



THE PURSUIT OF **CYCLING** EQUITY

LINKING ACADEMIC RESEARCH TO PLANNING PRACTICE THROUGH A
COMPREHENSIVE REVIEW

SUPERVISED RESEARCH PROJECT | ALEXANDRA DORAN

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COMPREHENSIVE REVIEW

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- One Love -

Alexandra Doran

EXECUTIVE SUMMARY

Background

Planning for sustainable transport such as walking, cycling, and public transit can contribute to the creation of a more socio-economic and environmentally responsible future as it provides lower-cost, healthier travel alternatives to automobiles, and has the potential to reduce transport-related greenhouse gasses (GHGs). Balancing and adequately incorporating principles of sustainability (i.e.: the protection of the environment, the promotion of economic vitality, and the promotion of social equity) into practice is a challenging task, however. For example, while aspects pertaining to the environment and economy have been increasingly incorporated into transport plans and policies (and other plans and policies more generally), aspects pertaining to equity remain much less so. In fact, it is only relatively recently that equity has been recognized as an integral component of transport planning and policy-making. By failing to effectively incorporate equity into planning and policy-making, we risk disproportionately burdening, and inadequately accommodating the needs of disadvantaged groups who are oftentimes more reliant on such low-cost modes of travel.

The goal of this Supervised Research Project is to provide a comprehensive understanding and definition of cycling equity, as well as how planning practice can provide for it. This research benefits both researchers and practitioners as both can become increasingly informed of what directions can be taken to advance the pursuit of cycling equity now and into the future.

Methods

To provide a comprehensive understanding and definition of cycling equity:

1. Systematic Literature Review (Chapter 2)

To understand how planning practice currently provides, or could provide for cycling equity:

1. Systematic Literature Review (Chapter 2)

2. Critical Plan Review of Cycling and/or Active Transportation plans from 17 Canadian Cities (Chapter 3)

To understand what directions academic research and planning practice can take to advance the pursuit of cycling equity:

1. Identification of gaps between what is currently being researched, and what is currently being practiced (Chapter 4)

Key Takeaways and Recommendations

What is Cycling Equity and How Can Planning Practice Provide For it?

Cycling equity can be defined as a situation where cycling is a safe, secure mode of travel that improves mobility and accessibility fairly, enabling all people to participate and flourish in socio-economic life. To provide for cycling equity, planners and decision-makers recognize and address the needs and concerns of disadvantaged groups by including such groups throughout the entirety of the planning process, and by employing methods of analysis that assess a plan or project's potential to generate equitable outcomes. Plans and projects are prioritized in areas home to the most disadvantaged but are shaped under the consideration of key concerns and barriers such as physical safety, personal security, racism, policing and harassment, and fear of displacement from gentrification affiliated with cycling investments.

Future avenues that researchers, planners and decision-makers may take to increasingly provide for cycling equity include:

- Interviewing planners, decision-makers and community members in local contexts to better understand local needs and concerns as well as how such needs and concerns are being addressed (or failing to be addressed) beyond what is stated in planning documents.
- Conducting a comparative study between what was planned and what was realized to illuminate the challenges and opportunities planners and decision-makers have faced when attempting to implement its stated objectives. Such a study may require the cooperation of local planners to understand why (or why not), and how objectives were realized.
- Expanding upon the literature review conducted in this study to include additional keyword combinations and gray literature.

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CHAPTER ONE

An Introduction

Planning for sustainable transport, such as walking, cycling and public transit, plays an important role in the creation of a more socio-economic and environmentally responsible future as it provides lower-cost, healthier travel alternatives to automobiles, and has the potential to reduce transport-related greenhouse gasses (GHGs). In the context of Canada, planning for an increase in sustainable transport use is particularly important as the transport sector is the second largest contributor of GHGs (24%; 173 Mega Tonnes of Carbon Dioxide equivalent, 2015) (Environment and Climate Change Canada, 2017). Transport-related GHGs are oftentimes even higher at more localized scales such as in cities or metropolitan areas. For example, in the cities of Kelowna and Vancouver B.C., transport is the leading source of GHGs at 55% in the former, and 31% in the latter (City of Kelowna, 2017; Pynn, 2018). As a result, many transport plans and policies have focused on promoting walking, cycling and public transit (Boschmann & Kwan, 2008; Manaugh, Badami, & El-Geneidy, 2015).

In keeping with the three principles of sustainability put forward by the 1987 Brundtland Commission Report on Environment and Development (the protection of the environment, the promotion of economic vitality, and the promotion of social equity), sustainable transport can help improve the overall welfare of both people and planet (Boschmann & Kwan, 2008; Government of Canada, 2014):

Principle 1 Protection of the Environment The use of sustainable transport modes contributes to a reduction in Auto Vehicle Kilometers travelled (VKTs) which is a primary contributor to localized greenhouse gas emissions.

