mediating factors that may affect physical activity in both rural and urban environments include: socio-demographic variables such as age, income and education; personal and cultural variables; perceived safety; and time (TRB, 2005). Confounding the relationship between the built environment and physical activity is neighbourhood self-selection, since most people choose where they will reside (Feng et al., 2010). For instance, people with more active lifestyles may choose to live in more walkable neighbourhoods. This self-selection bias may lead to spurious associations between physical activity levels and the built environment. Frank, Saelens, Powell & Chapman (2007) conducted a study and controlled for neighbourhood selection by isolating the effects of the built environment on walking rates, car use and obesity. They found residents who preferred and lived in walkable communities walked the most and drove the least and individuals that preferred and lived in car dependent neighbourhoods walked the least (Frank et al.). The findings suggest that creating more pedestrian friendly neighbourhoods may result in higher activity levels for those who prefer walking (Frank et al.). Employing longitudinal designs, studying larger geographic areas, and investigating children and youth who generally do not select their neighbourhoods, may minimize this bias (Feng et al., 2010).

### **Summarizing Physical Activity and Built Environment**

Built environment effects on physical activity and active transportation is a relatively new field of research. A few systematic reviews demonstrated significant associations between the built environment and physical activity (Renalds et al., 2010; Saelens & Handy, 2008; TRB, 2005) while an equal number demonstrated inconclusive results (Ogilvie et al., 2004; Van Cauwenberg et al., 2011; Yee-Man Wong et al., 2011) or modest effects (Pucher et al., 2010; Yang et al., 2010). Most systematic reviews report on the direction of the associations and do not include the strength of the associations. Most literature is in the form of non-systematic reviews and indicates a positive association between built environment characteristics and physical activity, although the methodological rigour of many of the reviews is weak or unclear.

Literature to date suggests land use patterns and development, such as mixed land use and density, have the most consistent results and the greatest potential to positively impact physical activity levels. The only systematic review that addressed rural settings, did not mention land use patterns or development.

There are also relatively consistent results from systematic reviews that demonstrate design, including aesthetics, safety measures and traffic calming; and accessibility have great potential to influence physical activity. The literature on transportation systems is less conclusive, particularly regarding ‘walkable communities’. There appears to be more evidence on the value of street connectivity and cycle friendly infrastructure.

To summarize, the plethora of recent literature within the past decade suggests there is strong potential for built environment interventions to address physical activity; however, interventions may be complex and vary based on context (Dunn, 2008). It is difficult to tease out the strength of the associations and to determine which built environment features are most effective or most strongly associated with physical activity or subgroup population effects due to methodological issues with study design, definitions and measurements of variables, and confounding social variables (Barton, 2009; Raine et al., 2008; TRB, 2005). Nevertheless, the evidence does suggest that policy and practice changes regarding the built environment which encourage physical activity are needed due to the strong relationship between physical activity and health (TRB, 2005). It is likely that a combination of the aforementioned interventions and policies addressing the built environment will promote more active lifestyles and increase physical activity (Pucher et al., 2010).

## **Physical Activity and Health**

### **Effects of Physical Activity on Health**

The association between physical activity and health has been well established. The US Surgeon General’s Report released in 1996 advised that regular physical activity at a moderate intensity improves health outcomes at all ages (Centers for Disease Control and Prevention [CDC], 1996). Regular physical activity is associated with lower morbidity and a lower risk of premature mortality at all ages (CDC, 1996). The Surgeon General Report also states that physical activity has been found to lower the risks of chronic diseases such as cardiovascular disease (heart disease and stroke), type II diabetes, osteoporosis, osteoarthritis, and some cancers; prevent or delay the onset of high blood pressure; lower blood pressure; contribute to weight loss; improve symptoms of depression and anxiety; and improve one’s sense of well-being (CDC, 1996). Regular physical activity is also very important for children as it contributes to healthier adult weights, improves peak bone mass, increases motor development, and enhances self-esteem and cognition (Brown, Hume & ChinAPaw, 2009). Inactivity in the early years may increase the risk of later life negative health outcomes such as overweight and obesity, type II diabetes, and cardiovascular disease (Brown et al., 2009). Hence, it is important to address activity behaviours in all stages of life. The TRB (2005) and the WHO (Pruss-Ustun & Corvalan, 2006) have deemed inadequate physical activity to be a largely preventable public health concern.

### **The Cost of Physical Inactivity**

In Canada the costs associated with physical inactivity are estimated to be \$5.3 billion, which includes both direct and indirect costs (Ontario Society of Physical Activity Promoters in Public Health [OSPAPPH], 2007). Direct costs include hospital care, physician care and pharmaceuticals; whereas indirect costs include things such as lost productivity and economic output due to short- and long-term disability and premature mortality (PHAC & CIHI, 2011).

### **Recommended and Current Levels of Physical Activity**

The Canadian Society for Exercise Physiology (CSEP) is now charged with establishing the Canadian Physical Activity Guidelines (CSEP, 2011). The new physical activity guidelines outline the amount of physical activity necessary to obtain health benefits. Children and youth, ages 5-17 require at least 60 minutes per day of moderate to vigorous intensity physical activity. Adults greater than 18 years of age should accumulate 150 minutes of moderate to vigorous aerobic physical activity per week in bouts of 10 minutes or more (CSEP, 2011). The evidence informing the guidelines is published in a series of systematic reviews found in the International Journal of Behavioural Nutrition and Physical Activity and can be found on the CSEP website. The evidence from which the guidelines were developed demonstrates a clear dose-response relationship between duration and intensity of physical activity and health benefits (CSEP, 2011).

Despite the positive health outcomes associated with physical activity, there has been a profound decrease in physical activity levels over the past fifty years, while the number of overweight and obese Canadians has increased (CSEP, 2011). According to the Canadian Community Health Survey (CCHS) 2011 results, 54.8% of Canadian adults are considered active or moderately active and 45.2% are categorized as inactive (Statistics Canada [StatsCan], 2012b). The Community Health Measures Survey (CHMS) data from 2007-2009 indicates that only 15% of Canadian adults and 7% of young people meet the recommended physical activity guidelines (StatsCan, 2012c). Regional differences also exist and in Ontario, 27% of youth ages 12-18 and 47% of adults are considered inactive (OSPAPPH, 2007). Refer to the section *Physical Activity in Rural Settings* on page 25 for a discussion of physical activity levels in rural areas.

## **Obesity and Health**

There are many classifications for adult weight which are based on body mass index (BMI). BMI is an estimate of body fat determined by calculating one's weight in relation to height (StatsCan, 2005). The WHO has categorized BMI levels into six groupings, each with a varying level of health risk (see Figure 1) (StatsCan, 2005). For the purposes of this review and study, the three obese categories will be clustered together and referred

to as obese.

<b>Category</b>	<b>BMI range</b>	<b>Risk of developing health problems</b>
Underweight	<18.5	Increased
Normal weight	18.5 – 24.9	Least
Overweight	25.0 – 29.9	Increased
Obese Class I	30.0 – 34.9	High
Obese Class II	35.0 – 39.9	Very High
Obese Class III	≥ 40.0	Extremely High

*Figure 1: BMI Categories and Associated Health Risks.*

### **Effects of Obesity on Health**

Obesity, like physical inactivity, is associated with numerous negative health outcomes. A recent systematic review and meta-analysis found statistically significant associations with obesity and the incidence of type II diabetes, all cancers except esophageal and prostate cancer (colorectal, kidney, breast, endometrial, ovarian and pancreatic cancers), all cardiovascular diseases (hypertension, stroke, congestive heart failure and coronary artery disease), asthma, gallbladder disease, osteoarthritis and chronic back pain (Guh, Zhang, Bansback, Amarsi, Birmingham & Anis, 2009). Additionally, it has been shown that there is an increased risk of overweight and obese youth becoming overweight adults (Singh, Mulder, Twisk, van Mechelen & Chinapaw, 2008).

### **Current Levels of Obesity**

Across Canada there has been a steady increase in both self-reported and measured obesity rates (PHAC, 2009). According to measured height and weight data from the 2008 CCHS, 62.1% of adult Canadians are *overweight or obese*, with 25.4% classified as obese (PHAC & CIHI, 2011). This is a remarkable rise in overweight and obesity since 1978, when the combined rate of overweight and obese was only 13.8% (StatsCan, 2005). The dramatic increase is also evident among children and youth. Almost one third (31.5%) of 5- to 17-year olds were classified as overweight or obese in 2009 to 2011 (StatsCan, 2012b). Additionally, studies comparing self-reported and measured rates of overweight and obesity consistently show that self-reported rates are lower than actual measured rates. For instance, the measured adult rate of obesity in 2007 was close to 25%, whereas the self-reported rate of obesity was only 17% (PHAC, 2009). This indicates that the actual overweight and obesity rates are largely underestimated by most reports. For an overview of rates of obesity in rural populations, refer to the section *Health Concerns in Rural Settings* found on page 23.



### **The Cost of Obesity**

In Canada, it is estimated that the indirect and direct costs of obesity are approximately \$4.6 billion annually (PHAC & CIHI, 2011). In Ontario, the estimated cost of obesity is \$1.6 billion annually (OSPAPPH, 2007). These costs are based on an analysis of the Canadian Community Health Survey (CCHS), the National Population Health Survey (NPHS) and the Economic Burden of Illness Canada data and takes into account inflation and average earnings over the period (PHAC & CIHI, 2011).

### **Built Environment, Obesity and Physical Activity**

With rapidly rising obesity rates, the negative health outcomes associated with obesity, and the economic repercussions of obesity, it is important to look at interventions to directly address the obesity epidemic (TRB, 2005). There is an important distinction between physical inactivity and obesity which is crucial to note. Physical activity affects only energy expenditure, whereas obesity is due to an energy imbalance, affected by energy consumption *and* energy expenditure (TRB, 2005). Addressing obesity requires addressing both sides of the equation, energy taken in via diet and nutrition, and energy expended via physical activity. Hence, overweight and obesity cannot be attributed only to physical activity levels, but must also address nutrition. The built environment may affect diet and nutrition by facilitating or inhibiting access to fast food outlets and nutritious foods; however, this review will only look at the built environment and its effects on physical activity or inactivity, which may contribute to overweight and obesity. Hence, there is more limited evidence regarding the influence of the built environment on body mass when studies or reviews consider only physical activity. Most studies have found insufficient evidence of the influence of the built environment on weight as they do not account for the influence of diet (Papas, Alberg, Ewing, Helzlsouer, Gary & Klassen, 2007).

Much attention has been placed on the associations between the built environment, physical activity and obesity. Evidence indicates physical activity is a successful weight loss strategy and the relationship between physical activity and obesity is well established (Jackson & Kochtitzky, 2010). For instance, the likelihood of obesity is related to physical inactivity, with 27% of adult obese men considered sedentary or inactive compared to 19.6% of their active male counterparts (StatsCan, 2005). Colman (2001) reports that Canadians who are considered sedentary have a 44% higher rate of obesity than physically active Canadians. It is, therefore, hypothesized that improving physical activity levels with built environment policies and practices will curb the obesity epidemic by directly affecting energy expenditure.

Three recent systematic reviews have been conducted on the relationship between the built environment and obesity/body mass, of which two were of moderate quality (Durand et al., 2011; Papas et al., 2007) and one of strong quality (Feng et al., 2010).

Papas et al. (2007) in summarizing existing empirical research on the relationship between the built environment and obesity found 84% (17/20) of studies examined had a statistically significant positive association between obesity and a built environment characteristic, such as density measures of either recreational facilities or food sources. Only one of the three studies conducted in populations of children found a statistically significant positive association between the built environment and BMI, whereas 16 of the 17 studies conducted with adolescent or adult populations found a statistically significant positive association between BMI and a built environment characteristic (Papas et al.). Similar to the literature on the built environment and physical activity, most studies were of a cross-sectional nature and definitions and measures of the built environment were widely variable (Papas et al.). Additionally, many studies included in this review investigated the influence of physical activity or diet, but rarely addressed both.

Feng et al. (2010) concluded they were unable to pool the effects of the studies due to heterogeneity with the use and definition of built environment. Built environment metrics used in obesity studies included a varied mix of: population and housing density; diversity and spatial arrangement of land use mix; design features of streets such as width and length of sidewalks and traffic calming measures; connectivity features; access to facilities that encourage activity measured in terms of travel time and cost; walkability; and sprawl (Feng et al.). The review concluded that although theoretically the built environment may be a contributing factor to increasing obesity rates, the evidence does not show a clear role of built environment features to obesity with the exception of sprawl and land use mix (Feng et al.).

Durand et al. (2011) found no significant relationship between the built environment and weight status. The authors examined built environment factors related to physical activity and obesity risk by investigating the ten smart growth principles<sup>10</sup> and their possible impacts on physical activity and BMI. The authors found a few significant associations between smart growth principles and physical activity; however, no relationships were found between smart growth principles and body mass (Durand et al.). The authors reported that they did not investigate other factors that would affect body mass, such as eating and nutrition. They further suggested that a measurable difference may have been seen in body mass if longitudinal studies were completed with longer-term follow-up periods greater than one year (Durand et al.).

Lake and Townshend (2006) completed a non-systematic literature review which examined the built environment and its relationship with obesity, as well as food environments. The review concluded that evidence exists to support the relationship between the built environment, obesity and chronic disease. Built environment

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<sup>10</sup> Smart growth principles provide a framework for planning and development. Examples of smart growth principles include mixing land use, creating walkable neighbourhoods, and providing multiple transportation choices (Durand et al., 2011)

characteristics associated with positive health outcomes included land use mix, high residential densities and design features such as the quality of footpaths (Lake & Townshend). A report by CIHI (2006b) also reported that adults who engaged in active transportation were more likely (51%) to be in the normal weight category with a BMI <25 than those who did not (49%) and this was statistically significant ( $p < 0.05$ ). Both reviews support the notion of obesogenic environments (Lake & Townshend, 2006; CIHI, 2006b).

However, two other non-systematic literature reviews found there was insufficient evidence regarding the relationship between the built environment and body weight or BMI. Gebel et al. (2005) summarized existing evidence up until 2005 and determined the relationship between the environment and obesity was unclear, as the relationship may have been mediated by physical activity and a direct causal relationship could not be determined. Similarly, Raine et al. (2008) conducted a literature review on built environment features and weight status and found that 47% of the 89 studies looking at the built environment found no significant association with BMI or obesity. The authors did find a significant association between obesity and intersection density and land use mix. Raine et al. (2008) concluded low intersection density, low residential density and low land use mixes promote obesity and sedentary behaviour; however, there was insufficient evidence and an unclear association between walkability features and availability of facilities and obesity (Raine et al.).

In conclusion, the relationship between the built environment and obesity is more inconclusive. There is much less literature on the relationship between the built environment and obesity related outcomes. Furthermore, much of the literature on the relationship between the built environment and obesity does not take into account both diet and physical activity, which need to be addressed as factors affecting weight status and obesity (Papas et al., 2007). Similar to the literature on the built environment and physical activity, neighbourhood self-selection may confound the relationship between the built environment and obesity, and inconsistent built environment measures makes comparisons across studies difficult and prevents the pooling of research results. Employing longitudinal designs, using consistent built environment measures, studying larger geographic areas, and investigating children and youth who generally do not select their neighbourhoods, may minimize this bias (Feng et al., 2010).

## **Policies and Legislation Related to the Built Environment, Physical Activity and Obesity**

The importance of the built environment has been highlighted in a number of provincial, national and international policies, best practice documents, position statements and legislative documents.

In Ontario, the Ministry of Health and Long-Term Care (MOHLTC) has incorporated the built environment into the revised Ontario Public Health Standards (OPHS). The OPHS outline the core functions of public health and expectations for boards of health, which are responsible for providing public health programs and services in Ontario (MOHLTC, 2008a). The standards are intended to strengthen and enhance public health service delivery. The OPHS are legislated under the authority of the MOHLTC and mandate that boards of health comply with the published guidelines (MOHLTC, 2008a). The importance of the connection between the built environment, healthy sustainable communities, and healthy living has been recognized at the provincial level with the incorporation of the built environment into two of the OPHS policies, the *Chronic Disease Prevention* (CDP) and *Environmental Health Hazard Prevention and Management* protocols (MOHLTC, 2008a). The built environment has been incorporated into these two policies to address chronic disease risk factors, such as obesity and physical inactivity (Bergeron, 2009a). The CDP standard states the following:

The board of health shall work with municipalities to support healthy public policies and the creation or enhancement of supportive environments in recreational settings and the **built environment** regarding the following topics: healthy eating, healthy weights, comprehensive tobacco control, physical activity, alcohol use and exposure to ultraviolet radiation (MOHLTC, 2008a, p.20).

Furthermore, The *Population Health Assessment and Surveillance Protocol* states, “The built environment is an important aspect of the physical environment and is comprised of urban and building design, land use, the transportation system and the infrastructure that support them” (MOHLTC, 2008b, p.10). This legislation requires all Ontario health units to conduct epidemiological analysis of surveillance data on the built environment and collect data on population health including physical environment factors that affect health and chronic disease (Bergeron, 2009a). The Ministry of Health Promotion has created a guidance document titled *Healthy Eating, Physical Activity and Healthy Weights* to assist health units in implementing the above mentioned protocols and to provide advice about the requirements related to Physical Activity and Healthy Weights (Ministry of Health Promotion, 2010)

Recently, an environmental scan was completed in Ontario as part of the Association of Public Health Epidemiologists in Ontario (APHEO) initiative to develop indicators

relevant to the built environment. This scan was completed to identify policies, position statements, briefing documents and legislation in Ontario related to the built environment and physical activity, highlighting provincial government organizations (Bergeron, 2009b). The main provincial organizations addressing the built environment and its influence on physical activity included: the Association for Municipalities in Ontario; Green Communities; the Ontario Healthy Communities Coalition; the Ministry of Agriculture, Food and Rural Affairs; the Ministry of Energy and Infrastructure; the Ministry of Municipal Affairs and Housing (MAH); Ontario Trails Council; the Ontario Professional Planners Institute (OPPI); and the Peel Health Department (Bergeron, 2009b). However, it is beyond the scope of this review to outline the results of the environmental scan and so I refer the reader to Bergeron (2009b) for a complete list of relevant documents.

The OPPI launched a *Healthy Communities Initiative* and released a position paper in 2007 that outlined approaches for collaborating on concrete actions for healthier and more sustainable communities (OPPI, 2007). They have since released a number of position statements and policy papers of interest to planners and professionals working on built environments to improve health outcomes. The most recent document titled *Healthy Communities and Planning for Active Transportation: A Call to Action*, was released in June 2012 (OPPI, 2012). A healthy communities toolkit and handbook was also created by the OPPI, in collaboration with the MAH (MAH & OPPI, 2009).

Lastly, the Provincial Policy Statement, issued under the *Ontario Planning Act*, is the statement of the Province's policies concerning land use planning and provides policy direction for the entire province on matters of provincial interest in land use planning (MAH, 2005). The 2012 draft policy framework provides stronger, clearer direction to support strengthening linkages between land use planning and healthy, active communities, and supports active transportation (MAH, 2005).

Nationally, the PHAC has two publications that discuss the built environment, walkable communities, and health impacts which include: the *Pan-Canadian Healthy Living Strategy* (PHAC, 2005); and the *Report on the State of Public Health in Canada 2008: Addressing Health Inequalities* (PHAC, 2008a). The federal government has an initiative *Curbing Childhood Obesity: A Federal-Provincial-Territorial Framework for Action to Promote Healthy Weights* to address the obesity epidemic (PHAC, 2011).

The Chronic Disease Prevention Alliance of Canada [CDPAC] (2006) completed a national environmental scan to determine which non-governmental organizations and government stakeholders are addressing physical activity and/or obesity and the built environment. They found that the majority of best practice information relates to urban planning and transportation, but health implications are rarely detailed. CDPAC (2006) reported that the Canadian Mortgage and Housing Corporation and the Canadian Institute of Planners address the built environment, planning and transportation best practices, but there is little focus on the relationship to the physical activity or obesity.

The National Collaborating Centre for Healthy Public Policy (NCCHPP) is currently involved with two projects related to the built environment. The first project is centered on traffic calming policies. The second project, Healthy Canada by Design, is a collaborative project with Coalitions Linking Action and Science for Prevention (CLASP) focused on changing the way the built environment is developed in urban Canadian centres by influencing policies that inform it. However, both of these projects are urban based (NCCHPP, 2011).

Internationally, the WHO's *Healthy Cities* program is a long-term international development initiative promoting local interventions and strategies for sustainable development, which has led to healthy urban planning in some municipalities (Barton, 2009). The WHO also developed a *Global Strategy on Diet and Physical Activity* in which the built environment and policy change were emphasized (WHO, 2004). This has resulted in some jurisdictions such as Bogota, Columbia and Agita, Brazil, conducting large scale environmental interventions focusing on physical activity and the built environment of which the results are still unpublished (CMOH, 2004; CDPAC, 2006; Gebel et al., 2005). In the United Kingdom, the National Institute for Health and Clinical Excellence (NICE) (2008) produced an evidence based document titled *Promoting and Creating Built or Natural Environments that Encourage and Support Physical Activity*, which provides seven recommendations on how to improve the built environment to encourage physical activity. This document was developed specifically for health professionals, planners and transport authorities. This document recommends that pedestrians and cyclists be given highest priority when developing street and road infrastructure; that planning and transport authorities plan and provide networks for active transportation; that public spaces are accessible by active transportation means; and that planning applications prioritize people being physically active (NICE).

Lastly, the Government of South Australia, in collaboration with the WHO, developed the *Adelaide Statement on Health in All Policies* to encourage policy-makers at all levels of government to consider health and well-being as a key component when developing and implementing policy in all sectors (Government of South Australia, 2010). The statement promotes intersectoral collaboration and shared governance across and between all levels of government, and assists policy-makers incorporate health and equity into all policies. Specifically the document outlines the need for the infrastructure, planning and transport sectors to consider health impacts when planning for roads, housing and transport, including active transportation such as bicycling and walking opportunities (Government of South Australia, 2010). This document highlights the need for partnership development between public health and planning to ensure that health is considered in all planning decisions.

## **Built Environment and Physical Activity Interventions in Canada**

Four reports were found that have examined interventions and strategies around built environment and physical activity in Ontario and Canada.

An environmental scan by Malatest & Associates Ltd. (2007), prepared for the Simcoe Muskoka District Health Unit, gathered information from health units and community organizations in Ontario to determine what strategies, programs and practices were being used to promote healthy communities. The purpose was to determine the involvement of public health agencies in the area of land use planning and the built environment (Malatest & Associates Ltd.). Twenty-eight health units in Ontario participated, including some of which serve rural populations. Almost 70% of respondents stated their employees were aware of the impacts of land use planning and the built environment on community health. Eighty-percent of health units were involved in communication strategies such as hosting workshops, involvement on advisory committees, and promotional materials; and many health units were involved in research projects, particularly on active transportation (Malatest & Associates Ltd.). Two-thirds stated they were involved in developing policies, programs and initiatives related to land use planning and the built environment such as public education campaigns and working with governments and through policy to increase active transportation (Malatest & Associates Ltd.). The results of this scan demonstrate that health units in Ontario are becoming increasingly involved in building healthy communities by addressing the built environment.

A second document, *Healthy Communities and the Built Environment: Principles and Practices of Multi-Sectoral Collaboration*, examined seven community case studies focused on promising practices and successes of collaboratives working to create healthier communities through community design, land use planning and planning policy development in Ontario (Tucs & Dempster, 2008). A few of these case studies were in more rural areas and included health unit participation.

The third report by Perotta (2011) examined how ten public health units in Ontario, three of which are rural, were working to influence land use and transportation planning processes to help create healthy and sustainable communities. The report outlined interventions and strategies employed to influence land use and transportation planning, the expertise needed to address this, and the tools and research that health unit staff require to be more effective in this field. A need was identified to enhance health unit collaboration, particularly for health units serving rural populations who face unique challenges regarding land use and transportation planning and physical activity (Perotta).

Lastly, the Healthy Living Issue Group of the Pan-Canadian Public Health Network developed a report titled *Bringing health to the planning table: A profile of promising practices in Canada and abroad*. The report examined collaborative approaches to

planning decisions related to the built environment focused on improving health outcomes in 13 Canadian communities.

## **The Rural Context and Health**

Statistics Canada now uses the term ‘population centre’ as opposed to the term ‘urban area’. A population centre is defined as a centre with a minimum population concentration of 1000. There are three categories of population centres: small<sup>11</sup>, medium<sup>12</sup> and large<sup>13</sup> population centres. Areas outside of population centres continue to be defined as rural areas (StatsCan, 2012a). However, there are six definitions of ‘rural’ in Canada that are used for national and provincial level policy analysis (DuPlessis, Beshiri, Bollman & Clemenson, 2002). Bollman & Clemenson (2006) suggest that the choice of a definition will depend on the rural concern being addressed.

There is a paucity of research in rural settings, particularly around effective or potential interventions to address the built environment and the impacts on physical activity. Most studies take place in an urban context. Literature found addressing rural environments contained varied definitions and interpretations of the term ‘rural’. Many papers did not define the term rural. Many others included towns, small cities and farms in the definition of rural, which according to the Statistics Canada definition would include small and medium population centres. Hence, comparing results across studies and reviews is problematic due to the inconsistency in the use of the term rural.

Rural settings have encountered unique land use and development challenges over the past sixty years. Low density growth, the disinvestment in rural areas, an increased dependency on vehicles due to dispersed growth, and the conversion of farmland to suburban land due to urban population growth, have all led to a need to address strategies for healthy community development and sustainability in rural settings (Dalbey, 2008). Rural communities have a lower population density and cover a large geographic area. This is particularly true in Canada, which has one of the lowest population densities in the world with only 3.3 persons per square kilometre (Transport Canada [TC], 2010). Rural areas often have little to no infrastructure for public transit and may have poor or limited transportation infrastructure that supports active transportation and physical activity, such as bike paths or trails (TC, 2010). Rural residents may have to travel further distances for work, school and leisure, which increases the reliance of vehicles due to low residential density, low street connectivity, and single land use (Van Dyck, Cardon, Deforche & De Bourdeaudhuij, 2010). Rural areas also may have less service and access to facilities that promote physical activities, such as parks and recreational facilities. Additionally, the population in these settings is aging and a higher percentage of citizens

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<sup>11</sup> A small population centre has a population between 1,000 and 29,000 (StatsCan, 2012a)

<sup>12</sup> A medium population centre has a population between 30,000 and 99,999 (StatsCan, 2012a).