Principle 2 Promotion of Economic Vitality Sustainable modes of travel, particularly walking and cycling, have much lower capital, operating and maintenance costs when compared to automobiles and related infrastructure.

Principle 3 Promotion of Social Equity Sustainable modes of travel, particularly walking and cycling, can help to improve people's overall health and wellbeing. Additionally, its lower capital, operating and maintenance costs can benefit lower-income and other disadvantaged groups¹ who may not be able to use or afford a personal vehicle.

Balancing and adequately incorporating principles of sustainability into practice is a challenging task. For example, while aspects pertaining to the environment and economy have been increasingly incorporated into transport plans and policies (and other plans and policies more generally), aspects pertaining to equity remain much less so. In fact, it is only relatively recently that equity has been recognized as an integral component of transport planning and policy-making (Manaugh, Badami, & El-Geneidy, 2015). However, even with such progress, it is questionable whether, or to what extent what has been recognized has been effectively translated into actionable goals and objectives (Manaugh, Badami, & El-Geneidy, 2015). With that said, Agyeman et al. (2002; 2003) developed an expansive concept of sustainability known as Just Sustainabilities² to re-acknowledge and reinforce the role of equity in sustainability. Such a concept states that “sustainability cannot be simply a ‘green’, or ‘environmental’ concern, important though ‘environmental’ aspects of sustainability are. A truly sustainable society is one where wider questions of social needs and welfare, and economic opportunity are integrally related to environmental limits imposed by sup-

porting ecosystems” (Agyeman, Bullard & Evans, 2002 p.78).

Equity is a principle or concept that is often considered synonymous with fairness or justice³. It is a principle or concept that can be conceived socially, spatially and procedurally. Equity recognizes that different people have different needs, in particular those belonging to disadvantaged groups. By failing to effectively incorporate equity into planning and policy-making, we risk disproportionately burdening, and inadequately accommodating the needs of disadvantaged groups who are oftentimes more reliant on such low-cost modes of travel (Golub, Hoffmann, Lugo, & Sandoval, 2016; Gössling, 2016; Zimmerman et al. 2015). Further, by failing to do so, disadvantaged groups become increasingly at risk of facing additional problems such as less healthy, inactive lifestyles and socio-economic disadvantage (Lucas, 2012). It is critical to incorporate equity into the core of planning and policy-making, as well as the processes by which plans and policies are generated. In doing so, we are better equipped at putting forward plans and policies that support not only a healthier environment and economy, but also a healthier society overall.

While it is certainly important to incorporate equity into all facets of planning and policy-making, the following supervised research project will concentrate specifically on equity as it relates to cycling, with a focus on utilitarian cycling⁴. More specifically, the purpose of this research is to critically review what currently exists in academic literature and Canadian transport plans (insofar as they relate to cycling) in an effort to provide a comprehensive understanding and definition of cycling equity, as well as how planning practice can provide for it, now and into the future. To do so, the following key research questions will be addressed:

- What are the current themes in academic literature that pertain to cycling equity and how can planning practice provide for it?

- To what extent are Canadian cities both incorporating and operationalizing equity into transport plans (insofar as they relate to cycling), and what are the current best practices for doing so?

- Based on the findings from questions 1 and 2, what are the current gaps in research and practice, and what directions might research and practice take into the future to advance the pursuit of cycling equity?

Such questions will be addressed over the course of three chapters. By conducting a systematic literature review, Chapter 2 provides a comprehensive understanding and definition of cycling equity, as well as how planning practice can provide for it. Chapter 3 critically reviews municipal-level transport plans from a selection of Canadian cities to assess the extent to which equity is currently being incorporated and operationalized in bicycle planning, and establish current best practices for doing so. Given the results of Chapters 2 and 3, the fourth and final chapter discusses current gaps in research and practice, and the future directions research and practice could take to more effectively provide for cycling equity.

Overall, this research has the potential to benefit both researchers and practitioners. Through a comprehensive review of academic literature and transport plans, researchers and practitioners can become increasingly informed of what directions can be taken to advance the pursuit of cycling equity now and into the future.

CHAPTER TWO

The Pursuit of Cycling Equity: Current Themes in Academic Research

A Systematic Literature Review

2.1 Introduction

“Urban transit systems in most American cities . . . have become a genuine civil rights issue—and a valid one—because the layout of rapid-transit systems determines the accessibility of jobs to the African-American community. If transportation systems in American cities could be laid out so as to provide an opportunity for poor people to get meaningful employment, then they could begin to move into the mainstream of American life.”

Martin Luther King, Jr. cited in Sanchez et al. 2003
Moving To Equity: Addressing Inequitable Effects of Transportation Policies on Minorities
A Joint Report on The Civil Rights Project and Centre for Community Change

Equity is a principle or concept often considered synonymous with fairness or justice and can be overarchingly conceived in three ways: socially, spatially and procedurally (Lee, Sener, & Jones, 2016). Social equity evaluates the impacts (e.g.: costs and benefits) of plans, policies, projects etc. on different socio-demographic groups such as low-income, minority, or older populations (Lee, Sener, & Jones, 2016). Spatial equity evaluates the spatial distribution of impacts (e.g.: the geographic distribution of costs and benefits), and lastly, procedural equity evaluates the fairness of decision-making (Lee, Sener, & Jones, 2016; Bullard, 2004).

Two common perspectives of equity include horizontal and vertical equity. Horizontal equity, more often regarded as equality, presupposes impartiality in treatment across individuals, resulting in equal treatment of those in unequal positions. Ver-

tical equity, however, is more reflective of the principle of fairness where socio-demographic characteristics are considered in decision-making, and benefits are intentionally provided to those who are disadvantaged (Boschmann & Kwan, 2008; Foth, 2013).

Zimmerman et al. (2015, p.3) define equity as a principle which recognizes that “different people have different barriers to living healthy, fulfilled lives”, and looks to address “the effects of power imbalances and the social, economic and political differences that generate disparate outcomes for people in arenas such as health, education and employment”.

In terms of equity and transport, a 2016 Report prepared for the FHWA (U.S. Federal Highway Administration) Pursuing Equity in Pedestrian and Bicycle Planning states that a central goal of transportation equity is “to facilitate social and economic opportunities through equitable levels of access to affordable and reliable transportation options based on the needs of the populations being served, particularly populations that are traditionally underserved” (Sandt, Combs & Cohn, 2016 p.1). Martens defines an equitable and just transport system as one which provides “sufficient accessibility to all under most circumstances, irrespective of income, ethnicity, gender, abilities, and so on”⁵ (2016, p.207-208).

To provide a more comprehensive understanding and definition of cycling equity, a systematic literature review was conducted to answer two primary questions: what is cycling equity and how can planning practice provide for it? The following chapter will first present the methods used to collect academic literature, fol-

lowed by a more in-depth analysis of findings. Lastly, this chapter will highlight key takeaways from the findings obtained from the review process.

2.2 Methods & Preliminary Results

Two academic databases including Scopus and Web of Science were searched for articles using a number of keyword combinations. In Scopus, keyword combinations were searched by “Title, Abstract and Keywords”. Web of Science’s Core Collection was searched using keywords by “Title” and by “Topic”. The specific keyword combinations searched in both academic databases, and the results from each are summarized in Figure 1.

In Scopus, 282 initial results were found. In Web of Science, 108 initial results were found. From the 282 articles found in Scopus, 252 were excluded after accounting for lack of relevance and search duplicates. From the 108 articles found in Web of Science, 103 were excluded due to lack of relevance and search duplicates. Total initial articles collected for review was 35. Upon further review, however, 5 additional articles were excluded due to lack of relevance, quality, and incomplete publication, leaving a final total of 30 academic articles. In addition to the 30 academic articles, Golub et al.’s 2016 book, *Bicycle Justice and Urban Transformation: Biking for All?* was selected for review given its contribution to the advancement of the cycling equity and justice movement.