<sup>13</sup> A large population centre has a population between of 100,000 and over (StatsCan, 2012a).



are over the age of 65 (TC, 2010). Lastly, there are unique health concerns in rural settings including obesity, which will be outlined below.

### **Health Concerns in Rural Settings**

Rural communities have unique health concerns as demonstrated by a few studies investigating chronic disease risk factors and health outcomes. The Gateway Rural Health Research Institute (GRHRI) in Ontario, a community driven rural health research hub, investigates health in three rural regions which include Huron, Perth and Grey-Bruce. This research institute has reported that all three of these rural counties have significantly higher rates of chronic diseases such as CVD, hypertension, and diabetes compared to urban rates. The Ontario average for the percentage of obese adults is 16.8 (PHAC & CIHI, 2011), whereas Grey-Bruce, Huron and Perth are 18.6%, 22.7%, and 21.1% respectively (CCHS, 2005 as cited in GRHIR, n.d).

Numerous studies have investigated the rates of obesity in rural and urban areas in Canada. A cross-sectional study conducted in rural Ontario with elementary students found that the risk of being overweight or obese was at least as high as their urban counterparts, particularly for boys (Galloway, 2006). The study found that 17.7% of students were overweight and 10.9% were obese, both of which exceed the CDC 2000 reference samples (Galloway, 2006). Similar findings have been reported in the United States. Data from the National Health and Nutrition Examination Survey 2003-2004 and 2005-2006 indicate that rural children are significantly more obese than urban children with the rural prevalence of obesity at 21.8% and urban prevalence at 16.9% (McGrath Davis, Bennett, Befort & Nollen, 2011).

The story is similar for youth in Canada. A survey among adolescents in Ontario and Alberta found that among males, a significantly higher proportion were 'overweight' in rural areas compared to their urban counterparts and a significantly higher proportion of rural females were 'obese' compared to their urban counterparts (Plotnikoff, Bercovitz, & Loucaides, 2004). Bruner, Lawson, Pickett, Boyce & Janssen (2008) investigated adolescent prevalence of overweight and obesity by rurality and found that after adjusting for sex, age, SES and geographic region, there was a trend for increasing overweight and obesity as 'rurality' increased. The odds for being overweight were 1.56 x higher for rural as compared to urban adolescents (Bruner et al.). Ismailov & Leatherdale (2010) investigated the prevalence and factors associated with overweight and obesity among 25,000 secondary school students in urban, suburban and rural Canada and found the prevalence of overweight and obesity for females was significantly higher in rural settings. Males were also found to have a greater prevalence of overweight and obesity, although it was not statistically significant (Ismailov & Leatherdale).

Canadian adults living in rural areas are more likely to be obese than urban adults. According to the CCHS, 29% of adults living outside of a census metropolitan area

(CMA)<sup>14</sup> are obese compared to only 20% of those within a CMA (StatsCan, 2006). The data also indicates that as the size of the city increases, the likelihood of being obese decreases (StatsCan, 2006). Within Ontario, the CMOH (2004) reports that the highest rates of overweight and obesity are found in the Huron County, Northwestern, Porcupine, Sudbury and District, and Grey Bruce health unit areas, which are all mainly rural or sparsely populated northern rural/urban mixed jurisdictions.

### Physical Activity in Rural Settings

Physical activity levels, a main determinant of obesity, are also lower in rural areas. National studies in the United States show there are more overweight and obese behaviours among rural adults compared to urban counterparts, such as higher rates of physical inactivity and screen time, as well as structural differences such as more limited resources and fewer facilities for physical activity (McGrath Davis et al., 2011). Only one Canadian study was found that compared rural and urban physical activity levels in youth. This cross-sectional study surveyed four urban and four rural schools in two provinces and found similar activity levels among rural and urban youth (Loucaides, Plotnikoff, & Bercovitz, 2007).

Some research indicates that the *type* of physical activity may vary based on whether the setting is urban or rural. Van Dyck et al. (2010) conducted a study in Belgium comparing rural and urban neighbourhoods and found urban dwellers reported more walking and cycling as a mode of transportation, walked more for recreation, and took more steps per day, as measured by a pedometer than rural participants. Arnadottir, Gunnarsdottir & Lundin-Olsson (2009) conducted a study in Iceland and found urban and rural living may influence physical activity based on type of activity, but that actual total physical activity did not differ. Rural participants engaged in more *work* related physical activity and less *recreational* activity, whereas their urban counterparts engaged in more *leisure time* physical activity (Arnadottir et al.). This was also found by Millward & Spinney (2011) who assessed the degree to which ‘active living’ varied along the rural-urban continuum. They found that inner city participants had higher levels of leisure physical activity and engaged in more active transportation where opportunities were more available than suburban or rural participants. They also found time spent in work related physical activity or chores increased as one moved into the rural setting (Millward & Spinney). These three studies highlight the need to examine definitions of physical activity to ensure that leisure time, work related and transportation related activity are all accounted for, as many studies only examine leisure time or transportation related activity. Few have examined work related activity, which may be more relevant in rural settings.

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<sup>14</sup> A census metropolitan area is a grouping of census subdivisions comprising a large urban area (the "urban core") and those surrounding "urban fringes" and "fringes" with which it is closely integrated. An area must register an urban core population of at least 100,000 at the previous census (StatsCan, 2012a)

There are many hypotheses as to why rural physical activity levels are generally found to be lower, particularly leisure time physical activity. More work related physical activity may lessen the importance of or provide less time to engage in leisure time activity (Arnadottier et al., 2009; CDC, 1998). Additionally, contextual differences in the rural setting may mean that facilities for leisure physical activity are less available and accessible. Facilities, such as community centres, gyms, pools, and trails, may be far away; transportation may be lacking; facilities may be unaffordable, as rural residents are more likely to have lower SES; and climate may be more of a concern (Arnadottier et al., 2009; CDC, 1998; Galloway, 2006). Barriers and unique enabling factors for physical activity that have been reported in rural settings will be discussed in the discussion chapter of this thesis.

### **Built Environment and Physical Activity Interventions in Rural Settings**

Current best practices related to land use, community design and transportation infrastructure are largely based on non-rural areas (Aytur, Satinsky, Evenson & Rodriguez, 2011). Some interventions and strategies have been suggested to address active transportation and improve physical activity rates, specifically in rural communities. For instance, Transport Canada (2010) has developed a website dedicated to rural health concerns which provides solutions for sustainable transportation interventions, including active transportation. Wiggs, Brownson & Baker (2008) recommends recreational trail development in rural settings to improve physical activity levels, as rural dwellers are less likely to use active transportation. The authors noted that the land may be easier to find to develop trails, there are less reported safety concerns on rural trails, trail development is cost-effective, and that trails take less time to develop and encounter fewer development obstacles in the rural setting (Wiggs et al.). Brownson et al. (2000) demonstrated in one study that trail development improved walking rates among women and lower socio-economic groups in rural communities.

Eyler & Vest (2002) suggested building accessible facilities and improving sidewalks in rural towns and communities after conducting focus groups with rural, white women and determining barriers to physical activity. Specifically they suggested paving roads, improving sidewalks, building walking trails and bike paths, providing bike rentals, and building facilities for physical activity, such as a community centre or recreational centre (Eyler & Vest).

A study by Aytur et al. (2011) found that communities which had local pedestrian and cycling plans had higher percentages of workers walking or bicycling to work compared with areas without plans (Spearman's  $\rho = 0.13$ ;  $p < 0.01$ ) and this relationship was the strongest in rural, lower-income communities.

Active transportation plans in rural areas may address improving intersections by including crosswalks and signals; improving street design; and improving the diversity of land use by integrating residential, commercial and park space (Aytur et al., 2011). Aytur

et al. (2011) also examined prevalence and quality of active transportation plans in rural communities and found rural areas were less likely to have plans than urban areas. However, where rural plans existed, they were of a higher quality than those found in urban settings and included strong public participation and implementation elements. This is important as planning literature suggests that higher quality plans are more likely to be implemented. The authors also found public health practitioners were less involved in rural planning processes and suggested that the public health sector increase their involvement in rural settings.

Lastly, Dalbey (2008) suggested smart growth strategies that could be applied in rural areas such as: preserving open spaces; incorporating mixed land use development; and developing compact, walkable communities. Dalbey (2008) suggests a three-pronged strategy to development patterns in rural areas to ensure that rural communities get the development patterns they want. This includes: helping existing places to thrive (investments in downtowns, infrastructure, and in places people value); creating new places (vibrant neighbourhoods and communities that people don't want to leave); and protecting the rural landscape that communities value (maintain the rural economy and environment by preserving natural areas and working lands).

Further health unit and community specific rural examples were outlined in reports mentioned in the 'Approaches to the Built Environment and Physical Activity' section of this chapter.

### **Planning and Public Health Collaboration**

Historically, public health practitioners and planners collaborated in the 19<sup>th</sup> century to address public health concerns such as infectious diseases associated with overcrowding and poor living conditions (Frank & Engelke, 2005; TRB, 2005). Urban and regional planning emerged once the relationships between planning and land use and public health were established (Barton, 2009; Frank & Engelke, 2005; TRB, 2005). The land use planning and development that resulted from the 19<sup>th</sup> century, such as low density development, the separation of residential, commercial and industrial land uses, and suburban sprawl, are now thought to contribute to a more car dependent, sedentary lifestyle, which is a risk factor for many chronic illnesses (TRB, 2005).

Chronic disease and associated risk factors, including physical inactivity and obesity, have renewed public health practitioners interest in the built environment as a determinant of health and as a mechanism to directly affect chronic disease risk factors (Barton, 2009; Frank & Engelke, 2005; Williams & Wright, 2007). As Chris Jackson, the Director of the CDC's National Center for Environmental Health states, "Land-use decisions are just as much public health decisions as are decisions about food preparation...we must be alert to the health benefits that can result when people live and work in accessible, safe, well-designed, thoughtful structures and landscapes" (Jackson & Kockitzky, 2010, pg.3). Many researchers and policy makers have called on public

health officials to reconnect and work with land-use planners, builders and engineers to address the built environment, particularly around physical activity and active communities, to ensure that health impacts are considered when planning and making decisions about the built environment (CMOH, 2004; Frank & Engelke, 2005; Jackson & Kochtitzky, 2010; Renalds et al., 2010; Williams & Wright, 2007).

Recommendations have also been made specifically for public health practitioners in rural areas. Gangeness (2009) recommended that public health nurses (PHNs) serving rural communities should conduct needs assessments and consider the built environment when focusing on health promotion and prevention efforts as well as participate in developing healthy public policy to improve physical activity rates in rural areas (Gangeness).

### **Limitations and Gaps in the Literature**

Many limitations and gaps that exist within the current body of literature, which have been noted throughout this review, but will be highlighted here.

Much of the empirical evidence to date examining the relationship between the built environment and physical activity and/or obesity is based on cross sectional designs, which makes causality and the direction of the relationship between the built environment, physical activity and obesity difficult to determine (Papas et al., 2007; Renalds et al., 2010). Causal relationships have not yet been established to indisputably claim that certain built environment interventions would increase physical activity or affect weight status (Dunn, 2008; TRB, 2005). Prospective, longitudinal studies are necessary to address causality which measure population health outcomes in years, not weeks or months and to further determine relationships (Brownson et al., 2006; Frost et al., 2010; TRB, 2005; Renalds et al., 2010). Additionally, there is insufficient evidence to suggest which policies and interventions that may increase or encourage physical activity will have the greatest impact on activity levels and accompanying health outcomes. Interventions and their outcomes are likely to differ based on the population, the types of physical activity, and the setting and context. There are complex interactions between humans and the environment which need to be considered, including residential self-selection, socio-cultural variables, and demographic characteristics such as age and gender, when examining this relationship (AHS, 2008; Dunn, 2008; TRB, 2005). The impact and complexity of context on specific interventions needs to be addressed.

The lack of standardized and consistent definitions and metrics used to measure the built environment, physical activity, obesity and population health also poses great challenges to researchers (TRB, 2005). For instance, some studies measure physical activity levels objectively with pedometers, while others measure activity levels based on self-report. This may contribute to the lack of significant relationships found in systematic reviews, as diverse and imprecise measurements prevent definitive conclusions (Van Cauwenberg et al., 2011). The inconsistent use of measures and variety of variables used also prevents

the pooling of results and meta-analyses. It has been suggested further studies be designed with similar metrics, scales, and data sources (Feng et al., 2010). Another limitation is defining and determining the geographic scale to which physical activity is most strongly correlated (Heath et al., 2006) and the type of physical activity (leisure, transportation, work related) being measured (Arnadottier et al., 2009; Millward & Spinney, 2011). The lack of local level or neighbourhood data has also been mentioned as limiting research in this area, as data collection, priority setting and program evaluation are made more difficult (Brownson et al., 2006; Papas et al., 2007).

Lastly, most research on the built environment and physical activity has been conducted in urban settings, which may not be generalizable to rural settings (Renalds et al., 2010). There is a paucity of research measuring and collecting data on the built environment and interventions to encourage physical activity in rural settings (Bergeron, 2009a; Gangeness, 2009; Renalds et al., 2010). The rural research conducted used a variety of definitions of rural, making comparisons and generalizations problematic. The lack of rural research is significant as anywhere from one fifth to one third of Canadians and Ontarians reside in rural communities (Bollman & Clemenson, 2006; Health Canada, 2008).

## **Chapter Summary**

This chapter summarized the existing literature on the impacts of the built environment on physical activity and obesity; policies, legislation and best practice information; rural specific concerns; the relevance to public health; and limitations and gaps in the literature related to the built environment and physical activity.

Much has been written about the increased prevalence of chronic diseases and associated risk factors, such as physical inactivity and obesity, and the potential for these risk factors to be associated with the built environment. Building a supportive built environment and modifying the existing environment through infrastructure and supportive policies are being investigated as mechanisms to address these risk factors. This is of particular relevance in rural communities where the prevalence of these risk factors is higher than in more urban areas. Yet relatively little has been found in the existing body of literature on the impacts the built environment can have in rural settings.

Creating healthy public policies and enhancing the built environment related to physical activity is now legislated in the OPHS. However, it is largely unknown to what degree health units in Ontario are addressing the built environment as it relates to physical activity, particularly in rural settings. Hence, the current study was completed to investigate rural public health units in Ontario to determine what influences their staff to engage in built environment interventions to promote physical activity, to what extent they are employing interventions, and barriers and enablers that they have encountered with this work.

## **Chapter 3: RESEARCH QUESTIONS, ETHICAL CONSIDERATIONS AND METHODOLOGY**

### **Research Questions**

The objective of this study was to explore how rural health units in Ontario are integrating the built environment into public health interventions related to physical activity for the purposes of fostering healthy and sustainable communities.

Research questions included:

1. How are rural health units in Ontario interpreting and integrating the built environment into public health interventions related to physical activity?
2. What specific interventions have or are being implemented that address the built environment specifically related to physical activity?
3. What barriers and/or enabling structures exist when addressing the built environment related to physical activity?
4. What would assist staff in rural health units in their work related to enhancing the built environment to promote physical activity?

### **Research Approach**

This exploratory research study employed a descriptive qualitative approach. Qualitative research involves developing a detailed understanding of a phenomenon or issue by exploring a subject in a non-experimental, natural setting (Creswell, 2007; Magilvy & Thomas, 2009). Numerous studies have looked quantitatively at the relationship between the built environment and physical activity; however, little research has been conducted on built environment and physical activity interventions in Ontario that are context specific and address rural settings. This research provided qualitative, contextually rich information at a local level that may inform the design and implementation of further built environment and physical activity interventions by Ontario's rural health units.

Qualitative descriptive studies aim to provide a thorough summary of an event or phenomenon in everyday language and are the method of choice when straight descriptions of phenomenon are desired (Sandelowski, 2000). A qualitative descriptive approach is particularly well suited for investigating areas where relatively little research has been done (Pope & Mays, 1995). Sandelowski (2000) suggests that qualitative descriptive designs are “especially amendable to obtaining straight and largely unadorned answers to questions of special relevance to practitioners and policy-makers’ (p.337). Hence, the current study gathered perspectives from public health practitioners and managers working on built environment interventions to address physical activity. The results can inform other public health practitioners, decision-makers, and policy-makers working on similar initiatives.

Fundamental qualitative description is a methodology that attempts to minimize interpretation of the data by attempting to acknowledge and not take into account any preconceived ideas regarding the issue (Sandelowski, 2000). Hence, the researcher attempted to stay as close to the data as possible and minimized interpretation of the participant's ideas by portraying the voices of participants through the use of verbatim quotations. Fundamental qualitative description entails low inference interpretation of the data rendering it likely that most researchers would agree on the description of the phenomenon or the facts of the event (Sandelowski, 2000). To ensure participants and other researchers would agree with the presented description and results, the investigator sought descriptive validity by checking the researcher's interpretations with participants and through peer review (Baxter & Eyles, 1997; Sandelowski, 2000). The researcher acknowledges it is impossible to be interpretation free when describing the problem and results; however, the researcher attempted to maintain low inference by means of reflexivity, achieved through journaling and memoing throughout the study. The researcher was the instrument for data collection, denoting the investigator collected all of the data (Creswell, 2007). Recognizing the researcher was the instrument of data collection and the affect this could have on participant responses and researcher interpretation, reflexivity was ongoing throughout the study. The researcher acknowledged and reflected on her experience as a PHN in a rural community for three and a half years and her local municipal involvement in built environment initiatives by journaling and reflecting, to minimize the influence on the data collected and to minimize inferences. The researcher was reflective about the possible impact her past work experience may have had on the results, particularly when she piloted the interview guide at her previous place of employment.

When employing fundamental qualitative description, the researcher does not generally utilize a conceptual or philosophical framework to describe an event (Sandelowski, 2000). Qualitative descriptive designs are particularly suitable for minimally theorized research questions, meaning investigators are not impeded by theoretical or philosophical commitments. Qualitative descriptive studies tend to be based on naturalistic inquiry, where the problem or issue is studied in its natural state (Sandelowski, 2000). True to the tenets of naturalistic inquiry, this study did not employ a conceptual framework; variables were not selected a priori; and no commitment was made to any one theoretical view.

The researcher also recognized the importance of the subjective meanings and varying perspectives of participants. The multitude of perspectives gathered demonstrates the significance of the existence of multiple realities and truths. By using fundamental qualitative description as the methodology for this study, rich descriptions and perceptions were gathered from a variety of public health staff on what interventions were being employed in their health units to address the built environment and physical activity, what contextual factors were affecting their efforts, and what they felt would improve their ability to address the built environment within their health unit.



## **Ethics Approval**

Ethics approval was received from the Faculty of Health Sciences Research Ethics Board in March 2012 prior to the commencement of the study. Ethics approval was also sought from each participating health unit's internal review board when required. In accordance with the Tri-Council Policy Statement, the key ethical concerns addressed with this qualitative research were consent, confidentiality, the conduct of research, and the relationship between participant and researcher (CIHR, NSERC, & SSHRC, 2010). The process of written, informed consent was used for each participating health unit and participant. The consent outlined the purpose of the inquiry and the methods used, who the data was being collected for, what types of questions would be asked of participants, measures taken to protect health unit and participant confidentiality, expected duration of the study and time commitment, a statement about the potential benefits and risks to participants, and the signature of the participant and researcher (CIHR, NSERC, & SSHRC, 2010). Participants were also made aware they were able to withdraw from the study at any time without any repercussions and that they could request that any or all of their data to be excluded from the study up until one month following the interview. Permission was also sought to audiotape and transcribe the interviews. The consent also outlined how results of the study would be shared and disseminated to participating individuals and health units.

To protect participant anonymity, unique identifiers were used and participant names removed from transcripts. Participants were made aware that due to the small number of health units and participants involved, it would be difficult to maintain confidentiality, particularly based on specific references that they may have made.

## **Methodology**

### **Sampling Strategy**

This study employed two stage purposeful sampling. The first stage involved sampling all health units in Ontario which serve a predominately rural population, referred to as rural health units. There are 36 health units in Ontario, 13 of which are considered 'rural northern' or 'mainly rural' based on Statistics Canada's 2007 peer groups (MOHLTC, 2009). Peer groups are clusters of Ontario health units with similar social and economic factors (StatsCan, 2012a). All thirteen 'rural northern' or 'mainly rural' health units were invited to participate in the current research study. Peer groups with urban/rural mixes were not sampled. Sampling all of the available rural health units provided the researcher with the total sample.

The second stage of sampling entailed identifying participants within consenting health units. The sample was purposefully selected and included key informants from each site identified as the most knowledgeable in the subject area (Magilvy & Thomas, 2009). Purposeful selection ensured detailed, information-rich perspectives were gained from the participants and contributed to a deeper understanding of the issue (Kuzel, 1999; Patton,

2002). This study used criterion sampling, a fixed sampling strategy, which is useful for small, exploratory studies (Kuzel, 1999). Criterion sampling samples data sources that meet predetermined criteria of importance (Patton, 2002). The inclusion criterion for this study were that participants were public health practitioners or managers identified by the health unit as those most knowledgeable about program planning, implementation, and policy development in relation to physical activity and the built environment.

Sample sizes in qualitative inquiry are typically small, allowing for in-depth analysis of a topic or issue (Patton, 2002). Although there is no set number on the size, 5-8 data sources are often considered sufficient for homogeneous samples (Kuzel, 1999). The goal for this study was to recruit and interview approximately 8-13 public health practitioners or managers. This sample size was deemed small enough to yield deep insight into the physical activity programming and challenges or barriers health units face in rural settings related to the built environment as well as achieve data saturation.

### **Participant Recruitment**

Health unit recruitment began in March 2012 after REB ethics approval was received. An initial email was sent to each health unit's Medical Officer of Health (MOH) or Director requesting their health unit staff participate in the study. The email outlined the purpose of the study; methods involved; duration of the study; expected time commitment; and included a consent form (see Appendix C). The email requested that a staff member most knowledgeable and involved in physical activity and built environment initiatives at the health unit be identified and email addresses provided. A follow-up reminder e-mail was sent two weeks after the initial e-mail. A third attempt was made to contact the health unit by phone if no response had been received.

Once a response was received from the MOH, the MOH's assistant on behalf of the MOH, or Director, a recruitment e-mail was sent to the staff members within the health unit who were identified as having in-depth knowledge about the research topic (see Appendix D). Information and a letter of consent were sent to participants via e-mail which outlined the study and inclusion criteria (see Appendix E for a draft sample of consent). Interested individuals completed the consent and returned it to the primary investigator. In two instances, two staff members were identified by the MOH or Director; therefore, both participants were included at the health unit's request.

### **Data Collection**

The investigator contacted consenting participants and arranged interview times convenient for them. Participants completed a demographic questionnaire prior to the interview (see Appendix F). Telephone interviews were conducted due to logistical issues such as traveling distances to some health units, weather, and funding. Each interview was approximately 60-90 minutes in length. Interview questions were pilot tested at the

health unit where the researcher was previously employed. Results were included in the final analysis, as few changes were made to the interview guide.

Interviews are often used in qualitative descriptive research to gain insight into phenomenon that would be difficult to obtain by an alternative method (Partington, 2001; Sandelowski, 2000). The researcher used a semi-structured interview guide which provided a framework for the interviews and ensured all participants were taken through the same set of questions and prompts. This ensured consistency across interviews, which is useful in multi-site studies such as this one (Baxter & Eyles, 1997; Patton, 2002) (see Appendix G). A predetermined set of questions was used, but the investigator still had the freedom to explore participant responses and follow new leads. As Patton (2002) notes, standardized questions are helpful for neophyte researchers with minimal interviewing skills, for time constrained interviews, and aid data analysis as one can locate participant responses to each question with ease (Patton). Participants were sent the interview guide in advance to better prepare and understand the nature of the questions asked. The researcher established her role as the interviewer and gave a brief background of her research and experience at the outset of the interview to aid with rapport building, to ensure the participant was aware they did not have to answer any questions for which they were unaware or are made uncomfortable, and to establish a non-judgemental relationship (Partington, 2001). Permission was also sought from each participant to be contacted by the investigator after the interview for clarification if needed and member checking, which will be outlined in the section on rigour.

With the exception of one interview, all interviews were audio-taped with a high quality digital recorder with permission of the participants for ease of transcription (Partington, 2001). One participant declined to have the interview recorded. The researcher took hand written notes during this interview and the participant sent their drafted responses via email after the interview. The researcher made notes after each interview noting insights and reflections (Patton, 2002). These notes served as a back-up in the event of technological failure with the audio-recording (Creswell, 2007). Data collection and analysis were done concurrently, which enabled the researcher to think about collected data while modifying data collection strategies to garner further insights and improve the data (Miles & Huberman, 1994). Data saturation was achieved, as no new themes or concepts emerged as data collection concluded.

### **Data Management and Analysis**

As the interviews were completed, transcripts were transcribed verbatim by the researcher and a paid transcriptionist. Transcripts transcribed by a transcriptionist were reviewed by the researcher to ensure accuracy. The interviews were stripped of identifying information to protect the confidentiality of participants and only available to the primary investigator. The data analyzed was strictly the text data or the narratives from the interviews themselves.

Qualitative content analysis was the approach used to analyze the data gathered. This is the approach of choice when conducting qualitative descriptive studies, as it requires analyzing and summarizing verbal data with the least amount of interpretation by the researcher as possible (Sandelowski, 2000). Multiple preliminary readings of the transcripts were completed, examining and reflecting on the data to gain a general sense of the data gathered (Miles & Huberman, 1994). Throughout this data analysis process, the researcher looked for patterns or categories to emerge from the data. This is known as inductive data analysis in qualitative inquiry (Creswell, 2007; Magilvy & Thomas, 2009; Pope & Mays, 1995). Hence, the data analysis was inductive in nature as themes were not established a priori and were built from the bottom up as they emerged.

Using the qualitative software program NVivo9, an initial coding structure was constructed as patterns and themes were identified by the researcher (Miles & Huberman, 1994; Pope & Mays, 1995). True to qualitative content analysis, the codes were derived from the data themselves (Sandelowski, 2000). The researcher attempted to stay as close to the data as possible, with as minimal interpretation as possible. To achieve this, the researcher constructed the initial coding structure using direct words and sentences from the transcripts themselves (Miles & Huberman, 1994). The data was then collapsed into larger categories or ‘chunks’, moving towards broader generalizations (Miles & Huberman, 1994; Pope & Mays, 1995). The broader generalizations and themes developed aided in the summarizing and the answering of the primary research questions. Once broad generalizations were developed, member checking was completed to ensure descriptive validity. Member checking involved sending summarized results in tables to consenting participants to ensure summaries accurately reflected their experiences and thoughts. Feedback provided by participants was positive and validated the themes constructed by the researcher.