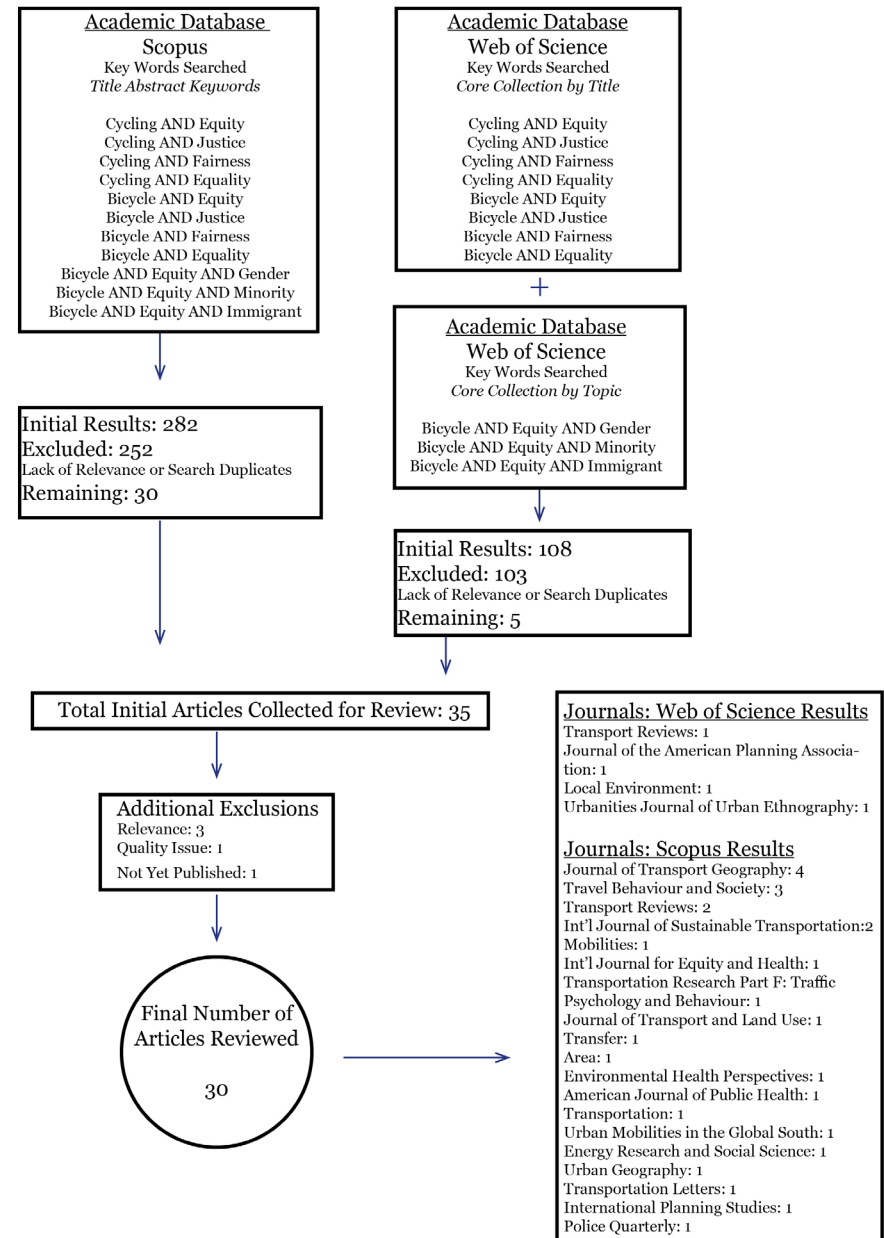
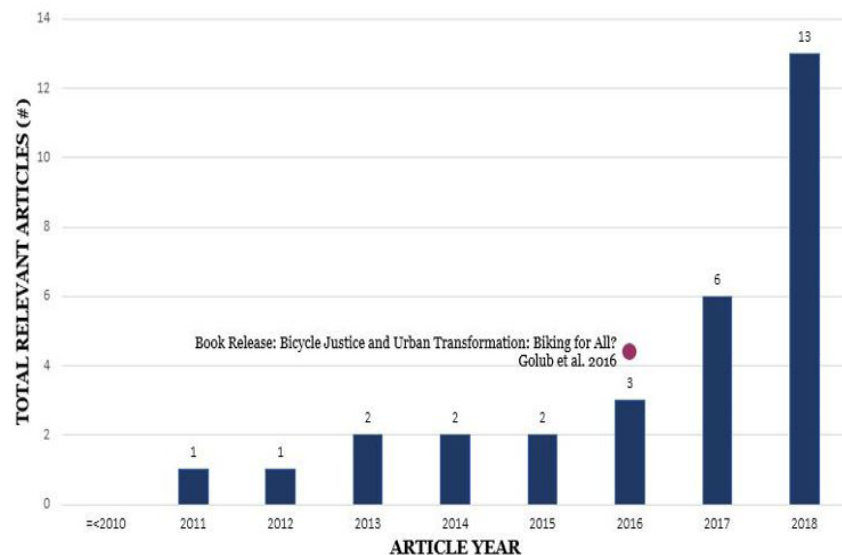


Figure 1: Literature Search Methods and Results

Initially, no search restriction was placed on the year of publication. The reason for which no initial restriction was placed on year of publication was to establish how many articles have been published, through time, given the keyword combinations. From this initial search, the intent was to refine it to articles no older than the year 2000. However, when no restriction was placed on the year of publication, no articles deemed relevant were older than 2010. As a result, no additional search restricting the year of publication was conducted. Figure 2 shows all selected articles by year of publication, demonstrating an increasing trend in number of publications from 2012 onward.

Figure 2: Number of Relevant Articles/Year



Note: Given the search criteria, no relevant articles are found prior to 2010. It is also worth noting that after the publication of Golub et al.'s book in 2016, the number of cycling equity related articles rises dramatically.

As demonstrated in Figure 1 and Figure 2, 30 articles and 1 book were selected for review after accounting for duplicate search results and lack of relevance. Each of the 30 articles were published in a variety of academic journals. Many journals were responsible for publishing one of the 30 articles, however, journals responsible for publishing the most include the Journal of Transport Geography (4), Transport Reviews (3), Travel Behavior and Society (3) and the International Journal of Sustainable Transportation (2).

While it is certainly possible that there are articles pertaining to cycling equity published before 2010, the databases and keyword combinations employed for the purposes of this review simply did not produce them. It should also be noted that no grey literature (e.g.: government/institutional reports) was included as part of the systematic literature review as the purpose of this chapter was to strictly review academic publications.

2.3 Analysis of Findings

Articles resulting from the systematic literature review revealed five key themes that help to provide a comprehensive understanding and definition of cycling equity, and how planning practice can provide for it. Such themes include, (1) Disadvantaged Groups and The Planning Process, (2) Politics and The Economy, (3) Safety and Security, (4) Racial Profiling, Policing, and Harassment, and (5) (In)adequacies in Planning Tools.

Theme One: Disadvantaged Groups and The Planning Process

In the pursuit of cycling equity, it is critical that practitioners, particularly cycling advocates and planners, recognize and address the needs and concerns of disadvantaged groups that have long been ignored and overlooked (Golub et al., 2016). In doing so, planners and decision-makers become more adept at generating effective plans, projects and policies that provide for equitable outcomes (Bastian and Börjesson, 2018). Key groups acknowledged in the literature as having long been ignored or overlooked include women, low-income, elderly and children, and minorities and immigrants.

Women

With the exception of countries with well-established cycling cultures such as The Netherlands, Germany and Denmark, the proportion of women cyclists is consistently and significantly lower than that of men (Aldred, Woodcock, & Goodman, 2016; Frater & Kingham, 2018; Goodman & Aldred, 2018; Xie & Spinney, 2018).

For example, in the UK women are approximately half as likely as men to cycle (Goodman & Aldred, 2018). A study in Cardiff, UK revealed that of the population of frequent cyclists, only a third were women (Xie & Spinney, 2018). Results from a number of studies reveal that concerns of safety and personal security (real or perceived) are the primary reason for which women are less apt to engage in cycling as a mode of travel (Abasahl, Kelarestaghi, & Ermagun, 2018; Aldred, Elliott, Woodcock, & Goodman, 2017; Aldred et al., 2016; Frater & Kingham, 2018; Goodman & Aldred, 2018; Prati, 2018; Xie & Spinney, 2018). Concerns of safety and personal security most often relate to quality of infrastructure or collisions with other road users, and concerns of crime and violence (Abasahl et al., 2018; Aldred et al., 2017; Aldred et al., 2016; Frater & Kingham, 2018; Goodman & Aldred, 2018; Prati, 2018; Xie & Spinney, 2018). Xie & Spinney note that women tend to report higher fear of crime than men, and “since those who are fearful of perceived danger may minimize their exposure to risk, women’s widespread fear of physical and sexual violence is manifested in public places and has become a major constraint on their spatial behaviours and activities.” (2018, p.200). Accordingly, women place greater importance on environments that ensure social safety as compared to men. For example, findings from a stated preference survey in the US revealed that women, compared to men, are more likely to consider lighting an important characteristic of a safe bicycle route (68% vs. 45%) (Xie & Spinney, 2018). For these reasons, women may be considered “indicator species” for bicycle-friendly environments (Abasahl et al., 2018). Additional factors can relate to cultural differences and assigned gender roles such as having to travel with children and household responsibilities that require trip chaining (e.g.: travelling to work, to buy groceries, to pick up children) (Prati, 2018). It has been hypothesized by some researchers that as rates of women cycling increases, so does gender equality (Prati, 2018). For example, Prati (2018) sought to investigate the extent to which higher gender equality is associated with higher rates of women cycling using a six-fac-

tor Gender Equality Index in 28 member states of the European Union. Results from such analysis revealed that a composite score of gender equality is associated with women’s participation in utilitarian cycling. Similar findings are found for adolescent females (Frater & Kingham, 2018). In New Zealand, reasons for which the rate of adolescent female cyclists is proportionally less than that of males is due to a number of reasons, including “image, a desire to be feminine and shun physical activity, gender attribution, injunctive and descriptive norms in relation to both friends and parents, a desire to be social, cycling confidence and concerns for their safety and personal security” (Frater & Kingham, 2018, p. 137). Lastly, a study from India revealed that poor women do not engage in cycling due to a number of concerns and barriers such as lack of dignity, harassment and abuse (Joshi & Joseph, 2015).