### **Strategies to Ensure Rigour**

Rigour or the degree of trustworthiness within qualitative inquiry was determined using Lincoln & Guba’s (1985) evaluation framework which includes credibility, transferability, dependability and confirmability.

Credibility is deemed one of the most important principles for assessing trustworthiness (Baxter & Eyles, 1997). Credibility is the degree to which participants would recognize the representation of the experience as their own or those who have not experienced it would understand it based on the researcher’s description (Lincoln & Guba, 1985). This was attained through purposeful sampling, researcher subjectivity and reflexivity, and triangulation. Acknowledging researcher subjectivity enhances credibility by outlining how the researcher is situated in the study, how the researcher relates to and influences participants and their responses, and by documenting decisions made throughout the study (Baxter & Eyles, 1997; Law & MacDermid, 2008). The researcher achieved this subjectivity by journaling and memoing throughout the duration of the study. Triangulation was achieved through peer debriefing and member checking, both of which

are methods to reduce systemic bias (Law & MacDermid, 2008). Peer debriefing entailed the researcher sharing data, the initial coding structure, and results with the researcher's thesis supervisor and committee to ensure information was not being misinterpreted by the primary investigator. Member checking involved verifying key themes that emerged from the data by sending summaries to all consenting participants to check the accuracy of the researcher's interpretations of the data (Law & MacDermid, 2008).

Transferability is the degree to which the findings are applicable to settings or situations outside of the study (Lincoln & Guba, 1985). The researcher attempted to provide detailed information on the experiences of participants and the general context of the health units, so readers could determine if the results would be applicable to their own setting or health unit.

Dependability can refer to the plausibility of accounts or the consistency between the data and the findings (Baxter & Eyles, 1997; Law & MacDermid, 2008). The researcher maintained an audit trail by maintaining multiple versions of the NVivo file and by memoing decisions made throughout the study. The thesis supervisor and primary researcher each independently coded two transcripts to ensure consistency and increase dependability. Peer debriefing with the thesis committee also strengthened the dependability of the study, as the committee reviewed a few transcripts and the initial coding scheme. The use of standardized interview questions and employing only one interviewer further enhanced consistency and strengthened the trustworthiness of the study (Baxter & Eyles, 1997; Pope & Mays, 1995).

Confirmability is the degree to which findings are based on the participants', not the researcher's biases, motivations or interests (Lincoln & Guba, 1985). Hence, the researcher maintained an audit trail which included note taking on all study design, data collection and analysis decisions including coding decisions, noting how data was collapsed and chunked, and how the researcher moved from an empirical to a conceptual level (Lincoln & Guba, 1985; Baxter & Eyles, 1997). The researcher also journaled any biases and interests that arose, as this may have influenced the interpretations of the data (Baxter & Eyles, 1997).

## **Chapter 4: FINDINGS**

This chapter presents the research findings using a descriptive qualitative approach. As discussed in the previous chapter, responses were gathered from semi-structured interviews with public health staff deemed to be the most knowledgeable about built environment interventions related to physical activity within their rural health units. The interview questions posed aimed to elicit answers regarding what types of interventions health units were engaging with regards to the built environment and physical activity, and barriers and enablers to these interventions. The full interview guide can be found in Appendix G. This chapter commences with a broad overview of the health units and respondents who participated in the study and the characteristics of the different populations served by the health units. A summary will then be provided on the participant's interpretation of the built environment and its effect on physical activity and population health. Following this, major themes that emerged from the data will be presented regarding the types of interventions that health units were employing and the impacts and evaluations of these interventions. Key themes related to barriers and enablers to interventions will then be discussed. Lastly, the chapter will conclude with lessons learned from the process of developing and implementing interventions and strategies for moving forward with work in this area. The analysis will provide a foundation for which recommendations may be made to address the built environment related to physical activity from a rural health unit perspective.

### **Participating Health Units and Respondent Background**

#### **Characteristics of Participating Health Units**

There are currently 36 health units in Ontario. Key informants from thirteen health units who serve large rural populations were recruited, of which twelve ( $n=12$ ) responded and participated for a 92% response rate. Each geographic region was represented including: Northwest Ontario, Northeast Ontario, Eastern Ontario, Central West and Central East Ontario, and Southwest Ontario. All of them serve a large rural population as defined by Statistics Canada's 2007 Peer Groupings "Mainly Rural" and "Rural Northern Regions".

#### **Characteristics of the Participants**

Two health units requested to have two participants interviewed to gain a broader perspective of the interventions offered by their health unit for a total sample of 14 interviewees. Based on the results of the demographic survey, three participants were managers and the remainder reported having a variety of functions which included: education; health promotion; policy development and analysis; program lead; and front line staff/direct service provider. Of the total respondents, seven (50%) were health promoters, four (29%) were public health nurses, and three (21%) were managers.

During the interviews, participants described being engaged in a variety of work activities related to the built environment and physical activity. Two major themes emerged to explain ‘roles’ of respondents. The majority ( $n=9$ ) discussed activities related to health promotion and education, as well as building partnerships, coalitions and networks. Health promotion activities focused mainly on raising awareness and promoting safe, accessible active communities that were active transportation friendly, such as walkable and bikeable communities. In rural settings this included focusing on the connectivity of towns and trails, and promoting existing active transportation infrastructure such as trails and roads with paved shoulders.

Building partnerships, coalitions and networks was the second major theme depicting the primary role of respondents. This entailed building relationships and working with community and municipal partners, facilitating linkages between community partners by creating opportunities for collaboration, and participating on committees and networks related to the built environment and/or physical activity.

Many respondents indicated their main roles included community development activities, such as engaging and mobilizing the community and coordinating community assessments, and program planning, implementation and evaluation of initiatives to improve the built environment. Consultation, leadership and coordination roles, such as program lead or coordinator for all built environment work, were also discussed.

Additional roles outlined by participants included policy development and implementation activities, advocating for healthy public policy and community infrastructure changes, and capacity building with partners in the community with resource dissemination, educational sessions and providing learning opportunities for learning with partners.

### **Organizational Structure**

All health units identified varying governing structures and internal organizational structures. Organizations were described as serving or being a department of a single county, two counties or districts, or three counties or districts. These were labeled upper tier governments by many respondents. Participants also noted that they worked with anywhere from 2 to 24 lower tier governments, such cities, towns, municipalities and townships.

### **Program Involvement and Collaboration**

Each organization referred to their program areas and divisions slightly differently; however, all ( $n=12$ ) participating health units identified that work on built environment initiatives fell predominantly under the following divisions: Health Promotion; Chronic Disease and Injury Prevention; Healthy Lifestyles; and/or Healthy Community programming. Program areas that addressed the built environment included: physical

activity promotion; injury prevention; healthy communities; community health; sun safety; food and nutrition (healthy eating, food access); school health; workplace health; family health and Healthy Babies Healthy Children; the youth engagement strategy; and tobacco. Many health units ( $n=10$ ) identified that Health Protection, Environmental Health and/or the Health Inspection program division were also involved in built environment initiatives, addressing health hazards, water and air quality, sewer/sewage and septic locations, energy conservation and the preservation of green space and the natural environment. All participants with one exception ( $n=13$ ) worked in Health Promotion, Chronic Disease and Injury Prevention or Healthy Lifestyles or Healthy Communities Development programs. One respondent worked in Environmental Health programming.

More than half respondents reported formal collaboration on built environment interventions between program areas within one division. For example, collaboration was noted to be more formal within program areas such as physical activity, injury prevention, school health and nutrition within the CDP or Health Promotion divisions. Collaborative structures to address the built environment included: program staff cross-over; cross service committees; and built environment working groups. Some of these structures were specific to physical activity initiatives, whereas others more broadly addressed building healthy communities. Many committees and working groups were multidisciplinary, and across program and departments. Collaborative processes included communication mechanisms to enhance program and departmental collaboration and included formal meeting arrangements with team leaders, program leads or departmental managers regarding built environment initiatives.

A few health units reported no or minimal collaboration between major program divisions such as those typically referred to as health promotion, CDP, healthy lifestyles, healthy communities and those referred to as environmental health, health protection, and healthy environments. Although they sometimes shared learning opportunities or were aware of each other's activities because of the small size of the health unit, they did not collaborate on built environment initiatives. A few organizations noted they were hoping for or were moving towards increased program collaboration.

Public health staff working on all built environment initiatives represented a variety of disciplines, mainly public health nurses (PHNs), health promoters, public health inspectors, registered dietitians and nutritionists. Two respondents noted their health units did not employ PHNs to work in the area of the built environment; however, one respondent noted this was by chance and not an organizational policy. Similarly, all but two organizations employed health promoters or health promotion specialists for these initiatives. Additional disciplines involved in built environment activities included environmental technicians, hydrogeologists, media consultants, community developers, epidemiologists, program evaluation consultants and health information specialists.



### **Characteristics of the Community and Population Served by Health Units**

Almost all respondents described their health unit service area as predominantly rural or encompassing vast rural areas. Many respondents also described the geographic area served being very large in land mass with large distances between destinations or points of interest. All health units served populations with less than 200,000 people with the exception of one health unit that contained one large urban population centre. A few health units ( $n=5$ ) served medium population centres, but over half ( $n=7$ ) did not contain any large or urban population centres. Many respondents noted smaller towns, villages and hamlets within their regions.

A number of population characteristics were also mentioned, particularly related to seasonal population changes. One third described significant population growth due to seasonal migrant workers, seasonal employment, cottagers and tourism. Many health units described their regions as agricultural communities, where farming was noted as a significant form of employment and industry. Tourism, manufacturing, healthcare, and mining were also noted to be important to some local economies.

Many respondents reported their population was mostly Caucasian or of European descent, with few visible minorities and a lack of cultural diversity. A few discussed specific populations of cultural or religious affiliation, including Amish, Mennonite and Low-German speaking Mennonite. A small number of health units mentioned serving larger Aboriginal populations. Language was mentioned by a few respondents, primarily noting larger Francophone populations.

Age of the population in communities was also mentioned repeatedly. Over half of the respondents stated they served an aging, older population. SES was also highlighted as an important demographic characteristic of some regions, noting high rates of poverty, pockets of low SES and income levels below the provincial average. A couple of respondents mentioned a lower SES or economic disadvantage as a characteristic of rural areas. One respondent noted, “I would say that our rural communities—...more people are disadvantaged economically, lower socio-economic status, lower education in some of the rural communities.” [Participant 5]

### **Interpretation of the Built Environment and the Impact on Health**

Participants were asked to describe their understanding of the term ‘built environment’. Most respondents interpreted the built environment as structures, systems or places built or modified by humans, which included the design of streets, roads, buildings and communities; land use decisions, such as land use mix; and/or transportation infrastructure.

Respondents overwhelming felt the built environment impacted population health by affecting chronic disease risk factors, such as physical activity levels and access to

nutritious food. Some also felt the built environment affected one's safety and could address injury prevention. Others noted it could affect one's sense of community and social cohesion, which was thought to positively affect mental health. Additionally, many respondents indicated ecosystem impacts, such as air and water quality and protection and global warming affect the health of people at a population level.

Respondents described both the positive and the negative impacts they believed the built environment could have on physical activity levels. Physical activity was felt to positively be affected by the built environment if it was considered safe, accessible, aesthetically pleasing, and an easy option. Many respondents felt if the infrastructure was made available, such as connected and continuous sidewalks and accessible paths and trails, then physical activity levels would be improved. Similarly, many respondents felt there were negative impacts on physical activity levels if more barriers than opportunities existed to be active, such as neighbourhoods not conducive to walking, cycling or which lack recreational facilities and playgrounds. As noted by one respondent:

I think the built environment and what it looks like and how it's shaped can have positive impacts on physical activity if it is accessible and safe and available for all. It can have a negative impact if you live in an environment that is not conducive to walking or cycling, where there are more barriers than opportunities to be active. [Participant 3]

## **Interventions**

Participants were asked to describe how their health unit was integrating the built environment into public health interventions to address physical activity levels in their community. 'Health interventions' was defined by the author as public health activities, interventions, initiatives, program planning and delivery, and policies related to the built environment. A number of major themes were identified related to interventions that health unit staff were undertaking with regards to the built environment and physical activity. These were: engaging in policy work activities at a municipal or regional level; building and working with community partners, committees and coalitions; gathering and providing evidence; hosting knowledge sharing opportunities; program development and implementation; social marketing, information sharing and raising awareness; and resource development and dissemination. Findings are presented in Table 1 which summarizes the major themes related to the types of interventions that organizations were employing. Each major theme category includes subthemes, which outline the types of activities that are captured within the main theme. A brief description is also included of each subtheme. Differences were also examined between health units based on rurality,

determined based on: population density<sup>15</sup> of the population served; and the percentage of the population that lived in rural areas<sup>16</sup>. The parameters used to compare health units included: health units that served a population density less than 20 people per square kilometre; and those that served a population density greater than 20 people per square kilometre. The rural area population parameters were health units that served a rural population greater than 50% of the population and those that had less than 50% of the population living in rural areas. Variances based on the degree of rurality will only be discussed where differences were found.

**Table 1*****Summary of Themes and Subthemes Related to Interventions***

<b>Major Themes</b>	<b>Subthemes</b>	<b>Description of subthemes</b>
Engagement with Policy Work at a County and/or Municipal level	Input into official plans	<ul style="list-style-type: none"> <li>• Review and comment on official plans</li> <li>• Development of policy statements for official plans</li> </ul>
	Input into master plans	<ul style="list-style-type: none"> <li>• Input into transportation master plans</li> <li>• Input into AT, cycling, pedestrian, parks, trails, and recreation master plans</li> </ul>
	Input on specific county/city/municipal policies	<ul style="list-style-type: none"> <li>• Input on road/sidewalk standards policy</li> <li>• Influence/develop policies related to walkability, bikeability, AT, access to recreational opportunities</li> </ul>
	Input on individual planning applications	<ul style="list-style-type: none"> <li>• Input on sidewalks, walkability, design, accessibility</li> </ul>
Building and Working with Community Partners, Committees and Coalitions	Involvement with community coalitions or committees	<ul style="list-style-type: none"> <li>• Participation on trails, AT, cycling, master plan, healthy communities committees/ coalitions</li> <li>• Participation in Healthy Communities Partnership</li> </ul>
	A resource for community groups or committees	<ul style="list-style-type: none"> <li>• Leadership role (coordinator, co-chair, advisory role)</li> <li>• Research and evaluation (provides</li> </ul>

<sup>15</sup> Population density is the number of persons per square kilometre. The calculation for population density is total population divided by land area. Land area is the area in square kilometres of the land-based portions of standard geographic areas (StatsCan, 2012a).

<sup>16</sup> Rural area population percentage is the percentage of the population that does not live in a large, medium or small population centre (StatsCan, 2012a).

<b>Major Themes</b>	<b>Subthemes</b>	<b>Description of subthemes</b>
		evidence, best practice information, health status information) <ul style="list-style-type: none"> <li>• Resource support, management and coordination (Assists with funding proposals and provides grant money)</li> <li>• Building capacity (Provides training to partners, builds linkages between partners)</li> </ul>
	Participation in a committee of Council	<ul style="list-style-type: none"> <li>• Transportation committees</li> </ul>
	Internal health unit committees	<ul style="list-style-type: none"> <li>• To address the BE, PA, nutrition and healthy communities</li> </ul>
	Participation in networks	<ul style="list-style-type: none"> <li>• Regional and provincial BE and PA networks</li> </ul>
Gathering and Providing Evidence	Research or data collection on BE characteristics	<ul style="list-style-type: none"> <li>• Qualitative data collection regarding community perceptions and attitudes regarding the BE and AT values, needs, barriers and concerns</li> <li>• Walkability and bikeability assessments</li> <li>• Surveys, open forums and mapping of PA and recreational opportunities and recreational facility access</li> </ul>
	Research or data collection on PA levels or modes of AT	<ul style="list-style-type: none"> <li>• PA levels, type of activity, frequency and duration</li> </ul>
Hosting Knowledge Sharing Opportunities	For the community, municipal decision-makers and public health staff	<ul style="list-style-type: none"> <li>• Participatory walkability and cycling workshops, AT workshops, healthy cities workshops</li> </ul>
Program Development and Implementation	Events held in the community	<ul style="list-style-type: none"> <li>• Car Free or Open Street events</li> <li>• Events to highlight existing AT infrastructure</li> <li>• Biking events (i.e. Bike to Work Week)</li> </ul>
	Comprehensive community based programs	<ul style="list-style-type: none"> <li>• Share the Road program</li> <li>• Ontario Communities walkON initiative</li> <li>• School Travel Planning Projects</li> </ul>
Social Marketing, Information	Awareness raising and information sharing:	<ul style="list-style-type: none"> <li>• Presentations on specific programs</li> </ul>

Major Themes	Subthemes	Description of subthemes
Sharing, and Awareness Raising	For the community, municipal decision-makers, and public health staff	<ul style="list-style-type: none"> <li>• Campaigns to raise awareness on the BE, PA and AT</li> <li>• Social marketing regarding the BE, PA and AT</li> <li>• Deputation to Councils</li> </ul>
	Promotion of AT and trails	<ul style="list-style-type: none"> <li>• Trail promotion</li> <li>• Promote walking, biking and AT</li> </ul>
Resource Development and Dissemination	Trail guide development	<ul style="list-style-type: none"> <li>• Develop trail guides or maps</li> </ul>
	Policy document resources	<ul style="list-style-type: none"> <li>• Planning Guide Resource</li> <li>• Toolkit for creating healthy communities</li> <li>• Policy statements for official plans</li> </ul>
	Charter development	<ul style="list-style-type: none"> <li>• AT Charters</li> </ul>

Note. AT = active transportation; BE = built environment; PA = physical activity

All respondents described how staff in their health units were addressing the built environment related to physical activity through: policy work; building and working with community partners, committees and coalitions; and gathering and providing evidence on the built environment and/or physical activity in the community. Most respondents described: hosting knowledge sharing opportunities such as conferences, workshops or forums for community members and partners, local decision-makers, and health unit staff; program development and implementation; social marketing, information sharing and awareness raising activities; and resource development and dissemination. However, there was variation in the specific interventions within these broad themes that will be outlined and discussed below.

### **Engagement with Policy Work at a County or Municipal Level**

All health units reported to be working on policy related activities and influencing or developing policy at a city, county and/or municipal level, depending on the political structure and organization of the region served by the health unit. Two respondents noted their focus on policy was fairly new or just evolving; however, a few health units reported policy related activities were the main focus of their work related to the built environment and physical activity. One respondent noted, "...policy development, which I think is our main thrust now, trying to do things sort of way upstream." [Participant 2]

Primarily respondents indicated their health units were involved with influencing, reviewing and/or commenting on official plans<sup>17</sup>. Health unit staff participation on steering committees and official plan review committees were avenues for influencing official plan development. Many health units noted formal procedures, such as circulating official plans from upper and lower tier municipalities through pertinent public health departments and providing formal feedback on issues such as sidewalk, road and trail connectivity, land use planning, park space, and active transportation planning. A few people reported their health units have provided input into policy statements or developed policy statements for official plans on healthy community design.

Health unit review, input and feedback on municipal master plans was also noted by almost all respondents. Included were master plans<sup>18</sup> on: transportation; active transportation; cycling; parks and trails; and recreation. Health unit staff were primarily involved in providing feedback regarding active transportation and the incorporation of pedestrian and cycling infrastructure into plans. This was described by one respondent:

So, I've been involved in reviewing the Official Plans and Master Plans as they come forward...so things we would look at is sidewalk connectivity, trails within the new development, are there any bike lanes proposed, if not, why? Could we propose some? So we're really looking for that connectivity, and land use planning, park space, issues such as that. [Participant 7]

Some municipalities have sought public health input on road and/or sidewalk standards policy regarding impacts of physical activity related to transportation infrastructure. A few respondents discussed involvement with strategic plans<sup>19</sup> and sustainability plans<sup>20</sup> for their counties or municipalities. Input on sustainability plans was only mentioned in areas where the rural population was greater than 50% of the population. Providing input on strategic plans was only reported for health units who served populations with a population density less than 20 people/km<sup>2</sup>. A few participants discussed their organizations involvement in reviewing individual planning applications, such as new subdivision plans, for input on issues such as sidewalks, walkability, design issues, and

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<sup>17</sup> Official plans are policy documents that outline municipal Council's goals, objectives and policy statements on land use and design, parks and open space, transportation, infrastructure, protection of the natural environment, and growth management strategies.

<sup>18</sup> Master plans are documents that guide community priorities and outline specific land use, transportation, and infrastructure strategies. Master plans need to be updated as projects are completed or as community needs change.

<sup>19</sup> A strategic plan is a comprehensive organizational strategy that guides and aligns municipal work and spending with the community's priorities and visions for its future. They outline the vision, mandate, values and strategic priorities for Council.

<sup>20</sup> Municipal sustainability plans outline the long-term vision for communities and steps to move towards a sustainable future, one where a strong economy and participative governance models protect ecological integrity, effectively manage the built environment, contribute to a vibrant cultural scene and strong social cohesion (Alberta Urban Municipalities Association, 2006).

accessibility to encourage physical activity and active transportation. One respondent noted:

...part of it has been responding to requests for comments for individual planning applications, let's say a subdivision or a Walmart going in somewhere. And, we have been doing things where we've been providing specific comment(s) on specific places with recommendations around things like increased sidewalks, and the frontage of the stores and etcetera to increase the desire to walk and that sort of thing. [Participant 2]

Lastly, two respondents noted their input had been sought by a municipality or county related to specific road or sidewalk standards policies; however, this was only mentioned by sources where the population density was greater than 20 people/km<sup>2</sup>. This is exemplified below:

The sidewalk policy came from Public Works...and we were given the opportunity to review that policy and we weighed in on it and put some input in that as well. [Participant 3]

### **Building and Working with Community Partners, Committees and Coalitions**

Building and working with community partners, committees and coalitions was deemed to be important by all participants. Work within this theme involved participation and involvement in a variety of community coalitions, committees and working groups, such as trails committees, cycling coalitions, active transportation committees, healthy communities committees, and transportation working groups. Virtually half of the interviewees referred to their roles and involvement in a local Healthy Communities Partnership<sup>21</sup>. A number of respondents noted the Healthy Community Partnerships they were involved with identified the built environment, physical activity and/or active transportation as key priorities for their communities. These partnerships were noted to be intersectoral and included health unit staff from a variety of program areas, community members, local agencies, local decision-makers, community partners and leaders.

Health units also functioned as a resource for community groups, committees, and coalitions. In some instances health units served leadership roles, such as coordinating or chairing committees and holding advisory positions. Respondents also talked about providing resource support and management to community groups, such as providing small grant opportunities to support community group work and assisting community groups with funding proposals. Some health units noted health unit staff operated as knowledge brokers within the community by providing the evidence on the relationship between the built environment and health, sharing best practice information with partners,

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<sup>21</sup> The Healthy Communities Partnership is a provincially funded program through the Healthy Communities Fund that provides organizations, community members and partners an opportunity to work collaboratively in a coordinated approach to create healthy, active communities.

and providing local health status information regarding the community. Lastly, a couple of respondents noted they have helped build community capacity by providing training for community partners and municipal leaders on the impacts of the built environment on health, physical activity and active transportation and through facilitating linkages between community partners themselves.

A few health units described participating in committees of Council related to active transportation and alternative and public transportation committees; however, this was only mentioned by sources that serviced a lower population density (less than 20 people/km<sup>2</sup>) and those whose rural population was greater than 50% of the population. A small number of respondents indicated their organizations had created internal committees that specifically addressed the built environment, some of which spanned program areas and were interdisciplinary.

The following excerpt outlines the many functions of the public health staff role in building and working with community partners, committees and coalitions:

So we sit on community committees, like Healthy Communities Committees, Active Transportation Committees, Trails Committees. We participate in activities like Share the Road activities. Sometimes these are community based groups and sometimes they're actually committees of Council. We view one of our key roles as being able to share best practice information, health status information, information on the connection between the built environment and health. We assist with organizing community meetings and workshops. One of the key things that we do also is we help to connect partners together, so we might be doing some work in a school, we're also doing work with municipalities on physical activity and built environment and we connect those partners together. So it increases their capacity and increases their ability to move forward. So I think that's a really critical role that public health plays. We have a really good sense of who all the partners are out there and were able to connect those partners together. In the past we've assisted with writing funding proposals. In the past we've had grants from external sources. We've been able to offer small bits of funding to support some of the community or municipal work that is happening. [Participant 5]

Lastly, many participants discussed participation in regional and provincial built environment and physical activity networks, such as the Ontario Public Health Association (OPHA) Built Environment Subcommittee.

### **Gathering and Providing Evidence**

All health units were engaged in gathering and providing evidence in some capacity on built environment characteristics or on physical activity levels or modes of active



transportation. This occurred through conducting research, community needs assessments, and through local data collection.

In terms of built environment characteristics, primarily the data being collected was largely related to community perceptions and attitudes regarding the built environment. Many surveys have been conducted with community members, municipal staff, and parents and students regarding their values, needs, perceived barriers to active transportation, and concerns regarding built environment characteristics. One health unit described two PhotoVoice<sup>22</sup> projects they have carried out to gather local perspectives on the local environment. Rich qualitative descriptions were garnered from students and community members regarding pedestrian safety, active transportation, and built environment design issues such as sidewalks in poor repair, within their neighbourhoods. As described by one participant:

The one [PhotoVoice project] was with grade five students and it was all around pedestrian safety, what helps you or hinders you from getting to school safely... another PhotoVoice project... it was just what keeps you safe and healthy in your community, or what makes you unsafe, unhealthy in your community. And some of the results there also showed a lot of design issues; accessibility issues, like curbing, just sidewalks in poor repair. [Participant 14]

Almost half of the respondents discussed quantitative data collected on built environment characteristics. Many health units conducted walkability and bikeability assessments via neighbourhood walkabouts or GIS mapping to observe sidewalk existence, connectivity, and active transportation priority routes and safety. A few respondents discussed conducting mapping and inventory exercises, surveys and open forums related to physical activity and recreational opportunities in neighbourhoods. It is important to note that half of the respondents had not collected any data on built environment characteristics. Additionally one participant stated they lacked access to data on built environment measures or indicators in their region.