In conclusion, findings from the literature have shown that there are proportionally less women cycling in places with less-established cycling cultures which can be attributed to concerns of personal security, social safety and travel with children. As such, planners and decision-makers must work to provide gender-sensitive and inclusive plans and policies that clearly address women’s needs and concerns, and that encourages and enables more women to cycle more often.

Low-Income

For many low-income groups, cycling is, or could be, a reliable and less-costly mode of travel (Golub et al., 2016; Houde et al., 2018). In the US, many low-income and immigrant groups cannot afford a car, and are dependent on cycling as a mode of travel (Houde et al., 2018). Unfortunately, in many urban contexts, transport plans and projects often exclude or negatively affect low-income neighbourhoods (Kent & Karner, 2018). For example, Gris   & El-Geneidy (2018) note that privileged areas in Quebec City, Canada tend to receive more investment than low-income census tracts. As a result, low-income groups living

in low-income neighbourhoods tend to face increased mobility and accessibility challenges, as well as higher exposure to negative transport-related externalities (Tucker & Manaugh, 2018). Examples of negative externalities related to transport include noise and air pollution from nearby auto-dominated roadways and unsafe walking and cycling conditions (Houde et al., 2018; Joshi & Joseph, 2015).

While increasing investment in low-income areas can help improve mobility and accessibility, an ever-emerging concern of low-income groups is fear of gentrification affiliated with cycling-related investments (Houde et al., 2018; Ibsen & Olesen, 2018). Ibsen and Olesen (2018) noted that while bicycling can be framed as increasing equity, this claim is in contrast with arguments bicycle-related infrastructure investments will fuel gentrification and displacement of the many people it is intended to serve. The authors also note that recent evidence suggests that bicycle infrastructure is emerging “disproportionately in gentrified neighbourhoods or is itself a driver of gentrification” (Ibsen & Olesen, 2018, p. 211).

In conclusion, findings from the literature have shown that low-income groups are, or could be more reliant on cycling as a mode of travel. Accordingly, it is important that projects and plans be assessed with a lens of equity to help provide for those who are most in need. In addition to assessing the degree to which projects and plans can generate equitable outcomes, planners must engage with low-income groups to ensure their needs and concerns, such as the fear of gentrification and displacement (real or perceived), are fully understood and addressed.

Elderly and Children

The dimension of age as it relates to transport is fairly well-studied (Goodman & Aldred, 2018; Houde et al., 2018). In terms of cycling, it is clear that those at both ends of the age spectrum would benefit greatly from having better access to a safe, secure

cycling network “due to their physiological vulnerability or more limited abilities to manoeuvre a bicycle” (Houde et al., 2018, p. 10).

In terms of elderly people, Aldred et al. (2016) note that promoting cycling should be a priority as the net health benefits of cycling tend to rise with age. For example, in London, UK it is estimated that “three-quarters of those aged 65 years and over can ride a bicycle, but only 6% of those who can ever do” (Aldred et al., 2017, p. 31). The trend of low rates of cycling among the elderly are not universal, however. Much like with women cyclists, populations of elderly cyclists tends to be higher in countries with a well-established cycling culture (Aldred et al., 2016). For example, in Germany and The Netherlands, cycling tends to become popular at older, until age 75 (Aldred et al., 2016). In places with a less-established cycling culture, several factors are thought to impact elderly and young people’s decision to cycle, including lack of access to safe, high-quality infrastructure that is separated from motor-vehicles, long travel distances, and concerns of personal security and social safety (Aldred et al., 2016; Goodman & Aldred, 2018; Houde et al., 2018).

Findings from the literature suggest that those at either end of the age spectrum tend to be more dependent on certain conditions for cycling to be considered both a feasible and desirable mode of travel. Such conditions include access to safe, high-quality infrastructure, short travel distances, and social safety. When it comes to planning for elderly and children, it is important that planners and decision-makers account for the fact that elderly and children may be less able (e.g.: physically, mentally and legally restricted) to participate in the planning process, and are therefore less able to effectively communicate their concerns and barriers. As such, finding ways to engage with elderly and children in a meaningful way would go a long way in generating increasingly equitable outcomes.

Minorities and Immigrants

For immigrants, in particular Latino/a residents in the US, additional factors not experienced by non-immigrant residents have been found to influence one's decision to cycle (Barajas, 2018; Mitchell & Ridgeway, 2018). For example, a study conducted with low-income Latino/a residents in the San Francisco Bay Area revealed "immigrant experiences and cultural narratives shape individuals' perception of belonging as a cyclist in their neighbourhood" (Barajas, 2018, p. 1). Latinos in the US are also found to be disproportionately involved in the number of bicycle crashes due to reasons such as less familiarity with traffic laws and riding more at night (Barajas, 2018). More generally, a study from New York City found that census tracts with larger populations of immigrants experienced higher rates of both pedestrian and bicycle crashes after controlling for characteristics of the built environment (Barajas, 2018). This can in part be attributed to lower investments in infrastructure for people cycling (and walking) in such areas.

In addition to immigrants, minorities (particularly those identified as Black in the US), face concerns and barriers not felt by other non-minority groups. For example, the experience of racism and heightened policing and harassment felt by minorities while cycling has led to a phenomenon called 'Biking While Black' (Goodman & Aldred, 2018). For example, an article assessing the fairness and effectiveness of bicycle stops in Tampa, Florida discusses an article that was published in the Tampa Bay Times titled "How riding your bicycle can land you in trouble with the cops – if you're black". The article noted that Tampa Police Department not only issued 2,504 bicycle citations - a total greater than the cities of Jacksonville, Miami, St. Petersburg, and Orlando combined, but of those ticketed, 80% were black yet only a quarter of Tampa's population is black (Mitchell & Ridgeway, 2018).

Often referred to as "invisible cyclists", immigrant and minority groups in the US are consistently ignored and overlooked in planning and policy-making despite the fact that immigrant and minority populations have been found to cycle more than their US-born counterparts (Barajas, 2018; Stehlin & Tarr, 2017). This has been worsened by a surge in cycling advocacy groups that are dominated by white, wealthier groups that tend to exclude and overlook the needs and concerns of communities of colour (Stehlin & Tarr, 2017). Accordingly, the long history of advocacy for a more 'liveable city' by and for communities of colour becomes overshadowed by the contemporary practices and advocacy of white, wealthier groups (Stehlin & Tarr, 2017).

In conclusion, findings from the literature have shown that minorities and immigrants, particularly those in the US, are some of the most dependent on cycling yet face proportionally higher rates of crash-related injuries as well as racism, policing, and harassment while cycling. To effectively address the concerns and barriers of immigrants and minorities, planners and decision-makers should consider collaborating with immigrant-serving community organizations, and become more involved in understanding and addressing neighbourhood conditions and their potential effect on travel (Barajas, 2018). Planners and decision-makers should also take the time to understand how cultural histories and identities can influence mode choice. By centering identity when explaining mode choice, new perspectives on how groups make travel decisions may be illuminated (Barajas, 2018). More insights into the concerns and barriers facing immigrants and minorities are discussed in Theme Four: Racial Profiling, Policing and Harassment.

Theme Two: Politics and The Economy

When discussing cycling equity, it is critical to acknowledge and understand the political and economic forces shaping the plans, projects and investment priorities in local contexts. For exam-

ple, Stehlin and Tarr (2017) note that while the development of plans can often include a multitude of stakeholders, such as elected officials, consulting firms, community organizations and bicycle advocacy organizations, plan implementation often “rests on the spatialization of these networked powers” (p. 1338). For these reasons, planners must work to ensure all members of the community are able to effectively participate and contribute to the planning process. For example, Sagaris & Aurora (2017) note that participation, if not done democratically, can bring its own set of issues where decisions on investment can easily overlook needs and concerns of low-income and other disadvantage groups.

Emerging research is concerned with the ways in which investment in, and promotion of bicycling correlates with processes of gentrification and neoliberalism that may undermine the bicycle's potential to be a truly sustainable and egalitarian practice (Ibsen & Olesen, 2018). For example, a recent study from Portland, Oregon argues that bicycle promotion is predominantly rooted in neoliberal urban development and economic growth (Ibsen & Olesen, 2018), and that Portland is primarily concerned with promoting the image of bicycling as a symbol of city livability, progressivity and sustainability (Ibsen & Olesen, 2018). The authors conclude that while cycling certainly has the potential to serve as a less-costly, sustainable mode of travel, in its current state, bicycling seems to be fuelling processes of gentrification and displacement while depoliticizing policies of bicycle promotion under the banner of sustainability and equity (Ibsen & Olesen, 2018). Not only are researchers directing their attention to the relationship between cycling and gentrification, when asked, many local residents in the US and elsewhere are quick to share their concerns on such a relationship. For example, in Barajas' 2018 study, many interviewees spoke of the contrast in investment in bicycle infrastructure between neighbourhoods. One interviewee was quoted saying the following, “my neighborhood is more [bike] accessible [than my old neighborhood]

because Valencia Street has a bicycle route along the whole street but— These contradictions are very hard. Now that they have put more bike lanes in the neighborhood, the families and children that need them aren't here anymore. The same has happened with public transportation...It is super unjust.” (Barajas, 2018, p. 14).