Most data collection on physical activity levels and modes of active transportation used to inform programs was from external sources such as the Canadian Community Health Survey (CCHS), the Ontario Student Drug Use and Health Survey, and the Rapid Risk Factor Surveillance System (RRFSS) data. For instance, half of the participants noted that data collection on rates of physical activity came from the CCHS<sup>23</sup>.

Physical activity data collected by health unit staff included levels of physical activity, frequency, duration, and type obtained through community surveys and community

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<sup>22</sup> PhotoVoice is a participatory action research method which captures individual perspectives regarding the status and health of their communities.

<sup>23</sup> The CCHS provides information on walking and cycling for leisure, and modes of transportation to and from work, including active transportation.

assessments and was based on self-report. Only one participant noted their health unit had collected quantitative, objective data on physical activity levels by means of completing pedestrian and cycling observation counts prior to- and after changes were made to the built environment. Health units that serviced areas with a higher population density mentioned collecting more data, both from health unit and external sources, than those with lower density populations.

One respondent indicated their health unit had completed a literature review on the impacts of the built environment on health to inform their health unit's strategic direction and priorities for action.

### **Hosting Knowledge Sharing Opportunities**

Most respondents described how their health unit had been integral to hosting knowledge sharing opportunities for the community, decision-makers (both elected and staff), and public health staff, such as workshops, forums, seminars and conferences addressing healthy communities.

Almost all interviewees described participatory and interactive workshops, public forums and focus groups on walkability and cycling, active transportation and/or on creating healthy cities. Many opportunities were held in collaboration with non-profit national organizations such as Green Communities Canada<sup>24</sup> and 8-80's Cities<sup>25</sup>. They were generally community based, tailored to local community needs and inclusive to community members, community partners, and local decision-makers. This was illustrated by one respondent:

What kind of kick started the built environment discussion in the community was a Healthy Communities and Built Environment Workshop...And so that was led by public health, as well as municipal planners, engineers, and parks and recreation and other members of the community just to learn more about what the built environment was and also learn about healthy communities. [Participant 7]

Many workshops, seminars, conferences intentionally involved decision-makers and stakeholders or were tailored specifically towards elected officials or municipal staff. As was noted by one respondent:

...we strategically made it so that it was only engineers in this forum and road personnel so that they felt really open to having open discussions and it wasn't

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<sup>24</sup> Green Communities Canada is a national association of community associations working with governments and communities to reduce their impact on the environment by addressing things such as green space and sustainable transportation.

<sup>25</sup> 8-80's is another Canadian organization dedicated to creating cities where people can walk, bike, and visit parks, streets and other public spaces and that are friendly for people aged 8 to 80.

with other disciplines...now we have their buy-in and we've actually had a number of them interested in being involved as we move forward. [Participant 9]

A few knowledge sharing opportunities were also noted specifically for public health staff to increase internal health unit capacity and knowledge regarding healthy communities and the built environment as exemplified below:

We also had [name of speaker] come to do some staff training around the built environment... just because we wanted to get our heads around the whole piece around policy and the built environment; municipal land use policies, just a very new area for our health unit staff. [Participant 14]

### **Program Development and Implementation**

Many respondents described program development and/or implementation initiatives or events in the community to engage people on the issue of the built environment and physical activity. Many health units reported they had organized Car Free Days or Open Street events, where streets were closed to vehicular traffic and opened up for citizens to walk, bike, and be active. Others noted they organized group walks and runs to introduce people to trails and existing infrastructure to encourage physical activity. Many biking events had been developed as well, such as Bike to Work Week, commuter challenges, cycling festivals, guided cycling tours, and bike rodeos, which also introduced bike safety.

More comprehensive community-based programs also existed, such as Share the Road Programs<sup>26</sup> and the Ontario walkON initiative<sup>27</sup>. Half of the respondents reported working with Share the Road to increase motorist awareness of cyclists and to promote and encourage safe cycling. Many health units utilized the Share the Road social marketing tools such as posters, bumper magnets and yellow road signs for cyclists and vehicles. Others hosted bike summits with the coalition, public forums, and co-hosted events with the founder of the coalition. One staff member described, “we launched a Share the Road program last summer...so we have Share the Road bumper magnets and those just fly off the shelf.” [Participant 3]

Half of the respondents mentioned Ontario Communities walkON. The health units involved in this program mentioned hosting community and public forums on walkability, and hosting or attending walkability workshops with community members, community partners and municipal decision-makers, both elected and municipal staff. Train the trainer sessions were also included as part of this initiative.

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<sup>26</sup> The Share the Road Cycling Coalition is a provincial cycling advocacy organization in Ontario that works with municipalities to make their communities more bicycle friendly. Share the Road aims to increase motorist's awareness of cyclists on the roads.

<sup>27</sup> Ontario Communities walkON is a subsidiary of Canada Walks, which aims to make communities in the province more walkable.

Additionally, half of the respondents discussed conducting programs with schools, such as Active and Safe Routes to School and School Travel Planning Projects. These programs were often multi-faceted and included things such as community walkabouts to identify existing active transportation infrastructure; surveys to parents and students regarding safe routes to school, barriers to using active transportation, and safety concerns; programs to decrease traffic congestion; promoting walk or wheel to school days; and promoting International walk to school days or walking challenges to encourage walking to school. A few respondents mentioned working in collaboration with Green Communities Canada on these school initiatives.

### **Social Marketing, Information Sharing and Raising Awareness**

Almost all respondents discussed social marketing, information sharing and awareness raising activities in the community and with community partners, and municipal decision-makers, both elected and staff. A couple of respondents also mentioned activities specifically for public health staff.

Information sharing was primarily through didactic presentations. Presentations were made to schools, the Chamber of Commerce, recreational providers, elected officials, county and municipal Staff, and the public regarding ways the built environment can impact health and physical activity. Some respondents advised that their health unit was represented at public meetings to provide health information related to the built environment. To engage local decision-makers and to increase their awareness of the issue, deputations have been made to Councils by public health staff or community coalitions with health unit staff. Community coalitions also have circulated minutes to Council to raise awareness regarding work in the community. To build capacity within the community, public health staff have organized and promoted training aimed at municipal leaders regarding impacts of the built environment on active transportation.

Many participants mentioned using social marketing techniques to increase community awareness regarding specific campaigns or to increase awareness regarding the built environment, physical activity and walkable and bikeable communities. For instance, health units: utilized local media outlets, such as radio, television and newspapers; maintained websites and social media sites, such as Facebook pages; developed or contributed to community newsletters; developed and distributed posters and bumper magnets; and utilized electronic signs and displays at community events to promote messaging. A participant described social marketing work like this:

We also do a lot of awareness raising through the local media so—and having newspaper articles on various topics related to being active and healthy communities, that sort of thing. I do a once a month radio interview on our local community radio station and talk about various aspects of physical activity and health and healthy communities...[Participant 10]

Over half of the participants discussed general awareness raising regarding healthy active communities; the benefits of walking, cycling and active transportation; existing venues to be active, such as trails; and safety and injury prevention.

The importance of raising awareness and how it can change community and partner perceptions was highlighted by one respondent:

...[the chair of a committee] lives in a neighbourhood that has no sidewalks and she said she recalls a number of years ago when her street was being resurfaced, the petition circled in her neighbourhood, no sidewalks... “I signed it without thinking of the greater implications”...She's like, “Look at me now.” So I mean that mind shift can happen right. [Participant 3]

### **Resource Development and Dissemination**

Resources were developed to assist with policy related activities. They included: a toolkit on creating healthy communities; a guide for how to work with municipalities to create healthy communities; a planning guide resource for planning and policy decisions; and healthy community design guides with policy statements for official plans. One respondent explained the planning guide resource that the health unit developed:

So it was developed as a tool for the general public, elected officials, municipal staff, volunteer groups, businesses, etcetera, those with an interest in improving conditions for walking and cycling in [the] County. The guide outlines a wide range of possible decisions municipalities and politicians face when making planning and policy decisions regarding active transportation. [Participant 8]

Almost half of the respondents reported they developed and promoted resources on existing infrastructure such as guides or community maps for walking trails, cross country ski routes and bike routes. A couple of respondents also discussed Active Communities and Pedestrian Charters that were developed and adopted by communities or municipalities. The charters were also used as a roadmap for planning within the health unit and with community partners.

### **Effect of Population Density and Percent of Rural Population on Interventions**

Generally no differences were found in terms of the *major themes* or types of interventions health units were employing and population density of the region served or percentage of the population that was rural. However, greater variances were noted related to some *subthemes*. For instance, health units in regions with a lower population density reported that they were doing less than health units in regions with a greater population density related to gathering evidence or data on physical activity or active transportation. Additionally, health units with a lower population density reported that

they were more actively involved in committees of Council. Finally, in areas where the rural population was greater than 50% of the population, sources noted that their health unit participated in committees of Council and provided input into sustainability plans.

### **Impacts of Interventions**

Respondents referred to impacts of interventions; however, this was not an interview question and therefore not consistently addressed in all interviews. Most notably, respondents felt buy-in and support from the community, partners, and decision-makers and elected officials had increased after interventions. Communities demonstrated support by attending community events, participating in interventions, and providing positive feedback. Many respondents discussed well attended public forums, workshops and events such as Car Free events.

Impacts of workshops and conferences included: increased buy-in from decision-makers, elected officials, the Board of Health and health unit management; increased interest and awareness regarding built environment initiatives from Council and municipal staff; report generation on priority actions; recommendations to municipalities; committee or coalition formation to address recommendations; and health unit and community priority setting. One respondent noted a Healthy Communities Partnership formed to address action steps for building a healthy community and another source noted a built environment committee formed after an 8-80's workshop.

Improved role clarity for key players were noted as impacts of interventions. Respondents stated many municipal staff, such as engineers and planners, had a greater appreciation for the role that they can play in CDP. The following excerpt demonstrates a shift in planning's role perception regarding building healthy communities:

...that whole planning world has shifted in the last few years too acknowledging the fact that public planning came into place in response to communicable disease issues with that whole Broad Street pump thing and now they're seeing that the work that they do has a huge implication for chronic disease prevention as well. [Participant 3]

The role of public health has become clearer for planners, engineers, municipalities and counties, as public health's input has been sought for official plans, development plans, active transportation plans, and for completion of walkability and bikeability assessments. One participant discussed this:

I'm given the opportunity to provide input on development plans as they come across, so when the planner is reviewing an original plan or site plan or something, they have to circulate it to different disciplines in the area, like Hydro and all that kind of stuff. And we're now on that circulation list to weigh

in from a walkable communities perspective. [Participant 3]

Development and strengthening of relationships with non-traditional partners and improved collaboration were stated as key developments from interventions.

Lastly, a few respondents noted policy changes have occurred because of specific interventions. One respondent noted the inclusion of a cycling chapter in a transportation master plan after much advocacy work by the health unit. Another participant discussed changes to the language in an official plan, “And the results of that PhotoVoice project were actually instrumental in getting some of the language changed in our official plans to support Active Transportation.” [Participant 14]

### **Evaluation of Interventions**

Participants were asked to comment on evaluation and evaluative processes for interventions. Generally, formal evaluation of interventions was rare or sporadic. Most respondents noted formal evaluations were not occurring. One respondent mentioned a workshop evaluation. Another respondent noted work plan evaluation by looking at deliverables and outcomes. However, the majority of respondents remarked that either no evaluations were being done or they were being done informally. Informal evaluations included tracking participation rates at community events, conversations and verbal feedback regarding specific interventions, and tracking policies that have changed.

Barriers and challenges were highlighted as to why health units were not engaged in evaluation activities. Resources, both human and financial, were the primary reason for not evaluating programs. Most respondents discussed a lack of financial resources, low staff capacity, lack of time dedicated towards evaluation, particularly in smaller health units or satellite offices, and the huge undertaking evaluation poses. A few health units had only recently hired an epidemiologist. Employing only one epidemiologist for an entire health unit was also deemed challenging due to competing program demands. Many interviewees discussed the difficulty in evaluating CDP initiatives because of the difficulty determining cause and effect, the number of small program components to evaluate, and determining behaviour change, that can take years to see the outcomes. Other barriers noted for evaluation included a lack of skills, such as data analysis and interpretation. One respondent outlined challenges for building in evaluation into interventions:

some of the challenges to evaluating ... is that it takes years to see the outcome of your effort. So it's very difficult to determine cause and effect when you're evaluating chronic disease prevention programs for that reason. And also because we're a small health unit, we only have one epidemiologist and one program evaluator and they have to provide support to the entire health unit and all the programs, so that's also an issue. [Participant 11]

## Barriers to Interventions

A number of barriers and challenges were identified when developing or implementing interventions addressing the built environment related to physical activity. Based on participant responses, major themes were identified at an organizational and community level. Additionally a number of themes were identified that were unique to the rural context of the communities and regions served. Table 2 outlines the major themes and subthemes.

**Table 2**  
*Summary of Themes and Subthemes Related to Barriers to Interventions*

<b>Hierarchy of barriers</b>	<b>Major Themes</b>	<b>Subthemes</b>
Organizational Barriers	Human and financial resources	<ul style="list-style-type: none"> <li>• Small number of staff</li> <li>• Multiple job profiles</li> <li>• Competing priorities for staff</li> <li>• Funding for interventions</li> </ul>
	Public health staff knowledge, education and training	<ul style="list-style-type: none"> <li>• Unfamiliar with planning language, legislation and how to respond to planning applications</li> </ul>
	Issue outside of public health mandate	<ul style="list-style-type: none"> <li>• Health unit does not make actual changes to the BE</li> <li>• Bring only the health perspective to the table</li> </ul>
	Organizational Structure	<ul style="list-style-type: none"> <li>• Programs ‘siloes’ in health unit</li> </ul>
Community Barriers	Political structure or the political process of the community served	<ul style="list-style-type: none"> <li>• Health unit serves multiple counties and/or municipalities</li> <li>• Lack of buy-in, support, or readiness from decision-makers</li> <li>• Decision making by elected officials</li> </ul>
	Partners and community partnerships	<ul style="list-style-type: none"> <li>• Competing interests</li> <li>• Lack of buy-in, support, or readiness</li> <li>• Lack of communication mechanisms</li> <li>• Role ambiguity among key players</li> </ul>
	Prevailing attitudes, perceptions and culture	<ul style="list-style-type: none"> <li>• Car dependent culture</li> <li>• Long, slow process to change cultural attitudes and perceptions</li> <li>• People see change as unnecessary</li> <li>• Safety concerns</li> <li>• Community opposition to AT infrastructure</li> </ul>
	Human and financial resources	<ul style="list-style-type: none"> <li>• Lack of municipal human resources</li> <li>• Cost of BE infrastructure and retrofitting</li> </ul>



Hierarchy of barriers	Major Themes	Subthemes
		<ul style="list-style-type: none"> <li>• Municipal and county budgets</li> </ul>
Rural Contextual Barriers	Rural road and transportation challenges	<ul style="list-style-type: none"> <li>• Car dependency</li> <li>• Safety concerns with rural road conditions and sharing the roads</li> </ul>
	Environmental factors and geography	<ul style="list-style-type: none"> <li>• Large geographic area and great distances between points of interest</li> <li>• Climate and weather</li> </ul>
	Lack of research, best practice information and data in rural settings	<ul style="list-style-type: none"> <li>• Knowledge gap of needs in rural area</li> <li>• Urban focus related to the BE and PA interventions and best practices</li> </ul>
	Financial resources	<ul style="list-style-type: none"> <li>• Small economic tax base</li> <li>• Large amount of infrastructure and BE per capita</li> </ul>

Note. AT = active transportation; BE = built environment; PA = physical activity

### Organizational Barriers

Four themes were identified as barriers to interventions at an organizational level. Primarily, respondents discussed human and financial barriers to interventions. A few respondents also discussed public health staff training and knowledge, the organizational structure, and the organizational mandate as posing barriers to built environment interventions.

#### Human and financial resources.

A number of participants identified human resources, staffing and financial resources within the organization as barriers to interventions. The small number of public health staff was noted as the primary barrier, as this affected the amount of time that could be dedicated to built environment interventions and activities. The small number of staff also led to competing interests or priorities in smaller health units, where one's role with the built environment or physical activity was only one part of a job profile. One participant noted:

I think one is that we are a smaller health unit and so as I said, I'm the only one that is doing physical activity promotion. So we tend to be more generalist in our program areas than specialists. It would be great to spend all of my time on active transportation and the built environment, but that's only one program area. [Participant 8]

Funding and money were stated to be barriers for health unit interventions. Health units in less rural settings (with a higher population density and those that serviced a

population where less than 50% of residents were in a rural setting) remarked with greater frequency that both financial and human resources were barriers.

#### **Public health staff knowledge, education and training.**

A few respondents noted staff knowledge in the planning realm was a barrier, as public health staff did not have the knowledge or expertise related to planning, planning language, and legislation. This was problematic when public health was asked by the county or municipality to weigh in on planning applications. Respondents stated there has been a large learning curve related to planning content and there is a need for increased public health training and expertise in this area. One respondent shared, “So I’m still developing my knowledge and my expertise in that; understanding the planning lingo and the processes, you know for example reviewing the official plan.” [Participant 8]

Lack of staff training and education regarding the built environment and planning was noted with greater frequency in less rural health units (population density greater than 20 people/km<sup>2</sup> and where the rural population was less than 50% of the total population). No health units where the rural population was greater than 50% remarked that staff knowledge or training was a barrier, indicating that health units who service a larger rural population did not perceive this to be a barrier to interventions.

#### **Issues outside of public health mandate.**

A couple of respondents noted that staff advocated for changes to the built environment to positively impact health, but it was not their role or mandate to make these changes. Their role was perceived as providing the evidence and rationale for making changes. Additionally, respondents discussed the many reasons for addressing the built environment beyond health, such as economical benefits and improved tourism, which were also felt to be outside public health’s mandate. As such, they only brought the health perspective to the table, which was presented as challenging.

#### **Organizational structure.**

The structure of some public health organizations was noted to be problematic when developing and implementing effective interventions. For instance, ‘siloes’ program approaches contributed to poor program collaboration and communication and a fragmented approach to interventions. One participant noted:

...we are very siloed in our health unit and something like the built environment touches all of our program areas, but it doesn’t seem to be owned by all program areas. [Participant 14]

**Community Level barriers**

Many themes were identified as barriers to interventions at a community level. All respondents noted political structures or processes that posed as barriers. Most respondents discussed challenges with community partners or partnerships, with prevalent cultural attitudes and perceptions, and human and financial resources.

**Political structure or processes of the community served.**

Almost all participants discussed challenges encountered due to the structure of the region served. Many health units served multiple counties and all health units served multiple municipalities, which involved working with multiple levels of and numbers of governments, with varying political and organizational structures. Relationships differed with some counties or municipalities; communication and collaboration varied between and within counties and municipalities; there were varying stages of readiness; and the volume and number of governments and staff was deemed cumbersome. Participants indicated there were many staff to get on board for initiatives, it was more difficult to gain broad base consensus for policy changes with multiple municipalities, there was a lot of legwork needed to work with so many municipalities, and often health units repeated interventions or processes with each county or municipality.

Many respondents discussed lack of buy-in, support or readiness from elected officials, who hold the decision-making power to make changes to the built environment. It was highlighted that all actions and decisions are trumped by Councils and elected officials and a lack of political will or Council ‘splits’ were problematic. Some respondents reported that occasionally there was not buy-in from municipalities. This was particularly challenging when there was buy-in at the upper tier of government, such as the county, but not with a lower-tier municipality. Some felt they needed to engage with and work with local elected officials, as described by the following participant:

The actual changes to the built environment are dependent on government action, and so working with our local government is a really significant focus of what we do. Sometimes the barrier is that they're not quite ready to hear the information or that they have other competing priorities. [Participant 10]

**Partners and community partnerships.**

Respondents discussed competing interests and priorities of community partners, such as municipal staff and property developers who examine the cost-benefit analysis of interventions. As one participant noted:

I think one of the big hurdles is... the developers and kind of the entrenched ideas that developers have about what planning is. I mean at the end of the day for them it is a lot of money, “How much is this going to cost, is that sidewalk

really going to make me be able to sell three more condominiums at a price that I want to get”...And that perception on the part of developers is often—pervades the politicians in the area too who want to bring in tax dollars and employment and etcetera for the community. [Participant 2]

Lack of communication with and among community partners was also noted to be a barrier. Lack of connection between planners and public health staff was noted in some communities. Lack of communication and collaboration between all key players involved in the built environment, physical activity and active transportation was also noted by one respondent. Another participant felt it was difficult to allow all community voices to be heard and to provide equal opportunities for communities.

Lastly, role ambiguity among key players was also identified as a barrier. A couple of respondents declared the challenge of determining who the key players were, what their roles were and where issues belonged. For example, when addressing active and safe routes to school, one participant questioned whether the issue ‘belonged’ to the school, public health or the municipality. One participant also noted that planners in their region have questioned why public health was at the table.

#### **Prevailing attitudes, perceptions and culture.**

Cultural attitudes and perceptions were barriers to interventions, particularly in the areas with a lower population density. Entrenched cultural norms, such as the ‘car dependent culture’ or ‘car centric’ society, were deemed problematic when implementing initiatives to improve active transportation. The process of changing cultural attitudes and perceptions was stated to be a slow, time consuming process. It was felt that education was required to increase the awareness of the issues, as many people perceived change as unnecessary. Engrained ideas, attitudes and traditional belief systems led some community members to question active transportation, particularly in smaller communities, where the mentality for active transportation was not present and was felt to be unachievable. Additionally some interviewees noted explicit community opposition to active transportation infrastructure. Some communities have contested widened streets for bike lanes and have opposed sidewalks in their residential areas over concerns about snow removal maintenance, fear of increased crime, and a loss of property frontage. In one community businesses made it clear they did not want to lose on-street parking. One respondent also noted that the local car manufacturers’ perceptions of built environment interventions were a barrier, as they perceived active transportation initiatives to be ‘anti-car’. The participant explained:

...there is some push back...“Your anti-car or your pushing back there”, so there has been some degree of or need for sensitivity in that respect. Although we do try to say no, “We’re not anti-car, and people are still going to drive but do they need to drive that one or two kilometers.” [Participant 1]

Lastly, community concerns regarding safety, both traffic and fear of crime, were stated to be barriers to active transportation promotion. A few respondents stated parents felt it was unsafe for children to bike or walk to school due to traffic and the perceived risk of ‘stranger danger’, particularly following highly publicized incidents pertaining to child safety. These fears posed as barriers, particularly with the school based programs such as school travel planning and active and safe routes to school. As one participant described the issue of parents’ perception of safety:

...I would say 80% traffic fear and 20% fear “I would never let my child walk to school for fear of them being snatched”, so a perception issue. And how much of that is impacted by the media and stuff like that, Tori Stafford and so forth.  
[Participant 12]

### **Human and financial resources.**

Resources, both human and financial, were noted by most participants as a challenge. This was particularly true in higher population density regions. Many noted it was costly or cost prohibitive to make changes to or retrofit the built environment to accommodate active transportation with infrastructure such as bike lanes and playground equipment that would support physical activity. This was exemplified by one interviewee:

...but just funding to support these initiatives...Something we are experiencing in some of our communities right now is just our green spaces, our playgrounds; there is no money to replace this equipment. And a lot of our playgrounds are sitting with no equipment because we have had to pull them out because of safety standards. [Participant 14]

Many counties or municipalities earmarked money for infrastructure maintenance, such as filling potholes, and not development of new infrastructure or retrofitting. Often when money was earmarked for infrastructure development, it was often the first thing cut from the budget if there were economic constraints. Public health staff remarked that because changes to the built environment were based on municipal and county budgets, this posed a significant barrier to the recommendations put forth by public health. Additionally, municipal human resources were a barrier. For example, many municipalities did not have a planner or a full-time planner because of their small size. This made connecting with the planner more difficult and at times meant the planner had less expertise or ability to address the built environment to positively affect physical activity and health.

### **Rural Contextual Barriers**

Many respondents discussed barriers specific to rural areas, such as rural road and transportation challenges, the rural environment and geography of areas, and the urban focus of built environment interventions, research and best practice information.

### **Rural road and transportation challenges.**

All participants noted road and transportation challenges unique to rural regions. Almost all respondents discussed the reality of car dependency in rural areas. Although similar to the cultural attitudes and perceptions of a car dependent culture, many discussed the reality that cars and motorized vehicles were required due to large distances. For instance, many children were bused to school in rural areas and residents commuted to places of interest, such as work and to get groceries. It was stated that it was not always feasible to use active forms of transportation in these situations.

Unique safety concerns were mentioned because of conditions and the users of rural roads. Many rural roads were described as being gravel, lacking painted lines, having narrow shoulders, and often in poor condition. One health unit advocated to the provincial government for paved shoulders on provincial roads. However, another respondent mentioned that in some communities there are large concentrations of Amish and Mennonite populations who travel by horse and buggy and paved shoulders would be problematic. As one participant described:

There's lots of gravel roads...so that's not great for cycling. And the roads that are paved aren't necessarily the safest route because of either the volume of traffic or the speed of traffic. The shoulders being very narrow. We've talked about paving shoulders, I know there's a number of municipalities that are doing that, but that's actually an issue for horse and buggies. [Participant 8]

Respondents discussed the safety concerns of sharing infrastructure with active transportation users and motorized traffic. Cyclists and pedestrians sharing roads with vehicular traffic, transport trucks, and farm equipment in agricultural communities, were noted as safety concerns, as were the volume and speed of motorized traffic. Trail users, such as pedestrians, cyclists and skiers, often shared trails with motorized vehicles such as ATVs and snowmobiles. Interviewees reported that the older population and parents of children felt it was particularly unsafe to walk or cycle due to these conditions. One respondent also noted fear of wildlife (e.g. bears) as a safety concern on trails, particularly for women and seniors.

### **Environmental factors and geography.**

Large geographic land mass, vast rural areas, great distances between points of interest, and proximity to destinations were all mentioned as posing barriers to interventions in rural communities. One respondent noted that citizens in rural areas had less opportunity for physical activity due to an increased car dependency and proximity to opportunities to be physically active, such as parks, trails and recreational facilities. Distances and proximity made the use of active modes of transportation and infrastructure development difficult or unrealistic. One respondent remarked that the development of sidewalks along rural roads was not realistic. Large distances also made maintenance of active

transportation infrastructure problematic, as it led to huge road infrastructure maintenance costs because of snow removal, filling of potholes, resurfacing roads, and shoulder paving. Low population density, small populations and the dispersal of the population in very rural settings were also described as barriers, as it meant there was decreased capacity for interventions.

Climate and weather were barriers, particularly in ‘snow belt’ regions where blowing and drifting snow were common. This posed problems for snow removal, which impacted active transportation itself and required additional resources that took priority over infrastructure development. The cold, snow and inclement weather also affected health promotion efforts to increase walking and cycling.

### **Lack of research, best practice information and data in rural settings.**

Many participants discussed a lack of rural research and the knowledge gap that exists related to the unique rural needs and circumstances. Many noted that most research, best practice information and examples of built environment interventions to improve physical activity were based in urban settings. One participant noted the OPHS definition of the built environment is urban focused.

Participants indicated there were greater opportunities to address the built environment in urban settings and hence county and municipal planning focused on urban development, with less consideration for village and rural development. Identifying what would work in a rural setting was identified as a challenge by one respondent:

And I guess the final rural challenge is just the knowledge gap that most stuff related to built environment and active transportation...is urban based and so there's a different set of needs or circumstances in a rural area, and that's part of our work is just addressing that and figuring out what works in our small community and then trying to share that information with others. [Participant 10]

Respondents also noted an overall lack of data and research, not specific to rural settings, which included: effective built environment interventions that affect physical activity levels; research on green spaces; built environment indicators and physical activity measures; and evidence for an economic case for active transportation.

### **Financial resources.**

Financial resources were mentioned at an organizational and community level. However, more rural regions noted municipalities financially have to do more with less, due to the lower population density, smaller economic tax base, and large amount of built environment infrastructure. Large regions had larger road networks, which required more development and additional maintenance. One respondent described the large amount of built environment infrastructure per capita:

...one of the challenges is that our municipalities...don't have a huge tax base, because we're rural, and they have lots of infrastructure too already to maintain, so... they're dealing with fairly tight budgets. And so to try to talk about adding sidewalks and paved shoulders and that sort of thing, they're always weighing the cost and benefit of doing those kinds of things. [Participant 10]

### Enabling Structures and Processes Related to Interventions

A number of enabling structures and processes were identified regarding the development and implementation of successful interventions. Major themes were identified at an organizational, community and systemic level. Additionally a number of themes were identified that were unique to the rural context of the communities and regions served. Table 3 outlines the major themes and subthemes.

**Table 3**

***Summary of Themes and Subthemes of Enabling Structures and Processes Related to Interventions***

<b>Hierarchy of Enablers</b>	<b>Major Themes</b>	<b>Subthemes</b>
Organizational Enablers	Human and Financial Resources	<ul style="list-style-type: none"> <li>• Funding opportunities</li> <li>• Dedicated resources and staff time within the health unit</li> </ul>
	Organizational buy-in and support	<ul style="list-style-type: none"> <li>• Support from upper management</li> <li>• BE deemed a health unit priority</li> </ul>
	Organizational processes	<ul style="list-style-type: none"> <li>• Top-down vs. bottom-up approach</li> <li>• Collaboration and communication</li> <li>• Responding to community needs</li> </ul>
	Internal champions	<ul style="list-style-type: none"> <li>• Individual staff members</li> <li>• Medical Officer of Health</li> </ul>
Community Enablers	Partners and community partnerships	<ul style="list-style-type: none"> <li>• Existing successful partnerships</li> <li>• Building and maintaining positive external relationships</li> <li>• Stakeholder buy-in, support and readiness</li> <li>• Community participation and engagement</li> <li>• Role clarification with partners</li> </ul>
	Political structure or processes of community	<ul style="list-style-type: none"> <li>• Working with multiple counties or municipalities</li> <li>• Enhanced communication due to political structure and size</li> </ul>
	Leadership	<ul style="list-style-type: none"> <li>• Community perceptions of public health leadership in the community</li> </ul>



Hierarchy of Enablers	Major Themes	Subthemes
		<ul style="list-style-type: none"> <li>• Community champions</li> </ul>
	Tourism draw	<ul style="list-style-type: none"> <li>• Interest and demand for AT infrastructure</li> <li>• Potential economical benefits</li> </ul>
Rural Contextual Enablers	Small rural nature of community	<ul style="list-style-type: none"> <li>• Strong sense of community with high engagement levels</li> <li>• Positive relationships and the process of developing relationships</li> <li>• Less political bureaucracy</li> </ul>
	Environmental factors and geography	<ul style="list-style-type: none"> <li>• Existing natural environment and infrastructure</li> <li>• Greater appreciation for nature and trails</li> </ul>
Systemic Enablers	Knowledge utilization, dissemination and sharing opportunities	<ul style="list-style-type: none"> <li>• Existing research evidence, best practice information of the BE impacts on health and PA</li> <li>• Provincial networks and networking opportunities</li> <li>• Information sharing among public health organizations</li> </ul>
	Mandates, policies and provincial programming	<ul style="list-style-type: none"> <li>• Provincial policies and legislation (OPHS, Places to Grow legislation)</li> <li>• Healthy Communities Program</li> </ul>
	Intersectoral collaboration	<ul style="list-style-type: none"> <li>• Provincial ministries</li> <li>• Ontario Professional Planners Institute</li> </ul>

Note. AT = active transportation; BE = built environment; PA = physical activity

### Organizational Enablers

A number of themes were identified at the organizational level that have enabled health units to address the built environment and physical activity. They included: human and financial resources; organizational buy-in and support related to the built environment; organizational processes and structures, such as program collaboration and responding to local community needs; and champions within the organization.

#### Human and financial resources.

Respondents discussed how financial resources dedicated specifically to the built environment and physical activity had enabled health units to carry out interventions such as bringing in high profile speakers and organizing workshops. Funding opportunities came from local grants, Healthy Communities funding, and external opportunities such as Heart and Stroke grants. Staffing and staff time dedicated specifically for built environment and physical activity initiatives were also acknowledged to be enablers to developing and implementing interventions.

### **Organizational buy-in, support and readiness.**

Many respondents discussed work in this area had occurred and was successful due to support from upper management and readiness from within the agency. This was especially apparent in health units that serviced areas with a more dense population. Organizational buy-in and readiness was evident in the following ways: with managerial support for walkable communities; Board of Health support for initiatives; identifying the built environment as a priority within the health unit; the development and maintenance of internal working groups and committees addressing the built environment, particularly those that were developed across service areas and programs; and support for staff to attend conferences, workshops, training and professional development opportunities, particularly those outside of the traditional realm of public health, such as those hosted by the OPPI.

### **Organizational processes.**

A number of respondents discussed organizational processes that acted as enablers such as: health approaches (top-down vs. bottom-up) taken; program collaboration and communication mechanisms within the health unit; and identifying and responding to community needs.

There was variation in approaches and the foci of interventions. A few respondents noted a more bottom up approach, focused on education and raising awareness in the community, with less focus on policy development and implementation; whereas a few other respondents discussed a more top-down approach evident in the following quote:

We recognize that this work is pretty upstream work when we're looking at reviewing official plans and influencing policy development at the municipal level. We recognize that we can have a greater impact by really becoming involved in a lot of these upstream activities. [Participant 5]

One participant compared the shift to an upstream approach that focused on supportive policies to the shift that occurred with tobacco:

...there's a growing body of evidence that has shown that in order for people to make individual behaviour change, there needs to be a supportive environment. And I think looking at the lesson say for example from tobacco where for a long time the messages were focused on telling people to quit smoking and then there became a shift over time to creating policies—a policy environment that provided incentives for people to quit smoking. So I think it's that same thing related to physical activity that you can only tell people so much to get out and go for a walk. If there's no place for them to do it or if they don't feel safe doing it, then they won't. So it's sort of looking at what we call moving upstream and looking at what are the factors that influence people's behaviour and how can we

have an impact on those. [Participant 10]

The same participant noted the importance of addressing the built environment with a comprehensive and simultaneous top-down and bottom-up approach.

We do a variety of promotion and education activities to build community level support for physical activity. So while the overall focus of our work is on policy, like creating supportive policies, it's also important that there is community support because that's what's going to motivate our decision-makers to actually take action and make some investments...[Participant 10]

Program collaboration within the health unit on built environment interventions and effective communication mechanisms were noted to be enabling processes, particularly in smaller health unit's where there was greater ease in intra-agency communication. Additionally, it was felt there was increased interdepartmental collaboration, greater ease of connections with departments such as planning, and a greater flow of information, when the health unit was a department of the county. A couple of respondents outlined communication and collaboration structures and processes such as formal meetings between senior management of departments, meetings with team leaders regarding initiatives, and review teams from all programs that collaborate to comment on policy documents such as official plans.

The organizational process of assessing and responding to local community needs was also discussed as an enabler. Communities themselves were drivers for many of the interventions, as there were varying needs and capacities of communities. Locally identified needs enabled health units to prioritize and provide specifically tailored interventions. Tailored workshops, school travel planning projects in response to requests from schools to reduce traffic congestion, addressing local health status indicators such as obesity, and recognizing a need to enhance were examples of the varied community needs and health unit responses. One participant highlighted one of their community's major health concerns:

I think it's just recognizing there was a need with obesity being one of the major issues up here and brainstorming and looking at interventions and just looking at the literature and the relationship between the built environment, that kind of thing, physical activity. [Participant 2]

### **Champions within the organization.**

Internal leadership and organizational champions were declared to be enablers by a number of respondents. A few participants reported their Medical Officers of Health's interest and passion had either spearheaded or demonstrated commitment to work in this area. Additionally, individual staff members were attributed with leading agency work on the built environment.

## **Community Level Enablers**

A number of enabling structures and processes emerged from the data at a community level. They included: partners and community partnerships; the political structure or processes of the community served; community's perceptions of public health leadership; and the potential or actual draw from the tourist industry related to active transportation.

### **Partners and community partnerships.**

All participants highlighted the value and importance of existing partnerships and the significance of building and maintaining positive external relationships and partnerships with community members and partners. Other enablers included: increased awareness and interest from partners regarding the built environment; stakeholder buy-in, support and readiness for initiatives; community participation and engagement; and role clarification with partners.

Participants discussed a variety of partnerships and collaborative relationships with community partners, agencies and organizations. Collaborative partnerships with city, county and municipal staff were highlighted by all respondents. This included planners and the planning department, engineers and the engineering department, public works, parks and recreation staff, and tourism and economic development. Many respondents referred to these partners as non-traditional partners.

All respondents discussed their relationship with local planners and planning departments. Almost all stated the relationship was both positive and formal in that they sat on committees and worked on healthy policies together, regularly consulted one another with meetings and phone calls, and attended conferences or workshops together. A number of participants advised it was the health unit who had actively pursued the relationship with planning. However, it was widely discussed that planners were now seeking public health input, recognize that public health has something to offer and understand the role public health can play creating healthy communities. Additionally, positive changes in planner perceptions had occurred over time and many planners now recognize their own role related to CDP. Support, resources and buy-in from the OPPI were also mentioned as being enabling factors for moving planning and public health work forward in this area. A small number of participants noted their relationship with planners was more ad hoc or informal, remote or that it varied by municipality.

All respondents discussed their relationship with local engineers, engineering departments, transportation and public works. Almost all respondents advised that this relationship was formal. For instance, the health unit had been consulted to review and provide comments on transportation master plans, active transportation plans, and sidewalk policies. There were also collaborative workshops and seminars. A few

respondents noted their relationship was more ad hoc, varied by municipality, or was less well developed than that with planning.

Participants collaborated on many interventions with local community groups, existing coalitions and committees, local cycling clubs, and active transportation committees. Partnering with existing groups was considered a strategy for success. Some felt citizen groups were able to achieve more than public health led initiatives and more sharing of resources occurred. Other partners who collaborated with the health unit on built environment interventions included: school boards and local schools; non-profit organizations such as Green Communities Canada and 8-80's Cities; the local police service; property developers; and local businesses. Many of these partnerships were strengthened by the formation of Healthy Community Partnerships, as many of these service organizations and agencies were involved in the partnership.

The process of building and maintaining positive working relationships with municipalities, municipal and county staff, community agencies and partners was emphasized as key to successful interventions. The process of partnership development and the time necessary to build strong relationships was highly valued and viewed as a key role of public health staff. Developing these working relationships entailed identifying and strategically working with key players and decision-makers. An example given was the inclusion of decision-makers in one Healthy Communities Partnership. Formalized communication mechanisms, such as frequent and formal meetings with partners, and effective communication strategies, such as speaking the same language as partners and tailoring events and messaging for specific partners, were noted to be processes that supported partnership development and maintenance.

An improved awareness of the impacts of the built environment on health and a desire to address this by community partners was felt to have been an impetus for moving work forward. One participant discussed the large number of organizations, agencies and partners supporting built environment initiative, "It's not just one or two people that are interested in this, it's a fairly large number, so I think that's when we decided to do this." [Participant 4] One respondent noted the financial contributions of the local mining industry to built environment infrastructure, such as trail development, a local arena and ball park.

Buy-in, support and readiness from community partners, particularly from county and municipal staff, were deemed enabling. Council (municipal, county or city) support and endorsement of initiatives and having these decision-makers on board were key to success and for moving forward. Departmental staff support, buy-in and willingness to work with public health were also deemed to be very important for success as exemplified in the following quotation:

...we've talked about planners here and how we have sort of have good buy-in with them. And the idea that they get it. And in fact, we've seen lots of stuff

come out of their planning professional organizations and what not. So I think we're not the only ones who understand the relationship between physical activity and other health outcomes associated with the built environment. So I think one of the enablers is knowing that there is kind of a receptive audience out there that wants to work with us. [Participant 2]

Changes in departmental staff perceptions over time were noted to be very important as well as described below:

So when I first started working on this, where I had engineers that said, "You put everything in you can on bikes and we'll do everything we can to take it out". To the point now that they are saying, "Hey, can you help us put something in on bikes so that we can make it work" and so that has changed. [Participant 1]

Community support, buy-in, readiness and a stated desire for a more walkable and bikeable community were also viewed as crucial enablers important for gaining governmental support for initiatives. One respondent remarked, "I think for us it's really the grass-roots support. If you have local buy-in...it makes it easier to sell to the municipalities." [Participant 14]

Engaged, involved and active communities were also emphasized as community level enablers. Because many community groups and coalitions were working on the built environment, walkability and active transportation, health units aligned with and collaborated with them. A few respondents noted it was community groups driving the agenda or partners that got the ball rolling regarding and that these partners had expertise in the area. Many positive qualities of communities emphasized included: keenness; wanting their opinions heard; willingness to work hard and collaboratively; and a large volunteer base.

Lastly it was identified that planners, engineers and public health staff were becoming more familiar with each other's roles and this was key to developing, implementing and ensuring success of interventions. Role clarity was discussed by one participant below:

... trying to determine what can we as a health unit provide to the built environment issue. Try to make that clear so that the municipalities know what they can expect from public health...having that kind of mutual understanding of what our role is in this whole area...that's been key, having those discussions. So that they know when they send over official plans, what they're kind of going to get back, right? They kind of know we're going to be speaking to issues of connectivity, sidewalks, trails, bike lanes, park land...[Participant 7]

### **Political structures and processes of communities served.**

Political structures and processes of communities were noted to be enablers by many participants, particularly in more rural regions (greater than 50% of the population resided in rural areas). Many public health units regions are comprised of multiple counties and municipalities. Although this was deemed to be a barrier in some instances, this was also stated to be to be an enabling factor. For instance, because municipalities were at varying stages of readiness, working with multiple municipalities ensured that there was always a municipality willing and ready to work on the issue. Those municipalities then became champions for further work on the built environment. One participant described this phenomenon:

And I'm really thankful that we have [a large number of] municipalities. To be honest, because some of the municipalities are ready to move on some of these issues. And so, if we can work with them and get some change happening, then they become advocates... with their peers and I think that that allows us an in-road that we wouldn't otherwise have. I can't imagine trying to work with one huge machine of a municipal government and trying to weave my way through that. [Participant 13]

Participants also described the ease of navigating political systems and enhanced communication with smaller municipal structures. A few respondents discussed that public health staff were more aware of whom to call and contacting them was easier because of the small nature of departments. Additionally, in some regions county planners also served as municipal planners due to staff capacity and this was thought to enhance the flow of information as information was shared among municipalities.

### **Leadership.**

Community perceptions of public health leadership and public health credibility were considered enablers. Participants noted the importance of public health being viewed as a credible organization and source of information and resources by community partners. Leadership, beginning at the very top of the organization, was also felt to permeate community members, as was noted by one interviewee below:

... our Medical Officer of Health right now is very keen on this issue. And I think that has made a big impact on, in our community because they see [the MOH's] involvement and I think they take note...I mean [the MOH] is involved with one of the trail strategies. [The MOH] has been very involved with the integrated community sustainability planning. [The MOH] comes to all our community events and participates... [the MOH] is very visible, well-known, and active and a huge supporter of looking at the built environment and its impact on health. [Participant 13]

Many respondents also discussed community leaders or champions, particularly those who held influential positions. This was highlighted in the following quote:

I think that the most successful so far have been the trails and I think what's contributed to that is that [two of our communities] have staff people who are particularly interested and moved it forward and so with the enthusiasm of those individuals they've been able to take the communities' way ahead with the trail development. So I really attribute it to individual personalities and enthusiasm.  
[Participant 1]

### **Local tourism.**

Highlighting additional benefits to active transportation and built environment modifications, such as the potential or actual tourism appeal was also found to be enabling. Respondents discussed how tourism was a large component of the economy and that tourist interest and demand for active transportation existed. A couple of participants noted well established trails and points of interest that have made recreational active transportation popular and have attracted tourists in their communities. Tourist destinations have the added support for developing and maintaining walkable and bikeable communities.

### **Rural Contextual Enablers**

A number of rural specific themes emerged from the data where participants highlighted special opportunities because of the rural context of communities. Positive qualities relating to the small nature of communities and environmental factors and geography related to rural contexts were highlighted as enabling structures or processes for interventions.

#### **Small, rural nature of communities.**

Almost all respondents discussed positive qualities of smaller communities that were felt to be enabling. This was mentioned twice as often by respondents whose health units serviced less densely populated regions. For instance, some felt there was less political red tape and layers of bureaucracy in more rural settings where there were smaller local governments. Developing relationships with municipalities and elected officials was noted to be easier in smaller communities. Health unit staff remarked they found: it easier to connect with key players; decision-makers were more involved and visible to the community; that they knew and connected with individuals on a more informal basis; and that individuals performed a variety of roles. This was highlighted below:

I think another piece of success is that in a small community people wear lots of different hats, so on our committees you get somebody who comes as—they wear their trails hat, for example, but the guy who's the trail representative on



our committee also works for the roads department for the County and so he talks about stuff like that even though that's not – he's not really officially there in that capacity. So that's a really beneficial thing. [Participant 10]

Many remarked that there was a strong sense of community in rural areas, which led to increased community action and engagement in issues, fostered a large volunteer base for initiatives, and led to more collaborative work.

### **Environmental factors and geography.**

Environmental factors and geography were repeatedly discussed as enabling by participants, but only in more rural regions. Existing built environment infrastructure and the natural environment were noted to be enablers in rural settings. Some respondents remarked that they had well developed trail systems along rail corridors, space to develop trail systems, rich natural environments that encourage physical activity, and paved rural roads for cyclists due to farming. These attributes were noted to be unique opportunities specific to rural contexts. One participant noted an increased appreciation for nature due to the rural context:

I think one of the things that we've noted is that there is an increased appreciation of nature and trails just because it's kind of part and parcel of the community and that there is a closer proximity to agriculture as an example. [Participant 6]

### **Systemic Enablers**

A number of systemic enablers were identified that were macro-system issues, that is they were outside of the organization and community.

### **Knowledge utilization, dissemination and sharing opportunities.**

Almost all respondents discussed the vast amount of research evidence and literature that exists on the relationship between the built environment and physical activity which enabled them to move forward in this area, even though most literature is urban based. Almost all participants discussed the importance of knowledge utilization, sharing and dissemination opportunities such as participation in provincial networks and committees such as the OPHA Built Environment Workgroup and physical activity networks. Knowledge sharing opportunities also included built environment webinars and conferences such as OPPI conferences, healthy community design, and CDP conferences. Information sharing across public health networks and among health units was also felt to be an enabler, as examples of successful interventions and challenges encountered in other communities furthered local health units work.

**Mandates, policies and provincial programming.**

Half of respondents noted the OPHS influenced implementation of built environment interventions. The mandate to address the built environment was outlined by one participant:

Just being mandated by the Ontario Public Health Standards. So within the Ontario Public Health Standards we are mandated to focus on the built environment as well, as it relates to healthy eating, healthy weights, physical activity, injury prevention. So that's a major influencer as well. [Participant 7]

Others noted more generically that it was part of public health's mandate, part of their job in physical activity and promotion to address the built environment, and part of a shift in public health to focus on policy development. A few others noted that provincial programs and accompanying funding, such as the Healthy Communities Program and the preceding Heart Health Program, spearheaded work in this area. Other external grants and funding opportunities, such as recreation infrastructure funding from the provincial and federal government and Heart and Stroke grants were deemed to be enabling for many respondents. Lastly, the provincial Places to Grow legislation was mentioned as influencing work in this area.

**Intersectoral collaboration.**

Intersectoral collaboration was repeatedly discussed by respondents as being key to successful interventions, more so among health units with a higher population density. Support and readiness to move the agenda forward with partners from other sectors was deemed enabling. For example, collaboration on interventions had occurred with the Ministry of Transportation and Ministry of Natural Resources, with the education sector, and with planners and the OPPI. The OPPI had developed and disseminated resources and documents and hosted conferences in which staff from all sectors, including public health, had attended. A few respondents discussed the benefits of the message about the built environment's impacts on physical activity coming from outside of public health as exemplified in the following quote:

It took the message coming from somewhere else, not just the health unit who's mandate it is to address health. People see this issue as "it's our job". Once others sectors saw it could benefit tourism and decrease injuries, it started to move forward. [Participant 12]

## Lessons Learned and Strategies for Moving Forward

Upon evaluating the barriers encountered and the enabling structures and processes for successful interventions, a number of lessons learned and strategies were identified for moving forward by participants.

The importance of building and maintaining partnerships was identified as the primary lesson learned by respondents. As one participant noted, all work in public health is grounded in partners. Communication mechanisms, such as speaking the same language; collaborative processes, such as cross sector collaboration; and consensus building were all highlighted as important processes. Some strategies put forth for improving communication included: getting health information and tools out to planners; learning planning language; and contracting work out to planners to have public health documents in ‘planner language’. It was also suggested that public health staff become familiar with planning documents and legislation through improved staff training.

Garnering community support was also felt to be imperative to success and was felt to be achievable through effective communication. Communication strategies identified for continued success included using repetitive and consistent messaging and having the message come from outside of public health, as this was felt to garner more public support. It was suggested that focused, manageable and realistic message be promoted, as highlighted in the following excerpt:

...when promoting active transportation in a community that’s rural, having a manageable message and focus. So in other words recognizing that most people drive a fair distance to get to work or to get in to town to go shopping, it’s probably not realistic for most of those folks to bike to do that, but so our message was park the car when you’re in town and then walk to do your errands. So it’s looking at what’s manageable and doable for people in a rural community given the current state of the built environment. [Participant 10]

Recognizing that interventions require political support and will, engaging and strategically working with decision-makers and elected officials who make the changes to the built environment were identified as effective strategies for moving forward. Acknowledging competing interests and financial restraints and working with municipalities to find collaborative solutions within budgetary constraints were also discussed.

Lastly, many participants discussed the slow, arduous process of behaviour change at both an individual and population level. Many mentioned that change takes time, it is a long process and that it is sometimes an uphill battle that takes patience, perseverance, maintenance of realistic expectations, and thinking outside of the box.

## **Chapter Summary**

In summary, this chapter outlined research findings for the research questions regarding the types of interventions health units were engaging with regards to the built environment and physical activity, and barriers and enablers to these interventions. This chapter began by summarizing the characteristics of the public health unit's and the respondents who participated in the study. The characteristics of the population and communities served by the participating health units were also presented to provide contextual background for the study. Findings were then presented regarding actual interventions that health unit's were employing related to the built environment and physical activity and barriers and enablers to these interventions. Finally, lessons learned from encountering barriers and enablers and strategies for moving forward with work in this area were presented.

## **Chapter 5: DISCUSSION AND CONCLUSION**

This final chapter will outline how the study findings corroborate the literature regarding the built environment and physical activity, particularly in rural settings. Following this, implications of the research findings will be outlined for: public health practitioners and researchers; public health organizations; and the municipal sector. The chapter concludes with strengths and limitations of the study and knowledge translation strategies for dissemination of the findings.

This study was conducted to explore how rural health units in Ontario are integrating the built environment into public health interventions related to physical activity and to explore barriers and enabling structures to those interventions. Given there is relatively little research on rural interventions and on types of interventions health units are employing regarding the built environment, the following research questions guided the study.

Research questions included:

1. How are rural health units in Ontario interpreting and integrating the built environment into public health interventions related to physical activity?
2. What specific interventions have or are being implemented that address the built environment specifically related to physical activity?
3. What barriers and/or enabling structures exist when addressing the built environment related to physical activity?
4. What would assist staff in rural health units in their work related to enhancing the built environment to promote physical activity?

### **Context**

As was noted by some participants and by Dunn (2008), the importance of local context must be emphasized. Health units in the current study possessed varying organizational structures and governance models, decision-making processes, readiness for change, cultures, and histories. Health units varied based on: political geography; their make-up in terms of the number of counties, districts and municipalities; the physical geography in terms of the land mass; and the demographics of the population served. Even within some health units regions there were great variances because of large geographic areas and large numbers of communities served. A couple of respondents noted they were unable to speak to interventions occurring in other districts or communities, as they were only familiar with their own district. Some health units had satellite offices which added another layer of complexity due to the physical geography separating offices, differing cultures in communities and within satellite offices, and languages spoken. Additionally, because of the small number of staff and capacity in many of these satellite offices, the breadth of programming was different, as the focus on service delivery was on traditional mandated programming and not the built environment.

The degree of rurality also varied. Rural communities are all very different and should not be painted as a catch all term for non-urban. This study did not highlight the variability in the term 'rural'. It is important to note the limited amount of analysis that has been done regarding inter-rural differences, both in the current study and in the existing body of literature. Based on findings from this study, there were no stark differences in terms of the interventions, barriers or enablers based on population density or the percentage of the population that was rural. Population demographics did not seem to be a major factor differentiating health unit results. Therefore, the level of analysis was at the health unit level.

Within this study notable differences in context and subtleties included: seasonal population changes with tourism, cottagers and seasonal workers which have contributed to infrastructure changes; industry, such as car manufacturers and mining which negatively and positively affected interventions; agricultural communities, which affected development patterns, infrastructure development and farming equipment on the roads; demographics such as Mennonite, Amish, and First Nations communities; and inclement weather in snow belt regions. These were just a few of the local contextual issues highlighted by this study. Hence, it is clear that best practices will not be a one size fits all solution and lessons learned will vary based on local contextual issues.

### **Findings in the Context of Earlier Research**

Themes that emerged from the current study regarding public health interventions, barriers and enabling structures and processes related to the built environment and physical activity largely corroborate concepts in the existing body of literature. These themes, as well as those not found in the literature, will be discussed in the following section.

#### **Comprehensiveness and Intensity of Interventions**

Comprehensiveness of interventions, determined by examining the number of interventions (themes) and activities (subthemes) varied by health unit but did not differ based on the density of the population, degree of rurality, or geographic location. The intensity of interventions also varied by health unit, but again was not related to density or rurality. For instance, participants who described their health unit as 'policy focused', were focused intensely on policy related work and reported less concentrated work in other areas. Health units that reported little work in the policy arena described in greater detail more focused activities related to education and awareness raising, and building and working with community partners.

Respondents in the current study discussed the top-down (policy driven) versus the bottom-up (awareness raising in the community) approach to interventions and one

respondent noted the importance of a simultaneous top-down and bottom-up approach. Awareness raising and social marketing were not mentioned in the current study by all respondents, as many noted they were moving towards more policy related activities. However, if policy is the primary focus, and education of the community and partners is neglected, support and buy-in for policies that are required to generate change and to improve the effectiveness of built environment interventions may not be present. Lack of awareness was mentioned as contributing to community opposition to sidewalk development in subdivisions. One participant described how at first a community member had signed a petition opposing sidewalk development in the neighbourhood; and following education regarding the impacts of the built environment, that community member was now actively involved and advocating for sidewalk and active transportation development. Furthermore, if health units are only engaged in policy related activities, it is questionable how relevant this is to the public to which they are meant to serve.

It is likely that comprehensive programming which incorporates a combination of interventions will be more successful and subsequently lead to more active lifestyles and increase physical activity (Pucher et al., 2010). This may include health education and awareness raising, as well as developing and implementing supportive policies. Pucher et al. (2010) summarized a number of international case studies where comprehensive packages of interventions have been implemented and have been successful at promoting active transportation. These comprehensive packages included a wide range of policy interventions, infrastructure changes and marketing campaigns. For example, in Odense, Denmark, improvements to 500 km of bike lanes and paths, the addition of car free zones, improvements to cycling infrastructure (bike boxes for cyclists, special road markings), improved and expanded bike parking, and promotional programs have resulted in an 80% increase in bicycle trips from 1984 to 2002, with a 29% decline in injuries from 1999-2004 (Pucher et al.). In Boulder, Colorado, the construction of over 100 miles of multi-use pathways, 74 miles of on-street bike lanes, 195 miles of paved shoulders, bike parking, and education and outreach programs have resulted in the doubling of workers commuting by bicycle from 3.8% in 1980 to 8.8% in 2006 (Pucher et al.). Lastly, in Portland, Oregon a 247% increase in the miles of bike lanes and paths, special bike-only traffic signals, mandatory bike parking, road closures to cars, and education and marketing have resulted in: a 60% increase in the number of workers commuting by bicycle, while the number of workers increased only 36%; an increase in the number of bicycles crossing downtown bridges by 37%; and a 14% decrease in reported crashes from 1990-2008 (Pucher et al.).

### **Policy Related Activities**

All public health agencies reported to be involved in policy work, whether they were providing input into, developing or implementing policy.

Recommendations have been made for public health practitioners to advocate for or participate in local planning processes to support and/or contribute to policies, master

plans, smart growth principles, planning and zoning meetings to create healthier environments (Durand et al., 2011; Jackson & Kochitzky, 2010; TRB, 2005). This has seemingly struck a chord, as the current study found health unit policy activity participation was primarily at the county and/or municipal level. All respondents discussed their health units involvement in influencing municipal or regional planning policies from a public health perspective. Participating in the development of local strategic policy documents enables health agencies to respond to local community needs and their unique contexts. However, no examples were found in the literature evaluating the effectiveness of public health's input into municipal policies such as planning documents. Public health input is being sought by municipalities, but in the absence of long term data, the effectiveness of this input and whether this has improved health outcomes is unknown. Evaluation is needed to determine whether input into and participation in this process has measurable changes to the municipal plans themselves and whether these changes translate into any long term health outcomes.

All health units provided input into municipal policies, with little variance based on population density or percentage of rural population for official plans and master plans. Health units serving a larger rural population reported providing input into sustainability plans, strategic plans and individual planning applications; whereas less rural health units reported less input into these documents. It is unclear why more rural health units reported to be more involved in more policy work at a county or municipal level. Participants discussed enabling structures and processes of a smaller and more rural community, such as the ease of developing relationships and the accessibility of municipal planners, which may have contributed to increased involvement. It may be that policy related activities are more highly valued with more limited financial and human capacity in more rural health units. The greater participation of more rural health units is interesting to note, as existing literature suggests policy development in rural communities is particularly challenging. A recent study by Aytur et al. (2011) found public health practitioners were less involved in rural planning processes than urban ones and reiterated the need for greater collaboration between planning professionals and public health professionals. The Rural Communities Impacting Policy project found people living in rural communities are often excluded from policy decisions (Dukeshire & Thurlow, 2002; Langille, Munro, Romanow, Lyons, Bull, & Williams, 2008). Dukeshire & Thurlow (2002) reported rural communities face significant challenges such as: lack of understanding of the policy process; lack of community resources such as funding, education and training; greater reliance on volunteers; and lack of access to information such as research. However, the current study suggests public health professionals and community partners are participating in the policy process as it relates to planning documents in rural settings. The results also indicate the more rural health units in fact have greater involvement in the policy process at a municipal level with contributions in *all* municipal planning documents. It may be that not all counties or municipalities develop each of these policy documents. Additionally, the current study did not compare urban with rural health units, but examined the degree of rurality of participating rural health units. It would be valuable to compare urban and rural health



units in Ontario to determine the extent to which they are participating in the policy process, if the above mentioned challenges exist in more urban settings, and to determine the successes and challenges regarding the policy process.

Participants discussed providing input into provincial policies, such as the Provincial Policy Statement and provincial bills such as Bill 100, the Public Transportation and Highway Improvement Amendment Act, 2010. Again, no literature was found on the impact or effectiveness of public health input at this level or the effectiveness of provincial built environment policies. Previous provincial policies that public health has spearheaded, such as the tobacco strategy, have led to supportive policy environments leading to positive behaviour change at a population level. There is evidence of effective policy environments, such as the tobacco programs banning smoking in public places, which have led to documented decreased tobacco consumption (Ashe, Graff & Spector, 2011). It is unclear if policy environments regarding the built environment will amount to similar behaviour changes. With provincial policies it is likely a number of policy interventions, not just one, that would amount to a normative environment for healthier choices such as active transportation.

The federal government has made supportive environments a priority policy area to address the obesity epidemic with the initiative *Curbing Childhood Obesity: A Federal-Provincial-Territorial Framework for Action to Promote Healthy Weights* (PHAC, 2011). This document mentions community design and its influence on physical activity levels, but it does not outline how to address the built environment to positively affect physical activity. However, no national policy or action plan was mentioned by participants or found in the literature that would address how to build or modify the built environment to positively impact physical activity. A national strategy would provide direction for all of the sectors and key players involved, identify leadership for work in this area, and indicate widespread political commitment (Global Advocacy Council for Physical Activity, 2010). It would also demonstrate an understanding of chronic disease risk factors and a commitment to address CDP, which was highlighted as a need by respondents in the current study. Aytur et al. (2011) and Gangeness (2009) both recommended local officials, including public health practitioners, advocate for provincial and federal policies to address the built environment and physical activity.

### **Partnerships and Collaboration**

The importance of developing partnerships and multi-sectoral collaboratives has been highlighted repeatedly in the literature (Frank & Engelke, 2005; Jackson & Kochtitzky, 2010; Perotta, 2011; Renalds et al., 2010; Tucs & Dempster, 2008). Establishing and working in partnership and collaboration with community partners, networks, coalitions, governmental bodies both within the health sector and with other sectors (education, agriculture, environment) is also a cornerstone principle in the foundational Ontario Public Health Standards (MOHLTC, 2008a). The quality and scope of partnerships is deemed a fundamental indicator of success in the standards. Hence, it is important to note

that all public health agencies reported involvement with community partners, coalitions and committees as a primary intervention and as a primary enabler to successful interventions related to the built environment. All respondents discussed the number one enabling structure was positive existing partnerships and the building and maintenance of external relationships.

Relationships that were discussed were primarily with municipal planners. This is significant as much literature focused on reinvigorating the relationship between planning and public health staff. In 2004, the CMOH released a report that recommended the province of Ontario commit to reversing the trend to overweight and obesity with a broad, intersectoral approach. The report specifically called on public health practitioners to work with land use planners, emphasizing the role of the built environment on health outcomes. Aytur et al. (2011) found planners in North Carolina were more likely to collaborate on active transportation plans (pedestrian and bicycle plans) with more non-traditional interest groups, such as business groups and non-profit groups in rural settings than when developing urban plans. However, public health staff were less likely to be involved with planners in rural settings. The authors indicated there was greater collaboration and partnership building in rural settings but less public health involvement (Aytur et al.). Contrary to this work, the current study found public health staff were collaborating with many non-traditional partners, such as planners, on many interventions including transportation plans. This may be due to the shift in public health practice towards more policy development activities. The OPHS have established requirements for fundamental public health programs and services, which includes health promotion and policy development (MOHLTC, 2008a). Half of the participants in the current study mentioned the OPHS as influencing their health units in addressing the built environment.

The small size of communities and rurality of areas was noted as key to developing and maintaining positive relationships with community members and partners where people: individuals and stakeholders already knew one another and knew who to call; were able to meet with one another more easily; were more aware of who key players were; and connected with key players informally due to chance encounters in town. These positive relationships also led to improved communication and collaboration in such settings. The findings corroborate existing literature. Gangeness (2009) found rural women felt they had decision-making authority, that their voices were ‘being heard’ by local government officials and policy makers, and that this influenced the availability and maintenance of rural built environments conducive to physical activity. The women attributed this to the unique positive relationships they had already formed with local decision-makers because to the nature of the small, close-knit, rural community (Gangeness). Respondents in this study noted there was a strong sense of community and community engagement, which they felt led to increased public participation and a large volunteer base. Similarly, Aytur et al. (2011) found greater public participation in the development and implementation of active transportation plans in the rural setting compared to planning in the urban setting. Dukeshire & Thurlow (2002) have found that low rural populations can lead to a small

number of volunteers or over commitment of the same individuals volunteering. However, volunteer fatigue was not mentioned as a barrier in this current study.

Participants believed it was easier to navigate political systems in smaller more rural communities, as there was less red tape and less bureaucracy in smaller, more rural communities, which corroborates existing literature in this area (Gangeness, 2009; TRB, 2005).

Respondents felt smaller, more rural communities fostered improved communication, collaboration and positive relationships with partners. These findings highlight the need to capitalize on the opportunities available in smaller, more rural communities such as developing partnerships and working collaboratively on built environment interventions. Hence, the increased opportunities for communication highlighted in the present study may foster improved collaboration with other professionals.

When partnerships were deemed a barrier, it was primarily due to competing interests, individual lack of buy-in and lack of communication between partners. One plausible explanation for competing interests and priorities of those involved is the lack of resources noted by many respondents. Building positive relationships may address competing interests if human and financial resources can be shared and there is decreased duplication of services and resources. One respondent noted the importance of working closely with partners because the health unit was simply unable to do the work alone.

Similarly, forming or enhancing relationships with community partners may improve buy-in, as taking the time to develop positive relationships may improve partner awareness and may increase support for initiatives. Increased community support also may increase political buy-in if constituents are pushing for or supporting change.

Improving communication between partners is essential for collaboration. San Martin-Rodriguez, Beaulieu, D'Amour & Ferrada-Videla (2005) in a review of the literature on successful collaboration on health care teams found that communication is a critical element that influences the degree of collaboration. The authors suggest that there are three main reasons why communication is key to collaboration: 1) health care professionals need to understand how their work contributes to outcomes and how to communicate this to other professionals; 2) efficient communication allows constructive negotiations with other professionals; and 3) communication is a vehicle for other determinants of collaboration, such as trust and mutual respect (San Martin-Rodriguez et al.). Mechanisms for improving communication and collaboration with partners may be accomplished through: building healthy community forums or workshops; creating a local network for communicating; including partners and decision-makers on committees such as Healthy Communities Partnerships; building cross sector committees that address identified community priorities; and collaborative training sessions and conferences.

One participant noted that planners were unsure why public health was at the table on built environment issues, demonstrating that public health's role related to the built environment and physical activity is not apparent to all players and sectors. San Martin-Rodriguez et al. (2005) also found that familiarity with, understanding and valuing the roles of other professionals facilitated interprofessional collaboration. Hence, role clarity with partners is also vital and may improve collaboration between key players.

### **Gathering and Providing Evidence (Surveillance, Research and Knowledge Exchange)**

Surveillance is another foundational standard in the OPHS (MOHLTC, 2008a). Measuring the effects of the built environment and surveillance of health effects is mandated in the OPHS. However, no recommendations have been given to health units for surveillance or measurement and currently there are no standardized indicators relevant to the built environment and its influence on physical activity (Bergeron, 2009a). Work is underway by the Ministry of Health to develop performance indicators to accompany the OPHS related to physical activity, but none exist as of yet related to the built environment (Salamo, 2012). This was iterated by one respondent who noted they did not have access to any built environment measures. The APHEO are currently developing public health indicators relevant to the built environment for local public health units to measure and monitor the impact of the built environment on population health outcomes. They are developing indicators at the street, neighbourhood, city and inter-city level. Indicators currently under development include density, street connectivity, and land use mix (Mahendra, 2011). However, it is unclear if they will be relevant to or specific to a rural setting. Once the built environment indicators and physical activity measures become available, it is felt that health units will be able to participate more fully in surveillance activities and will better able to meet the OPHS requirements.

Smaller health units discussed staffing concerns and capacity. A few respondents noted their health units did not have an epidemiologist for a long time or that the health unit had only one epidemiologist. This was limiting as time dedicated to conduct built environment and physical activity surveillance activities was restricted or nonexistent. With such emphasis placed on surveillance, both human and financial resources need to be addressed at an organizational level. Additionally, human resources may make implementation of the standards particularly challenging.

Research and knowledge exchange are a foundational standard in the OPHS (MOHLTC, 2008a). Research may involve the primary collection of new data or the analysis or synthesis of existing data and research findings. Three questions were posed regarding gathering evidence in this study. They included: whether health units were collecting local neighbourhood data on built environment characteristics or physical activity levels; whether health unit's were participating in or conducting research related to the built environment; and whether community needs assessments had been done. All denoted gathering and collecting evidence to make a case for built environment interventions.

Data collected by health units was reported as being primarily qualitative in nature, addressed perceived measures of built environment metrics (e.g. walkability, bikeability) and their effects on physical activity (e.g. barriers to active transportation), and was gathered through direct consultation from community members via public surveys, public forums, key informant interviews and a PhotoVoice project. Only one respondent discussed objective, observational data collection. This corroborates the literature which suggests much of the evidence of the association between the physical environment and physical activity is derived from perceived measures as opposed to objective measures (Brownson et al., 2009). Many studies have examined the perceived environment and found personal preferences and perceptions can impact active transportation and physical activity (Brownson et al., 2009; Dunn, 2008; Gebel et al., 2005; Frank et al., 2007; Raine et al., 2008). Respondents indicated that existing data was collected, analyzed and synthesized from data sets and sources, such as the OSDUHS, CCHS, RRFSS, best practice information and evidence from urban settings. Hence, a variety of new and existing data was being collected and synthesized to inform practice.

A need was identified by participants to gain access to local or neighbourhood data. The lack of neighbourhood data has also been identified in the literature as problematic, as it renders data collection, priority setting and program evaluation difficult (Brownson et al., 2006; Papas et al., 2007). Bergeron (2009a) also previously noted there is a need for data sources available at the health unit or neighbourhood level.

In the present study there were numerous references to the importance of evidence informed action and evidence based practice. It was clear that evidence, applied research and best practice information was not only valued by public health practitioners, but also informed decision-making and practice. Many respondents discussed the existing body of literature linking the built environment and physical activity and the difficulty in applying this to a rural setting, as much of the evidence is based in an urban setting or does not define the rural environment. Respondents were highly aware of existing evidence but unsure how applicable or transferable it was to their rural context. This was also noted in the literature (Bergeron, 2009a; Gangeness, 2009; Renalds et al., 2010). Many respondents noted the need for further research and best practice information in rural environments and were eager to note their involvement in the potential upcoming Locally Driven Collaborative Projects through Public Health Ontario (PHO) regarding best practices in rural environments (E. Arnett, Personal communication, October 17, 2012). The findings from the PHO Locally Driven Collaborative project outcomes (rural best practices project) should fill an identified gap regarding best practices in these settings.

## **Evaluation**

Although it was not identified as a barrier, many respondents remarked their health units or program areas were not engaging in formal evaluations of built environment interventions. This corroborates with a report by CIHI (2006b) that found that only 10%

of 413 Canadian policies and initiatives that promote healthy eating and active living had an evaluation component. When respondents in the current study were probed as to why evaluation might not be occurring, lack of local data, lack of resources and a lack of skill in data analysis and interpretation were noted to be barriers to evaluations. Existing literature also notes lack of local or neighbourhood data makes program evaluation difficult (Brownson et al., 2006; Papas et al., 2007). Lacking the training and skill set to carry out an evaluation was also mentioned as a barrier by respondents. The lack of knowledge and skill of evaluating health promotion programs in partnerships with stakeholders has also been identified as top 10 learning need in a Pan Canadian Survey of Community Health Nurses (Schofield et al., 2009). Improved program collaboration may address the lack of resources, as more staff would be involved in initiatives, skill set would be strengthened and there may be improved access to evaluation specialists and epidemiologists. Additionally, training in evaluation is an opportunity for professional development which may benefit many program areas, particularly for staff with multiple job profiles.

A few respondents noted evaluations related to population health and CDP are complex and difficult to conduct, as interventions are complex, individualized, dependent and based on context, and have long-term outcomes. This coincides with the work by Dunn (2008) who addresses the complexities of evaluating built environment interventions in population health. These interventions have: a complex set of casual phenomena; little experimental data to review; a wide range of stakeholders and fields of study; actions difficult to standardize across settings; actions which are directed to prevent disease among large populations that have both individual and population based risks; and uncertainty regarding effects on population subgroups (Dunn). Dunn (2008) has suggested that complex, context specific population health interventions aimed at both individual and population based risk, should utilize a realist review to evidence appraisal regarding built environment interventions and for summarizing results of studies in the population and public health sciences.

Realist approach to evaluation is a model of research synthesis that acknowledges that public health and population health interventions are ‘complex social interventions which act on complex social systems...programmes whose effects are crucially dependent on context and implementation’ (Pawson, Greenhalgh, Harvey & Walshe, 2005). Realist review examines existing observational evidence from population health studies, attempts to discern what works with whom, in what circumstances, in what respects and how, with the intent to enable decision-makers to reach a deeper understanding of the intervention and how it can be made to work most effectively and in what context (Dunn, 2008; Pawson et al., 2005). This approach seems most fitting when looking at complex built environment interventions addressing a number of health outcomes, including physical activity. This approach was not mentioned by any participants and warrants further investigation as an appropriate model of evidence synthesis for health units in Ontario employing complex interventions.

### **Additional Barriers to Interventions**

Health units that served a more rural population reported less organizational barriers than less rural health units. For instance, more rural health units noted with *less frequency* that public health staff knowledge and training and financial and human resources were barriers. The reasons for these results are unclear and warrant further investigation.

Barriers to health unit interventions, both community level and rural specific, mentioned with the greatest frequency in the current study generally corroborated existing literature on perceived and objective barriers to engaging in physical activity. Barriers included: car dependency; road and infrastructure conditions; lack of infrastructure and facilities; economic constraints; personal safety; weather; and industry.

Car dependency due to long distances between points of interest and proximity to destinations, including opportunities for physical activity, was overwhelming the number one rural barrier found in the current study and supported in the literature (Duncan & Mummery, 2008; Dharod, Drewette-Card & Crawford, 2011; Eyler & Vest, 2002; Galloway, 2006; Van Dyck et al., 2010). This is a difficult barrier to combat as car dependency is a reality in remote and rural areas. However, one participant noted messaging in rural areas should be more focused on using active forms of transportation *after* arriving in more urban or commercial areas. For instance, encouraging residents to walk between retail destinations they have driven to in a more urban setting.

Infrastructure conditions, such as inadequate or too few sidewalks, poor condition of existing sidewalks, and uneven roads, were also noted in the literature (Badland, Duncan & Mummery, 2008; Eyler & Vest, 2002; Riley-Jacome, Gallant, Fisher, Gotcsik & Strogatz, 2010). Respondents in the current study noted it was unrealistic to assume rural areas would have sidewalks along busy highway roads. The condition of rural roads was viewed as a significant barrier in the current study. Lack of paved shoulders, gravel roads, absence of fog lines or painted lines, and poor conditions of rural roads were noted by participants. Some of these conditions were also noted in existing literature. Eyler & Vest (2002) found women in rural areas perceived gravel roads to be a barrier to engaging in physical activity. Frost et al. (2010) found the presence of shoulders on rural roads positively impacted physical activity levels in rural areas.

Gangeness (2009) found economic constraints were more pervasive in smaller, more rural communities due to lack of funding, a limited tax base and inadequate resources which limited the opportunity to develop, maintain or enhance environments that enabled physical activity. This was supported by the present study, as financial resources and funding were mentioned by a number of respondents. The small economic tax base and the large amount of built environment infrastructure were felt to be challenging. The large volume of roads to maintain and municipal budgets earmarked for infrastructure maintenance prevented the development of active transportation infrastructure. Addressing these barriers is difficult as it comes down to money and political will.

Provincial legislation such as Bill 100, addresses the paving of shoulders of roads. Many municipalities have included in their transportation master plans the paving of shoulders and painting of fog lines as the need arises to resurface roads. Hence, there may be an opportunity for public health professionals to advocate for inclusion of these policies both locally and provincially. This would address many of the conditions of rural roads mentioned as barriers.

Galloway (2006) noted rural communities often lack infrastructure to support recreational facilities, such as soccer fields and public pools. Eyster & Vest (2002) found rural women felt there were fewer opportunities to be physically active. Lack of recreational facilities was mentioned by only two respondents in the current study. In fact, proximity to nature and existing trail networks in rural areas were deemed to be enabling structures in the current study. It was noted that existing trail networks and the space available in rural settings provided an opportunity for further trail development that otherwise would not be possible in a more urban setting. Frost et al. (2010) found positive associations between the presence of recreational facilities, trails and parks and the distance to these facilities and physical activity. This is promising with the number of trail networks that were discussed by participants; however, there may be room for improved promotion of existing trail networks and physical activity opportunities. There may also be an opportunity for public health staff to facilitate the connection between community partners and rural schools and faith groups to address access to physical activity and recreational facilities in rural areas through joint-use agreements.

Traffic safety and perceived personal safety were also highlighted as potential barriers to physical activity in the literature (Badland et al., 2008; Carver, Timperio & Crawford, 2008; Eyster & Vest, 2002; Foster & Giles-Corti, 2008; Riley-Jacome et al., 2010). Traffic safety was reported as a barrier in the present study and included concerns regarding the volume and speed of traffic and users of rural roads. Evidence shows that traffic calming measures in urban communities decrease traffic related injuries, increase perceived safety, and may improve physical activity levels (Elvik, 2001; Heath et al., 2006; Lavin et al., 2006; LFC, 2008). Hence, in small population centres, such as hamlets, villages and towns, traffic calming measures may be effective strategies to decrease traffic speed and traffic related injuries. Personal safety was mentioned, but more so parental fears for children related to 'stranger danger'. Parental restrictions of physical activity due to perceived stranger danger warrants further investigation, as little research is available in this area for rural communities. Additionally one respondent mentioned some residents, particularly women, were concerned about local wildlife. This was unique to this study and was not found in the literature. Weather was noted to be a barrier in the current study, particularly in snow-belt regions, where snow removal and blowing and drifting snow were mentioned to be both expensive and a safety concern. This contextual issue was also noted by Dharod et al. (2011) and Riley-Jacome et al. (2010).

Industry was discussed as a barrier in the current study. One participant discussed local car manufacturer opposition to interventions encouraging active transportation, as



interventions were viewed as ‘anti-car’. This was not addressed in the existing body of literature. There may be an opportunity to invite local industry and businesses to the table regarding these initiatives, as partnering with or involving these community partners would improve their understanding of the issue, buy-in and would assist moving work forward in this particular area.

### **Additional Enabling Structures and Processes to Interventions**

The importance of leadership within the health unit and community was mentioned by respondents as another enabling structure in the current study. This concurs with literature which demonstrates that health and environmental departments with innovative leaders and positive attitudes had greater odds of achieving changes to the built environment (Kuiper, Jackson, Barna & Satariano, 2012). Kuiper et al. (2012) found leadership that most prepared their departments for built environment work was achieved through staff updates, structure and strategy, tripled interagency and cross-sector collaboration. Leadership of successful departments: established and maintained a healthy built environment vision; cultivated innovation; supported, empowered and protected staff; directly engaged land use and transportation processes; established direct contacts with directors in other departments; and leveraged their professional reputation (Kuiper et al.). In this current study, leadership within the health unit or organizational level was mentioned less frequently than leadership within the community. This is perhaps an area for growth, as stronger leadership within organizations may prove to be not only an enabling structure, but key to greater success for work in this area.

Chillon et al. (2011) found interventions to improve active transportation to school were more effective when the school, parents and the community were engaged and when the intervention worked towards the specific goal of improving active transportation and were not broader in focus. This has implications for school travel planning projects. Focused programming, as opposed to broader healthy school initiatives, may be more effective in improving active transportation.

In conclusion, many of the barriers and enabling structures and processes to interventions that respondents noted in the current study corroborate with existing literature. In the present study, human and financial resources at an organizational level, political structures of the communities served, partnerships at a community level, and environmental factors and geography in the rural setting were mentioned as both barriers and enablers to successful built environment interventions. The implications section that follows will address many of the barriers outlined in this section.

### **Disciplines working on the Built Environment and Physical Activity**

In the present study the primary disciplines reported to be working on built environment interventions related to physical activity were health promoters and PHNs. Other disciplines involved in built environment interventions included PHIs, nutritionists and

dietitians; however, they were less involved in physical activity related interventions and were more focused on air and water quality and access to nutritious foods. Two respondents noted their health units did not employ PHNs to work in the area of the built environment. Two other respondents reported that their organizations did not employ health promoters or health promotion specialists for these initiatives. It was unclear as to why certain health units employed one discipline over the other related to the built environment and physical activity, or whether one discipline was better suited for work in this area, as these were not questions addressed in the interviews.

It was clear that respondents felt that public health should be involved in built environment interventions and this role is supported in the Public Health Agency's Core Competencies<sup>28</sup> for public health practitioners, which outlines public health's role in building healthy communities through engaging in the policy environment (PHAC, 2008b). However, which discipline should take the lead on this work or the skill set required, has yet to be defined and would be valuable to investigate. The release of the core competencies was a catalyst for discipline specific competencies, such as those developed for PHNs (Community Health Nurses Canada [CHNC], 2009) and those being developed for health promoters (Hyndman, 2007). However, the competencies for health promoters are still underway.

### **Relevance to Nursing: Role of the Public Health Nurse**

Only four respondents in this study were PHNs, which led the researcher to question whether PHNs were involved in these interventions or equipped to work in this area. Despite the small sample of PHNs, all but two health units employed PHNs in this area. Participants outlined their roles in relation to the built environment and many of these were consistent with the roles and activities of a PHN outlined in *Public Health – Community Health Nursing Practice in Canada: Roles and Activities* (Canadian Public Health Association [CPHA], 2010) and the Canadian Community Health Nursing Standards of Practice (CCHNSofP) (CHNC, 2011). For instance, the PHN role in Health Promotion includes, “encouraging the adoption of health beliefs, attitudes, and behaviours that contribute to the overall health of the population through public policy, community based action, public participation and advocacy on environmental and socio-economic determinants of health; and supporting public policy changes to modify physical environments that contribute to risk” (CPHA, 2010, p.16).

Many activities of the PHN outlined in the document are consistent with roles and activities highlighted by participants in the current study including:

- advocacy, such as using advertising and media for advocacy;
- capacity building in the community;

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<sup>28</sup> The Public Health Agency's Core Competencies outline the knowledge, skills and attitudes necessary for all practitioners of public health, regardless of the specific discipline (PHAC, 2008b).

- identification of opportunities and building coalitions and networks to promote health;
- communication, such as works to achieve inter-agency and inter-governmental cooperation;
- health education in supporting knowledge development, generation and translation and uses content expertise to offer formal presentations;
- leadership by initiating and participating in intersectoral efforts;
- participation in policy development, implementation and evaluation;
- research and evaluation activities (CPHA, 2010).

In the current study, building and maintaining external partnerships were emphasized as both interventions and as key enabling processes to successful interventions. The establishment, building and nurturing of professional relationships is also a foundational standard in the CCHNSofP (CHNC, 2011). Building a network of relationships and partnerships is deemed an essential role of a CHN. Similarly, a primary role of the PHN is building coalitions and networks to promote health, providing support to coalitions or networks, and helping to create links between partners, coalitions and networks (CPHA, 2010).

Additionally, the shaping and making of supportive policies that was highlighted in the current study is also supported as a role of the CHN in the CCHNSofP, which state: “advocating for healthy public policy by participating in legislative and policy-making activities that influence the determinants of health” (CHNC, 2011). Similarly, a guiding principle for CHNs in the *Public Health – Community Health Nursing Practice in Canada* document is to lead efforts to devise and promote public policy which will enhance communities (CPHA, 2010). Hence, the important work of policy related activities regarding the built environment are noted in key public health documents to be an important role of PHNs.

PHN’s possess the skills, assets and competencies required to do work in this area, however they may need more specific training or resources to gain expert knowledge in this area. This was identified as a need by some respondents in this study, but not specifically PHNs. The number one strategy identified for moving forward at an organizational level was increased training and expertise around the planning milieu, language and legislation for all public health professionals involved in built environment interventions.

## **Implications from this Research**

A number of recommendations will follow for public health practitioners, researchers and policy makers and shapers at an organizational and municipal level.

### **Implications for Public Health Organizations to Support Public Health Practitioners**

Based on the findings from the current study, public health practitioners and organizations are engaged in and working on built environment initiatives to improve health outcomes. However, how this work is being done and the focus of work differs based on public health agency structure, individual staff buy-in and support, available resources, and individual capacity or skill set. The following recommendations are meant to address the varying rural contexts and needs outlined in the current study and supported by literature.

#### **Improve role clarity.**

Improved role clarity for public health staff is crucial to: improve consistency of approaches to addressing the built environment across health units; to enhance capacity within the organization to address the built environment and physical activity; and to further engage partners outside of the health sector.

- Increase the understanding of public health's role related to the built environment both within the public health organization and with community members and partners. For instance, clarifying that the role of public health is to encourage planners to understand the connection between planning and health.
  - Improve role clarity within the organization as to what is within the public health mandate and what public health can bring to the table regarding this discussion
  - Improve clarity within the OPHS for public health staff to understand their larger role in the issue
  - Discuss the role of public health staff (health promoters, public health nurses, epidemiologists) related to the built environment with partners, such as planners, engineers and community agencies

#### **Improve practitioner training and professional development opportunities.**

- Provide basic internal staff training to increase awareness among all public health practitioners about built environment impacts on health.
- Provide training and support professional development opportunities for public health staff involved in built environment interventions, such as program leads, to increase their knowledge and skill related to:

- Planning, developing, implementing and evaluating interventions related to the built environment;
- Planning department structures and processes;
- Key players/stakeholders involved in built environment design (transportation, engineering, property developers, planning, elected officials);
- Planning language and legislation; and
- The political process and how to become involved.
- Training should be accessible, such as webinars, in-house training, and should include intersectoral opportunities

**Enhance organizational leadership.**

- Encourage cross program communication and collaboration through staff updates, direct contacts with directors/managers of other departments.
- Cultivate innovation within the organization.

**Enhance public health service delivery.**

- Provide comprehensive programming, including health education and awareness raising aimed at increasing community support, as well as policy interventions such as influencing and developing healthy public policy.
- Engage in communication campaigns and social marketing to increase public awareness, community and stakeholder support for built environment interventions to address physical activity.
- Promote consistent, realistic and doable messages in rural environments. For example, large distances between points of interest are a reality. Therefore, promote active transportation once at points of interest, such as walking between retail stores after having arrived in a community or urban centre.
- Promote existing infrastructure such as trails, green space, parks, and paved shoulders and in the absence of such, support policies to establish access to recreational facilities and active transportation infrastructure.
- Provide consistent, context specific feedback from a public health perspective into municipal and regional policy planning documents and by-laws such as:
  - official plans (land use planning and mixed land use, transportation and active transportation plans),
  - local community plans (connectivity, mixed land use, proximity and access to green space and parks),
  - parks and recreation plans (proximity, mix), trails plans (connectivity, accessibility, proximity),
  - subdivision plans (connectivity, green space, mixed land use), and
  - individual development applications (that support healthy built environment objectives) through formal review processes, advisory committee representation, presentations to municipal staff and elected

officials, delegations to Council, Board of Health motions and presentations, and community consultations.

- Develop how to documents and tools for public health practitioners for the above planning documents
- Develop standardized templates for reviewing planning applications and policy documents
- Provide input from a public health perspective into provincial policy planning documents and legislation, such as: the Provincial Policy Statement; the Planning Act; and provincial bills such as Bill 9, the Public Transportation and Highway Improvement Amendment Act regarding paving highway shoulders.
- Engage and include marginalized populations in interventions, such as Amish, Mennonite, First Nations populations.

#### **Improve intra- and inter-health unit collaboration.**

- Improve collaboration and communication within the health unit, particularly across program areas.
  - Develop a built environment committee within the health unit with representatives from many or all program areas
  - Create multidisciplinary teams where they do not already exist to address built environment interventions
  - Encourage communication or meetings between departmental managers or program leads
- Encourage models of service delivery that address public health issues comprehensively across program areas. This may help dissolve ‘siloed’ approaches to program delivery and improve communication and collaboration on all public health initiatives.
- Improve knowledge sharing opportunities with other health units/agencies related to research, best practices, and effective or successful interventions, particularly in a rural context.
  - Engage in information sharing and skill building through built environment, physical activity and CDP networks
  - Create a rural network where resources, documents, evidence and best practices can be shared among health agencies
  - Develop strategies collaboratively with other health units and share experiences about what worked, challenges, and how they were overcome

#### **Improve collaboration and networking outside of the health sector.**

- Connect the built environment and health outcomes message with other messages such as economic growth and tourism.
- Increase intersectoral collaboration through formal mechanisms (e.g. workshops on building healthy communities; include decision-makers on committees such as

Healthy Communities Partnerships; build cross sector committees to address community priorities; have public health representation at municipal meetings; and formalize communication through quarterly meetings and collaborative training sessions).

- Encourage the building of relationships and linkages with non-traditional partners (municipal staff, and agricultural sector) to build coordinated approaches to built environment initiatives.
- Encourage and provide opportunities for intersectoral and interprofessional conference attendance. (i.e. invite planners and elected officials to public health conferences; have public health staff attend OPPI conferences).
- Promote the use of planning training modules being developed by the OPHA Public Health and Planning 101 Project when available (K. Haley, personal communication, September 26, 2012)
- Increase the collaboration and communication with the OPPI.
  - Create venues for knowledge sharing and exchange (conferences) and opportunities for sharing of resources specific to rural communities
- Facilitate linkages between community partners and agencies where they don't already exist. (e.g. community group with a school or faith group to use physical structure as a recreational space).

#### **Policy.**

- Establish and maintain a healthy built environment vision and incorporate into organizational strategic plan.
- Develop a workplace policy that supports infrastructure and programs for physical activity and promotes active transportation to and from work (e.g. showers, bike racks, dress code policies).

#### **Implications for Public Health Researchers**

- Further research is needed into best practices and effective interventions related to the built environment and physical activity
  - Investigate employing a realist approach as a model of evidence synthesis for complex public health program interventions
- Encourage participation in and dissemination of the results from the PHO Locally Driven Collaborative Projects that investigate rural best practices in Ontario.
- Further research and best practice information is needed that:
  - Is specific to rural settings (conducted in rural contexts, examines rural specific challenges, defines the term 'rural', examines inter- and intra-rural differences)
  - Provides economic impact analysis that can be shared with municipalities and local decision-makers

- Develops and uses built environment indicators specifically for rural communities.
- Utilizes in depth case studies to capture the context of rural communities and environment. Uses multiple data sources and multiple participants (focus groups) to capture differences within an organization or region
- Contributes to theory development regarding the complex interplay of factors involved in built environment interventions that impact health outcomes in rural environments

### **Implications for the Municipal and Regional Sector**

The findings may be relevant from a broader audience including policy makers and decision-makers from non-health sectors such as transportation, planning and government officials, who may be looking at ways to enhance the built environment and policies to positively affect health outcomes.

#### **Improve role clarity.**

- Improve role clarity of all municipal staff to community partners
  - Outline role of planners, engineers, transportation and roads, elected officials and committees of Council
  - Ensure community partners are aware of key players involved in the issue and their roles

#### **Service delivery.**

- Build public support and demand for infrastructure changes through public education and social marketing campaigns in cooperation with public health.
- Increase awareness of existing opportunities and resources (trail guides, fee subsidies).

#### **Intersectoral collaboration and networking.**

- Continue to build partnerships with community partners, agencies, and non-governmental organizations.
  - Work collaboratively with all partners to effectively address financial and human resource issues (cost sharing, sharing of resources)
  - Involve stakeholders (schools and school boards, BIA, by-law, police) when developing and implementing policies, such as active school travel policies
- Continue to collaborate with public health, transportation, engineering, planning, private sector developers and community partners to implement built environment interventions that may impact physical activity levels. Such interventions may include:



- Implementing smart growth principles, particularly those applicable to rural settings
- Traffic calming measures
- Master plan and official plan reviews
- Policy changes locally regarding rural land use (zoning, subdivision bylaws)
- Increase knowledge sharing opportunities between municipalities and regions to share best practice information.
  - Improve communication between communities regarding built environment initiatives to foster ideas, hear what has worked and not worked, and strategies to overcome challenges encountered
  - Utilize existing networks such as the Association of Municipalities Ontario, the Ontario Good Roads Association, the Municipal Engineers Association, and the American Public Works Association to share information on policy development, resources and tools, and conference and training opportunities
- Build linkages in rural areas between community groups, municipalities and schools.
  - Develop joint use agreements/facility rental agreements with rural schools, faith groups and community groups to address access to physical activity and recreational activity in rural areas
- Capitalize on the positive, unique features of smaller, more rural communities.
  - Increase community engagement as community buy-in and participation are needed for success
  - Seek greater public participation into community plans and provide multiple opportunities for community engagement (public forums, public information meetings) for planning activities

### **Policy.**

- Adopt Active Living or Pedestrian Charters to demonstrate commitment to building healthy and sustainable communities.
- Raise awareness in municipalities regarding new land-use planning tools and utilize new planning reform tools that support sustainable, well designed communities. Municipal planning and development tools include:
  - Planning Act Tools (Building Blocks for Sustainable Planning; Information sheets on Planning Act Tools [ Intensification, Community Design; Transit-Supportive Land Use Planning]; 2012 Planning for Sustainability Calendar)
  - Planning By Design: a healthy communities handbook
  - Development Permit System
  - Community Planning and Development 3D Visualization Portal
- Implement smart development strategies in rural areas such as: mixed land uses; creating walkable communities; preserving open space, farmland and critical

environmental areas; and encourage community and stakeholder collaboration in development decisions (Dalbey, 2008).

- Address potential municipal regulations including: municipal zoning and development rules and legislation; regulating street connectivity; paving shoulders of rural roads; requiring fog lines to be painted on roads.

### **Study Strengths and Limitations**

The primary researcher's previous personal experience as a PHN in a rural community and involvement in municipal built environment initiatives was both a strength and a limitation. The researcher's familiarity and understanding of built environment initiatives, physical activity and CDP was beneficial when conducting interviews and analyzing data, as it provided much needed background for conducting research in this area.

Furthermore, the researcher identified with many of the rural contextual issues and concerns raised, which aided the interview process when probing and exploring existing interventions. However, a limitation with the researcher's familiarity with the topic may have led to more leading questions during the interview process and potential misinterpretation of the data during the analysis phase. Journaling and memoing were completed throughout the process to minimize this risk. The initial coding structure was constructed using direct words and sentences from the transcripts themselves to minimize interpretation. Additionally, a second person reviewed the coding to ensure no over interpretation.

Limitations with the study included recruitment strategies, and data collection and analysis. The initial recruitment strategy included sending recruitment letters to MOH's or Directors of health unit's. This was likely not the most effective recruitment strategy, as the process was long, required a lot of follow-up to identify potential participants, and it was not always clear if the most knowledgeable staff member was identified. Recruiting at the managerial level may have been more appropriate for the purposes of this study, even though consent at the organizational level from a director or MOH would still be necessary.

Interviews were conducted with single participants from each health unit with the exception of two cases who requested two participants participate in the interview. Conducting interviews with only one individual from each site and interviewing individuals primarily involved in physical activity interventions, may have provided a narrow perspective that did not adequately represent each health unit's activities. Ideally the researcher would have conducted multiple interviews or focus groups with all public health practitioners and managers working on the topic; however, this was beyond the scope of a Master's thesis. By involving only staff involved in physical activity programming, some interventions may have been overlooked which addressed the built environment. Single interviews also hampered efforts at triangulation, one of the most effective ways to enhance study credibility (Baxter & Eyles, 1997; Creswell, 1997).

Additionally, the researcher was unable to determine if the key informant from each public health unit was the most knowledgeable about built environment interventions related to physical activity. Some health unit's serviced large geographic regions. A few respondents noted they were only able to speak to their particular community. This was particularly true where numerous satellite offices or multiple counties and/or districts existed. Hence, data collected may not have been as comprehensive or an accurate representation of the full array of interventions being employed in each health unit. One time interviews also only collected data related to a single point in time and a few participants noted that their roles in this area were relatively new. A couple of respondents replied that they were unable to provide historical details as they were not employed in that area during that time.

Conducting one-time phone interviews may have also inhibited establishing rapport and trust with participants, which may have affected the quality of the participant's responses (Baxter & Eyles, 1997; Fontana & Frey, 2000; Partington, 2001). The researcher was also unable to corroborate findings with other data sources, such as observations or documents, as it was beyond the scope of this study to complete a document analysis or to visit health units to make observations.

The primary researcher was also a neophyte researcher and it was the first time she had conducted interviews and collected qualitative data. Hence, the data collected may not have been in depth or as thorough as would be expected with a more experienced researcher. Although a semi-structured interview guide assisted in data collection, probing of certain interventions led to a lack of detail. Participants discussed many interventions their health units employed, but the researcher did not probe in all cases what types of environments and contexts these interventions were occurring in. For example, it was not always clear if interventions were occurring in more populated areas of the regions served by the health unit or what interventions were occurring in hamlets and villages. Further probing would have provided more contextual information that would assist the transferability of the findings and would address more inter-rural differences. Case studies would have provided more depth, history and context for each health unit, although this was beyond the scope of this study.

Lastly, the sample of rural health units was based on 2007 peer groupings from Statistics Canada. Not all health units in Ontario who serve large rural populations were captured in these groupings because of a larger urban centre and demographic information utilized to determine groupings. Hence, this study is not a complete representation of all perspectives in rural Ontario. Additionally, population density and the rural area population percentage may not have been the most effective methods for defining and comparing the 'degree of rurality', as one medium population centre may have skewed these results.

There were many strengths of the study. Participants were very open and enthusiastic, they shared a great deal of information and the researcher felt that data saturation was

achieved, as no new themes or subthemes emerged towards the end of data collection. Further strengths of the study were the strategies and measures taken to ensure credibility and rigour of the study. The researcher's thesis supervisor reviewed transcripts, independently coded two transcripts, and reviewed the coding structure to increase dependability. The thesis committee also reviewed transcripts, the initial coding scheme and findings to strengthen dependability. Member checking with the participants themselves ensured that the researcher captured and adequately reflected their experiences and thoughts. Lastly, twelve ( $n=12$ ) of the thirteen health units who were recruited responded and participated, for a notable 92% response rate.

### **Knowledge Translation Strategies**

Knowledge translation (KT) is defined as “a dynamic and iterative process that includes synthesis, dissemination, exchange, and ethically-sound application of knowledge” and is deemed essential to all research projects to move evidence into practice (CIHR, 2010). It involves both researchers and knowledge users in the exchange of new information and facilitates the uptake of new knowledge generated. There are two types of KT: integrated KT, in which stakeholders are engaged throughout the entire research process; and end of grant KT, in which stakeholders are made aware of the information gained from a research project at the conclusion of the study (CIHR, 2010). This study only employed end of grant KT, in that participants and end users were provided with the results once the study was completed. The health unit participants were not involved in shaping the research questions, methodology, interview guide or the interpretation of the findings (CIHR, 2010).

The results of the research were shared with participants in a research summary and fact sheet that were tailored to the managers and practitioners. The researcher asked that the information be shared with colleagues, particularly within CDP or other relevant programs. The tailoring of the message may improve the uptake of the information received (CIHR, 2010). Additionally, results will be communicated and distributed to professional groups with related interests, such as the Registered Nurses Association of Ontario's Community Health Nursing Interest Group and the Ontario Nurses for the Environment Interest Group; the Community Health Nurses Association of Canada; the Ontario Public Health Associations Built Environment Working Group; the project coordinator of the Public Health Ontario Locally Driven Collaborative Project on rural built environments; and the Ontario Healthy Communities Coalition.

The researcher also submitted an abstract to present an oral presentation at The Ontario Public Health Convention and the Canadian Public Health Association Conference in 2013. The researcher also plans to present a poster presentation at the McMaster Faculty of Health Sciences Graduate Plenary in the spring of 2013. Submissions will also be made to peer-reviewed journals, such as the Journal of Rural Health and Environmental Health Perspectives.

Lastly, the final thesis will be shared with the research panel and be placed in the McMaster Digital Commons Library system, as required by McMaster University.

### **Concluding Remarks**

Canada and Ontario have seen dramatic increases in chronic disease and chronic disease risk factors in the past few decades. Two inter-related risk factors, physical inactivity and obesity, have increased considerably sending up alarm bells in the public health sector due to chronic disease morbidity and mortality and associated economic costs. This is of particular relevance in rural communities where the prevalence of physical inactivity and obesity are higher than in more urban areas. There is growing interest within the public health sector to address these concerns by shifting to more distal community-based population health interventions, in addition to individualized interventions focused on diet and personal physical activity. Community-based interventions include looking at built environment features that may influence physical activity levels and result in improved health outcomes. Much literature exists on interventions to address physical activity in urban settings; however, little has been written related to interventions in rural settings.

This research utilized a descriptive qualitative approach to explore how rural public health units in Ontario are integrating built environment interventions related to physical activity. It provided in-depth perspectives of public health practitioners and managers descriptions of built environment interventions aimed at improving physical activity and population health. Specifically, it gathered perspectives from staff serving rural populations and explored the structures and processes that have acted as enablers or barriers to interventions and strategies utilized to overcome encountered challenges. Gaps in the literature were addressed. It is the first study to the researchers' knowledge that has addressed built environment initiatives specifically in Ontario's rural health units. This research is both timely and relevant as evidenced by the explosion of research in the past five years on built environment and its effects on physical activity and the inclusion of the built environment in the CDP OPHS policy.

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## APPENDICES

### Appendix A

#### Summary of Included Literature

Reference (1 <sup>st</sup> author, year)	Objective	Findings	Setting (rural/urban/both)	Review	Quality Rating * = weak ** = moderate *** = strong
Badland, 2005	To review evidence on urban design factors and PA behaviours.	Urban design features conducive to transport-related PA are density, subdivision age, street connectivity, and mixed land use.	Urban	Non-Systematic Evidence Review	
Barton, 2009	To review literature on land use planning for healthy human settlements.	Clear relationship between accessibility (distance to facilities), and the quality and safety of the environments (traffic safety) and AT rates. The level of AT and outdoor recreational activity is closely related to access to local facilities.	Urban	Non-Systematic Evidence Review	
Bergeron, 2009a	To review the literature on the effect of the BE on five CD risk factors, including PA.	Evidence exists of an association between the urban BE, PA and a healthy body weight. A combination of land use patterns, transportation systems and urban design is associated with increased PA and enhanced health outcomes.	Urban	Non-Systematic Evidence Review	
Brennan-Ramirez, 2006	To review research linking measures of community environments and policies to measures of population-level PA.	Established indicators of active friendly communities include: land use, access to facilities, transportation infrastructure. Evidence indicates that increased density, street connectivity, land use mix and AT infrastructure increase walking and cycling rates. Positive association found between PA and access to recreational facilities.	Not reported	Non-Systematic Evidence Review	
Brownson, 2006	To review and summarize effective and promising	Strong evidence improving PA levels with improved access to recreational facilities and trail development.	Urban	Non-Systematic	

Reference (1 <sup>st</sup> author, year)	Objective	Findings	Setting (rural/urban/both)	Review	Quality Rating * = weak ** = moderate *** = strong
	environmental and policy interventions that address risk factors for CD, including PA.	Consistent evidence of PA improvement when urban planning and land use policies addressed variables such as higher density neighbourhoods, street connectivity, and mixed land use. Sufficient evidence regarding policies to improve street safety such as sidewalk continuity, street crossings and lighting. Insufficient evidence to suggest that transportation policies that address roadway design standards improve PA levels.		Evidence Review	
Brownson, 2009	To review evidence measuring BE attributes hypothesized to be related to PA.	Transportation related PA most affected by walkability, infrastructure, sidewalks, trails, bike lanes, connectivity. Open spaces and facilities such as parks, playfields and trails associated with higher PA levels. Personal preferences can impact AT and PA.	Both	Non-Systematic Evidence Review	
CIHI, 2006b	To review research from the CCHS and to explore relevant policies and programs in the community and physical environment.	Neighbourhood characteristics such as walkability (street lighting and sidewalks); the availability of recreational facilities and parks; the degree of urban sprawl; and access to recreational facilities, all related to increased PA levels and AT. Community recreation facilities and walking trails may play a role in promoting PA.	Both	Grey Literature	
Chillon, 2011	To review intervention studies of AT to school.	Most interventions showed some improvement (3-64%) in AT levels. 3 studies had a large or very large effect size. Heterogeneity and weaknesses in quality of studies limited ability to provide clear conclusions about the most effective strategies. Interventions that worked toward a specific goal (i.e., increasing AT) seemed to be more effective than interventions that were broader in focus.	Both (Mainly urban)	Systematic Review	**

Reference (1 <sup>st</sup> author, year)	Objective	Findings	Setting (rural/urban/both)	Review	Quality Rating * = weak ** = moderate *** = strong
Dunn, 2008	To review the evidence on the impacts of urban BE on PA using realist synthesis.	BE characteristics most consistently and strongly associated with PA (walking) were residential density; street connectivity; land use mix; proximity to parks, trails, pathways, recreational facilities, transit; and the presence of sidewalks.	Urban	Non-Systematic Evidence Review	
Durand, 2011	To review research on BE factors used in smart growth planning to determine whether they are associated with PA or body mass.	Increased PA, primarily walking rates, associated with five smart growth urban planning factors including: diverse housing types, mixed land use, housing density, compact development patterns, and levels of open spaces.	Urban	Systematic review	**
Elvik, 2001	To evaluate the effects on road safety of area-wide urban traffic calming schemes.	Area-wide urban traffic calming schemes on average reduce the number of injury accidents by about 15%. Found a reduction in the number of accidents for residential streets to be 25% and 10% for main roads.	Urban	Meta-analysis	**
Feng, 2010	To review literature on BE and obesity and to evaluate the quality of between study evidence.	Evidence does not identify a clear and strong role for BE risk factors for obesity with the possible exception of the county sprawl index and land use mix. Great heterogeneity across studies limits conclusions. County sprawl index was significantly associated with obesity outcomes in all studies that examined it. Associations with land use mix were also relatively consistent across studies.	Both (Mainly urban)	Systematic Review	***
Frank, 2005	To review the multiple impacts of the BE on public health. Specifically examines the influence of proximity, connectivity and urban design on PA.	Distance (proximity and connectivity) important to AT. Urban design influences how pedestrians and cyclists perceive the environment. Single-use development, low densities, and disconnected street networks discourage AT. Evidence indicates increased density, mixed uses, and street connectivity associated with increased PA.	Urban	Non-Systematic Evidence Review	

Reference (1 <sup>st</sup> author, year)	Objective	Findings	Setting (rural/urban/both)	Review	Quality Rating * = weak ** = moderate *** = strong
Fraser, 2011	A systematic review of studies that objectively evaluated the BE on cycling.	Environmental factors positively associated with cycling included: cycle paths; separation of cycling from traffic; high population density; short trip distance; proximity of a cycle path or green space; and 'safe routes to school' projects. Negative factors included: traffic danger; long trip distance; and distance to cycle paths. Policies promoting cycle lane construction appear promising.	Both (mainly urban)	Systematic Review	***
Frost, 2010	A systematic review of the literature to examine the influence of the BE on the PA of adults in rural settings.	Positive associations were found among aesthetics, trails, safety/crime, parks and walkable destinations. Results appear to differ between rural and urban areas. Inconsistent findings with sidewalks, safety from and density of neighbourhood traffic and physical activity.	Rural	Systematic Review	***
Gebel, 2005	To review the evidence examining the links between the BE, PA and obesity.	Urban form characteristics consistently associated with improved PA include: mixed land use and high population density; the availability of footpaths, trails, cycle ways and facilities for PA; street connectivity and design; and transportation infrastructure and systems linking residential, commercial and business areas.	Urban	Non-Systematic Evidence Review	
Heath, 2006	To review and evaluate environmental and policy strategies to promote PA.	Community-scale and street –scale urban design and land use policies and practices were effective in promoting PA. Insufficient evidence to assess transportation policies and their effects on PA.	Urban	Systematic Review	***
Jackson, 2010	A review of the impact of the BE on Public Health and its relationship to PA.	Lack of structures or facilities (sidewalks and parks) and fears about safety reasons for inactivity. Suburban growth (increased automobile dependency) and urban design of less walkable communities contributing to declining PA levels.	Both (mainly urban)	Grey Literature	
Lavin, 2006	To review impact so the BE on health.	Design of street networks (walkable, grid pattern streets), the availability of open and maintained spaces,	Urban	Grey Literature	

Reference (1 <sup>st</sup> author, year)	Objective	Findings	Setting (rural/urban/both)	Review	Quality Rating * = weak ** = moderate *** = strong
		and the perceived and actual safety of an area encourage PA and AT. Other environmental features influencing mode of transport include cycle and pedestrian lanes and traffic calming measures.			
Lawrence Frank & Co., 2008	To examine the connections between the BE and PA, obesity and related conditions.	Concentrated growth and increased density; mixed land use; increased road and path connectivity; enhanced street design; and AT friendly communities with more bike lanes, trails, paths, crosswalks and traffic calming measures were associated with improved PA levels. Open spaces and facilities such as trails were also associated with higher PA levels.	Urban	Non-Systematic Evidence Review	
Lee, 2004	To review empirical studies addressing environmental characteristics that influence PA (walking and biking).	Perceived barriers to PA include: opportunity, distance, access and safety. Objective barriers to PA include: proximity to facilities (distance), presence of AT (bike and pedestrian infrastructure), density, land use mix, and street types associated with PA.	Urban	Non-Systematic Evidence Review	
Ogilvie, 2004	To assess interventions promoting a population shift from using cars towards walking and cycling.	Found little evidence that the six engineering interventions, which included improving and extending cycling networks and traffic calming measures, had any population effect on shifting to active modes of transportation.	Urban	Systematic review	**
Papas, 2007	To summarize existing research relating the BE to obesity.	84% of articles included in the review reported a statistically significant positive association between some aspect of the BE and obesity. Many methodological issues were highlighted.	Both	Systematic Review	**
Pruss-Ustun, 2006	A WHO study to examine how specific diseases and injuries are impacted by environmental risks.	Modifiable BE characteristics associated with PA levels include: planning and policies related to diversity of land use; transportation systems; and design. Estimates that inactivity levels could be reduced by 31% in North	Urban	Risk Assessment	

Reference (1 <sup>st</sup> author, year)	Objective	Findings	Setting (rural/urban/both)	Review	Quality Rating * = weak ** = moderate *** = strong
		America by addressing the BE.			
Pucher, 2010	To assess the effectiveness of interventions including infrastructure (e.g., bike lanes and parking); education and marketing programs; bicycle access programs; and policies.	Some individual interventions can increase bicycling modestly. Substantial increases in bicycling require an integrated package of many, complementary interventions, including infrastructure provision (bike lanes and paths) and pro-bicycle programs, supportive land use planning, and restrictions on car use.	Urban	Non-Systematic Evidence Review	
Raine, 2008	A CIHI report to review the relationship between urban environments and obesity.	Walkability (increased residential density, mixed-use zoning and street connectivity); access to recreational facilities; and perceptions of the BE are associated with increased PA and healthy body weights..	Urban	Grey literature	
Renalds, 2010	To review and summarize research that examines the relationship between BE, walkability and health.	The BE and its impact on PA associated with walkability. The presence and condition of sidewalks, trails, lighting; land use mix; and perceived safety affected PA levels. Statistically significant associations found between: increased walkability and residential density; and increased walkability and smaller size of blocks.	Urban	Systematic review	*
Saelens, 2008	To review evidence on the BE correlates with walking.	Sufficient evidence accessibility, mixed land use, density, proximity to nonresidential destinations and aesthetics of BE positively associated with transportation walking. Recreational walking positively associated with pedestrian infrastructure and aesthetics.	Both	Systematic review	*
Transportation Research Board, 2005	To examine the relationship between the BE and PA in the US population. To examine the role of land use and travel patterns in	Evidence shows an association between the BE and PA, although the strength of the associations and BE characteristics most strongly associated with PA remain to be determined. Preliminary evidence that land use (density & mix), accessibility (distance from facilities),	Both	Systematic review	**



Reference (1 <sup>st</sup> author, year)	Objective	Findings	Setting (rural/urban/both)	Review	Quality Rating * = weak ** = moderate *** = strong
	the PA levels of the US population.	certain design features, and transportation infrastructure (sidewalks, grid pattern streets) may affect PA levels.			
Van Cauwenberg, 2011	To review studies investigating the relationship between the BE and walking and cycling in older adults.	Results inconsistent. Most environmental characteristics were reported not to be related to PA (residential density; land use mix and diversity; street connectivity; access to recreational, walking and cycling facilities; safety; aesthetics; and urbanization).	Both	Systematic review	**
Williams, 2007	To review the evidence of the impacts of the BE (land use patterns, transportation systems and design) on the health of the population.	Evidence indicates a strong relationship among health, PA and the design of communities. Land use patterns, transportation systems and design features influence the health of the population by affecting the convenience, practicality and amount of PA.	Both	Non-Systematic Evidence Review	
Yang, 2010	To determine what approaches are effective in promoting cycling, the size of the effects observed, and evidence of any associated benefits on overall PA.	Improving cycling infrastructure in urban environments has potential to increase cycling by modest amounts. Effect sizes attributable to the interventions appear relatively modest. Observational studies suggest changing the BE has the potential to influence cycling behaviour.	Urban	Systematic Review	***
Yee-Man Wong, 2011	To examine and summarize the relationships between objectively measured BE features and school AT.	Increasing distance between residence and school was consistently found to be negatively associated with AT to school. No consistent evidence of associations between GIS-measured aspects of the BE (land use mix, residential density, and connectivity) and AT to school, although some studies found a positive relationship.	Urban	Systematic review	***

Abbreviations: BE = built environment; PA = physical activity; AT = active transportation; CD = chronic disease

## Appendix B

### Systematic Reviews – AMSTAR instrument

Item #	Chillon et al., 2011	Durand et al. 2011	Elvik, 2001	Fe ng et al. 2010	Fraser & Lock, 2011	Frost et al., 2010	Heath et al., 2005	Ogilvie et al. 2004	Paps et al. 2007	Renalds et al. 2010	Saelens et al. 2008	TRB, 2005	Van Cauwenberg et al., 2011	Yang et al. 2010	Yee -an Wong et al., 2011
'a priori'	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Duplicate selection and data extraction	Y	Y	CA	CA	Y	Y	Y	Y	CA	Y	CA	N	CA	Y	CA
Comprehensive lit search	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
Status of publication used as an inclusion criterion	N	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y
List of studies (included. and excluded)	N	N	Y	N	Y	Y	Y	N	N	N	N	N	N	Y	N
Characteristics of included studies provided	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Scientific quality of included studies assessed and	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y

Item #	Chillon et al., 2011	Durand et al. 2011	Elvik, 2001	Fe ng et al. 2010	Fraser & Lock, 2011	Frost et al., 2010	Heath et al., 2005	Ogilvie et al. 2004	Paps et al. 2007	Renalds et al. 2010	Saelens et al. 2008	TRB, 2005	Van Cauwenberg et al., 2011	Yang et al. 2010	Yee -an Wong et al., 2011
documented															
Scientific quality used appropriately	Y	N	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
Methods to combine findings appropriate	NA	NA	Y	Y	Y	NA	Y	Y	NA	NA	NA	NA	Y	Y	Y
Likelihood of publication bias assessed	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N
Conflict of Interest stated	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	Y
<b>Quality Rating</b> * = weak ** = moderate *** = strong	**	**	**	***	***	***	***	**	**	*	*	**	**	***	***

Y= yes N = No CA = Cannot answer NA = Not applicable

## Appendix C

### Recruitment Email to be sent to Medical Officer of Health or Director

Dear Dr. XXXX:

My name is Cara-Lee Coghill and I am currently pursuing my Masters of Science in Nursing at McMaster University under the academic supervision of Dr. Ruta Valaitis. I am conducting a research study designed to explore how rural public health units in Ontario are integrating the built environment into public health interventions related to physical activity to foster healthy and sustainable communities.

I am requesting your health unit's participation in this study as your health unit serves a large rural population. This study is being done because there is little known about what interventions are currently being implemented to address the built environment and what factors are influencing these interventions at the health unit level in rural settings. This research will seek to identify enabling structures or processes and challenges/barriers that rural health units face in addressing the built environment within physical activity programming aimed at chronic disease prevention. It will help inform public health agencies of built environment interventions that may affect the health of populations. A summary of findings will be shared with all participating Ontario health units.

**I am requesting that you identify an individual(s), either a public health manager or practitioner working in physical activity program planning and development, who is knowledgeable about the built environment and can speak to your health unit's work in relation to the built environment.**

Interventions or initiatives on the built environment that may affect physical activity levels may include, but are not limited to:

- Participation on alternative or active transportation initiatives
  - Participation on transportation master plans (bike lanes, pedestrian)
  - Promoting policies or participating in trail development, cycle networks, paved shoulders, pedestrian infrastructure
  - Pedestrian/active transportation charters
- Activities related to accessible parks, green spaces or open spaces
- Promoting policies to establish parks, greenspace and open spaces
- Community assessments of built environment or physical environment features that may affect physical activity
- Partnerships or collaborations with community agencies/organizations addressing the built environment
- Providing support for policy action (e.g. public forums, petitions, letters of support)

- Involvement with a regional or provincial working group looking at the built environment, physical activity and health outcomes (OPHA, APHEO)
- Application submissions for funding built environment initiatives
- Messaging or social marketing campaigns regarding the relationship between built environment characteristics/land use and physical activity
- Conducting research or evaluations on the built environment

Should your health unit choose to participate in the study, one staff member from your health unit will engage in a one-time telephone interview with the primary investigator that will be approximately 60-90 minutes in duration. The staff member may also be contacted by email following the interview to clarify any issues that may arise and to comment on preliminary findings.

Please find attached a letter of information and participant consent form which provides additional details about the research project. At this time it is only for information purposes, but should you agree to participate, I will require a signed copy.

If you are willing to participate by providing the name(s) of relevant staff members, please email the primary investigator Cara-Lee Coghill at [coghilcl@mcmaster.ca](mailto:coghilcl@mcmaster.ca)

Should you have any questions about the research project, please contact Cara-Lee Coghill at 905-525-9140 ext. 21222 or contact the faculty supervisor/local principal investigator, Dr. Ruta Valaitis, at 905 525-9140 ext. 22298 or by email [valaitis@mcmaster.ca](mailto:valaitis@mcmaster.ca).

This study has been reviewed by the Hamilton Health Sciences/McMaster Faculty of Health Sciences Research Ethics Board (HHS/FHS REB). The REB is responsible for ensuring that participants are informed of the risks associated with the research, and that participants are free to decide if participation is right for them. If you have any questions about your rights as a research participant, please call The Office of the Chair, HHS/FHS REB at 905.521.2100 x 42013

Your participation is greatly appreciated!

Sincerely,



Cara-Lee Coghill, BKin, BScN, RN, CCHN(C)  
Masters Student  
School of Nursing, McMaster University  
1200 Main Street West Hamilton ON L8N 3Z5

## Appendix D

### Recruitment Email to be sent to Potential Participants

Dear **XXXX**:

My name is Cara-Lee Coghill and I am currently pursuing my Masters of Science in Nursing at McMaster University under the academic supervision of Dr. Ruta Valaitis. I am conducting a research study designed to explore how rural public health units in Ontario are integrating the built environment into public health interventions related to physical activity to foster healthy and sustainable communities.

I am requesting your participation in this study as you have been identified by the Director/ MOH of your health unit as a public health manager or practitioner involved in physical activity program planning and development, serving a predominately rural population and knowledgeable about the built environment.

This study is being done because there is little known about what interventions are currently being implemented to address the built environment and what factors are influencing these interventions at the health unit level in rural settings. This research will seek to identify enabling structures or processes and challenges/barriers that rural health units face in addressing the built environment within physical activity programming aimed at chronic disease prevention. It will help inform public health agencies of built environment interventions that may affect the health of populations. A summary of findings will be shared with all participating Ontario health units.

Interventions or initiatives on the built environment that may affect physical activity levels may include, but are not limited to:

- Participation on alternative or active transportation initiatives
  - Participation on transportation master plans (bike lanes, pedestrian)
  - Promoting policies or participating in trail development, cycle networks, paved shoulders, pedestrian infrastructure
  - Pedestrian/active transportation charters
- Activities related to accessible parks, green spaces or open spaces
- Promoting policies to establish parks, greenspace and open spaces
- Community assessments of built environment or physical environment features that may affect physical activity
- Partnerships or collaborations with community agencies/organizations addressing the built environment
- Providing support for policy action (e.g. public forums, petitions, letters of support)
- Involvement with a regional or provincial working group looking at the built environment, physical activity and health outcomes (OPHA, APHEO)

- Application submissions for funding built environment initiatives
- Messaging or social marketing campaigns about the relationship between built environment characteristics/land use and physical activity
- Conducting research or evaluations on the built environment

Should you choose to participate in the study, participation will entail a one-time telephone interview with the primary investigator that will be approximately 60-90 minutes in duration. You may also be contacted by email following the interview to clarify any issues that may arise and to comment on preliminary findings.

Please find attached a letter of information and participant consent form which provides additional details about the research project. At this time it is only for information purposes, but should you agree to participate, I will require a signed copy.

Please note that if more than one person has been identified from your health unit and agrees to participate, one participant will be randomly selected for inclusion in the study.

If you are willing to participate, please contact Cara-Lee Coghill at [coghilcl@mcmaster.ca](mailto:coghilcl@mcmaster.ca)

Should you have any questions about the research project, please contact Cara-Lee Coghill at 905-525-9140 ext. 21222 or contact the faculty supervisor/local principal investigator, Dr. Ruta Valaitis, at 905 525-9140 ext. 22298 or by email [valaitis@mcmaster.ca](mailto:valaitis@mcmaster.ca).

This study has been reviewed by the Hamilton Health Sciences/McMaster Faculty of Health Sciences Research Ethics Board (HHS/FHS REB). The REB is responsible for ensuring that participants are informed of the risks associated with the research, and that participants are free to decide if participation is right for them. If you have any questions about your rights as a research participant, please call The Office of the Chair, HHS/FHS REB at 905.521.2100 x 42013

Your participation is greatly appreciated!

Sincerely,



Cara-Lee Coghill, BKin, BScN, RN, CCHN(C)  
Masters Student  
School of Nursing, McMaster University  
1200 Main Street West  
Hamilton ON L8N 3Z5

## Appendix E

### PARTICIPANT CONSENT FORM/LETTER OF INFORMATION

**Title of Study:**            **The built environment and physical activity in rural Ontario health units: a qualitative descriptive study.**

**Principal (Student) Investigator:**

Cara-Lee Coghill, B.Kin., B.Sc.N, R.N., Masters Student  
School of Nursing, McMaster University, Hamilton, Ontario  
**(905) 525-9140 ext. 21222**  
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**Local Principal Investigator:**

Dr. Ruta Valaitis, B.A., B.Sc.N., M.H.Sc., Ph.D.  
Associate Professor, School of Nursing, McMaster University  
Dorothy C. Hall Chair in Primary Health Care Nursing  
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**Masters Committee Members:**

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**Sponsors:**

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(CHNIG)

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You are being invited to participate in a study conducted by Cara-Lee Coghill, Masters Student in the Graduate Nursing Program at McMaster University. You are being asked to participate in this study because your health unit is a rural health unit in Ontario and you have been identified as an individual within your health unit who is knowledgeable



about the built environment and physical activity initiatives. In order to decide whether or not you want to participate in this study, the following will outline what is involved and the potential risks and benefits of participation. This form gives detailed information about the study and whom to contact if you have any questions.

**Why is this research being done?**

This study is being conducted because there is little known about how rural public health units in Ontario are addressing the built environment within physical activity programming. This research will seek to identify enabling structures and challenges/barriers that rural health units face in addressing the built environment within physical activity programming aimed at chronic disease prevention.

**What is the purpose of this study?**

The purpose of this study is to learn more about how rural public health units in Ontario are integrating the built environment into public health interventions related to physical activity. Public health interventions may include, but are not limited to: program planning and delivery; policy participation, development and implementation such as input into transportation master plans and promoting policies to establish green space; community assessments of the built environment; conducting research or evaluating research regarding the built environment; involvement in regional or provincial working groups addressing the built environment (OPHA, APHEO); and coalition work, partnerships or collaboration with community agencies addressing the built environment.

It is anticipated that the proposed study will be the first study to the researchers' knowledge that will address built environment initiatives specifically in Ontario's rural health units. This study will benefit health units serving rural populations as they incorporate built environment interventions and may facilitate knowledge sharing between rural health units. The findings may be relevant from a broader audience including researchers, policy makers and decision-makers from other sectors such as transportation, planning and government officials, who may be looking at ways to enhance the environment and policies to positively affect health outcomes.

**What will my responsibilities be if I take part in this study?**

If you agree to participate in this study, you will be asked to participate in a one time interview with the principal investigator. This interview will be conducted by phone and will be approximately 60-90 minutes in duration. The interview will be audio-recorded. In this interview you will be asked a series of questions about physical activity activities and built environment interventions in your health unit. Demographic information will also be collected. You may also be contacted by email following the interview to clarify any issues that may arise and to provide comments on the preliminary findings.

**What are the potential harms, risks or discomforts?**

There are no known or anticipated risks to you if you take part in this study. As a participant in the study, you do not need to answer questions that make you

uncomfortable or that you do not want to answer. Participation in this study may cause some inconvenience to you, as it will require some time commitment. Please see the section titled '*What information will be kept private*' on the following page for information on privacy and confidentiality.

**What are the potential benefits for participating in this study?**

The principal researcher cannot promise any personal benefits to you from your participation in this study. However, your participation may help other public health practitioners and communities served by public health units in the future. The findings from this research will facilitate the sharing and exchange of information, research, and programming and policy ideas regarding the built environment. It will help inform public health agencies of built environment interventions that may affect the health of populations. The findings from the overall study will generate important knowledge on built environment interventions in rural settings that may benefit your health unit.

**If I do not want to take part in this study, are there other choices? What if I want to withdraw from the study?**

Your participation in the study is voluntary. If you decide to participate, you can decide to stop at any time, even after signing the consent form or part way through the study. If you decide to stop participating, there will be no consequences to you. Until one month following your interview, you may request that any or all of your data be excluded from the study.

**What information will be kept private?**

Personal information collected will remain entirely confidential. You will be assigned a numerical code for your interview. Your name, health unit, position and personal characteristics will be removed. Transcripts of interviews will be shared with the principal investigator's thesis committee. Any quotes that are used in the final write-up will not reveal individual identities by name. Due to the small number of rural health units and participants involved in this study, it may be difficult to maintain confidentiality. Others may be able to identify you on the basis of references you make. Every precaution will be taken to ensure that this risk is minimized. If more than one individual is identified as a potential participant from your particular health unit, random selection of one individual will occur to ensure that only one participant from each health unit is interviewed. If this random selection occurs, it will help maintain your confidentiality.

All collected information will be securely stored in a locked filing cabinet in a locked office and on a password protected computer for five years post publication and then will be destroyed.

**How will I receive information about the study's results?**

A summary of findings will be shared with all participating Ontario health units.

**Will I be paid to participate in this study?**

There will be no compensation for your participation in the study.

**Will there be any costs?**

Your participation in the study will not involve any additional costs to you. Your participation in this study will involve your time.

**If I have any questions or problems, whom should I contact?**

If you have any questions about the research project now or following the interview, please contact **Cara-Lee Coghill** at (905) 525-9140 ext. 21222 or by email [coghilcl@mcmaster.ca](mailto:coghilcl@mcmaster.ca) . Dr. Ruta Valaitis is Cara-Lee's faculty supervisor and is the locally responsible investigator. You may contact her if you have any further questions at 905 525-9140 ext. 22298 or by email [valaitis@mcmaster.ca](mailto:valaitis@mcmaster.ca).

### Participant Consent Form

I have read the information presented in the information letter about a study being conducted by Cara-Lee Coghill, a graduate student at McMaster University. I have had the opportunity to ask questions about my involvement in this study, and to receive any additional details I wanted to know about the study. I understand that I may withdraw from the study at any time, if I choose to do so. I agree to participate in this study and have been given a copy of this form.

- |   |     |    |
|---|-----|----|
| 1. I agree that the interview can be audio recorded.  | Yes | No |
| 2. I would like to receive a summary of the study's results   | Yes | No |
| 3. I agree to be contacted about future research and understand that I can always decline the request | Yes | No |

Please contact me at: \_\_\_\_\_

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

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

I, Cara-Lee Coghill, have discussed this study in detail with the participant. I believe the participant understands what is involved in this study.

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

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

This study has been reviewed by the Hamilton Health Sciences/McMaster Faculty of Health Sciences Research Ethics Board (HHS/FHS REB). The REB is responsible for ensuring that participants are informed of the risks associated with the research, and that participants are free to decide if participation is right for them. If you have any questions about your rights as a research participant, please call The Office of the Chair, HHS/FHS REB at 905.521.2100 x 42013

***A copy of this consent will be left with you, and a copy will be taken by the researcher.***

## Appendix F

### Demographic Questionnaire

Study ID#: \_\_\_\_\_

1. How long have you worked in the field of public health?  
\_\_\_\_\_ years (fill in the blank)
2. What is the highest level of education that you have completed?
  - High school or equivalent
  - Certificate or training program
  - College Diploma
  - Bachelors
  - Masters
  - Doctorate
  - Other (please specify) \_\_\_\_\_
3. Which one of the following categories **best** describes your job title or discipline?
  - Physician/Medical Doctor (MD)
  - Registered Nurse (RN)/Public Health Nurse (PHN)
  - Public Health Inspector (PHI)
  - Registered Dietitian (RD)/Nutritionist
  - Health Promoter/Health Educator
  - Nurse Practitioner (NP)
  - Administrator/Manager/Director
  - Dental Professional
  - Epidemiologist
  - Other (please specify) \_\_\_\_\_
4. Which **best** describes your main job function?
  - Medical Officer of Health/Associate Medical Officer of Health
  - Management
  - Research/program evaluation
  - Direct service provider
  - Policy development/Policy Analysis
  - Education
  - Other (please specify) \_\_\_\_\_

5. What program area are you currently working in?

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6. Have many years have you been working in your current position?

- Less than 1 year
- 1-3 years
- 4-6 years
- 7-10 years
- More than 10 years

7. Please describe your current position/job description/role briefly.

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## Appendix G

### Interview Guide

I'd like to thank you for taking the time to be interviewed today. Before we begin, I'd like to remind you that the interview is voluntary and if there are any questions that you don't feel comfortable answering or that you do not feel that you know the answer to, please let me know and we go on to the next question. I will ask you to state your name for the purpose of transcription only. You will be assigned a numerical code for your interview to protect your confidentiality. However, due to the small number of rural health units and participants involved in this study, it may be difficult to protect your identity. Others may be able to identify you on the basis of references you make. Every precaution will be taken to ensure that this risk is minimized.

For the purposes of this study, 'interventions' will refer to any public health work, activities, interventions, initiatives, program planning and delivery, and policies related to the built environment.

Study questions:

1. Please briefly state your name, your discipline, your position and what roles or tasks you fulfill within your health unit?
2. Please briefly describe the community that you serve.
3. What does the term built environment mean to you?
4. What program areas within the health unit address the built environment?
5. Who are the individuals involved in these program areas?
6. What is your role in relation to the built environment at your health unit?
7. What, from your perspective, are the most important impacts of the built environment on population health?
8. What public health interventions have been/are being/will be employed to address the built environment to promote a healthy community?
9. What **influenced** your health unit's decision to implement these strategies or interventions?
10. Has your health unit evaluated any of these interventions? If so, how was this evaluation done?
11. For successful interventions addressing the built environment and physical activity, what do you feel contributed to their success?
12. Are there any local contextual issues that may impact your health unit's ability to address the built environment?
13. This is a rural area. Does this bring any special challenges? Does this provide you with any opportunities?
14. What type of local or neighbourhood data are you collecting regarding built environment characteristics or physical activity levels?

15. What enablers have your health unit encountered when developing and implementing interventions to the built environment and physical activity? What lessons were learned?
16. What barriers has your health unit encountered when developing and implementing interventions related to the built environment and physical activity? What lessons were learned?
17. What is the relationship or level of involvement between your health unit and: a) the local planning department in your area; b) the local transportation department in your area; c) the engineering/public works department in your area? Please describe.
18. What types of collaborations/partnerships exist between your health unit and community agencies/organizations regarding healthy, sustainable communities and the built environment? In what ways do you partner with community agencies/organizations?
19. What would assist you or your health unit in your work related to enhancing the built environment to promote physical activity?