How the ‘cycling citizen’ is constructed in bicycle promotion/marketing materials and planning documents has been thought to contribute to the relationship between cycling and fear of gentrification (Aldred, 2015; Gavin, Bennett, Auchincloss, & Katenta, 2016; Osborne & Grant-Smith, 2017). An Australian study found that in plan and policy documents, cyclists are often portrayed as slim, muscular people who are male, affluent, and white rather than female, working class or poor, and/or people of colour (Osborne & Grant-Smith, 2017). The authors hypothesized that the dominance of representations of MAMIL (middle-aged men in lycra) cyclists in policy documents may make cycling less accessible to other groups (e.g.: women, lower-income and fat people) as those in the “other” groups do not conform to what's portrayed as the common “cycling citizen” (Osborne & Grant-Smith, 2017). As a result, such groups risk becoming excluded from bicycle planning and policy decisions (Osbourne & Grant-Smith, 2017).

In conclusion, planners and decision-makers need to be aware of how underlying political-economic forces can influence the generation and implementation of plans and projects, and how such forces may hinder the potential for truly equitable outcomes. Further, planners must work to understand how certain plans and projects can potentially contribute to new or on-going gentrification processes, and the potential impact of those processes on longstanding residents. Lastly, planners and decision-makers must be aware of how promotional materials and planning documents may be “constructing” a “cycling citizen” that is exclusionary, making cycling less desirable and/or accessible to all those who do not identify as a white, middle-aged, affluent male.

Theme Three: Safety and Security

Cycling-related concerns pertaining to physical safety and personal security are felt universally, not just to those who are disadvantaged. However, in countries and cities with less-established cycling cultures (such as in Canada and the US), issues relating to physical safety and personal security often disproportionately affect disadvantaged groups compared to their more affluent counterparts (Golub et al., 2016). Because concerns pertaining to safety and personal security are often the most prominent barriers to cycling, it is important they are well-understood (Barajas, 2018; Prati, 2018; Tucker & Manaugh, 2018). While theme one highlights the various ways concerns of physical safety and personal security affect different disadvantaged groups, details pertaining to physical safety and personal security concerns have been reiterated below.

Physical Safety

Physical safety primarily concerns the presence and quality of infrastructure that either provides, or fails to provide a safe, well-connected network that links travellers with desired destinations. As noted in Tucker and Manaugh (2018) the mere presence of a bike lane is often not enough to ensure safe cycling if it is (a) not part of a well-connected system linking residents to desired destinations, (b) fails to be accompanied by adequate traffic calming measures, and (c) lacks community outreach initiatives to encourage cycling. Different types of bicycle infrastructure tend to elicit greater or worse feelings of safety, with a painted bicycle lane on a busy road being the worst, and a fully separated bicycle path the greatest. Unfortunately, it is typically low-income, minority and immigrant neighbourhoods that are provided with the least safe forms of infrastructure, if any (Barajas, 2018; Golub et al., 2016; Grisé & El-Geneidy, 2018; Tucker & Manaugh, 2018).

In the US, planners and decision-makers are supposed to, by

law⁶, consider whether transportation benefits and burdens are being equitably distributed across current and potential groups of users (Kent & Karner, 2018). However, given the current state of cycling in the US, it is clear that planners and decision-makers have generally failed to do so. To adequately assess the extent to which safe, secure cycling infrastructure is being equitably distributed requires careful attention to data and methods. More details pertaining to methods and tools to assess cycling equity is discussed in Theme Five: (In) adequacies in Planning tools.

Personal Security/Social Safety

Concerns pertaining to personal security/social safety are different from physical safety as they primarily relate to acts of crime such as violent attacks and theft. As mentioned previously, concerns related to personal security/social safety are even more pronounced with women, children, and elderly, and are often considered to be their primary barrier to cycling (Prati, 2018; Xie & Spinney, 2018). A study conducted in Bogota, Columbia revealed that users of Bogota's cycling network (Cicloruta) had worse crime-related safety perceptions than Bogota's inhabitants overall, resulting in the need for strategies to decrease threats to user's personal security and social safety (Torres, Sarmiento, Stauber, & Zarama, 2013). Strategies to decrease threats (real or perceived) to user's personal security and social safety included more lighting and an increase in police presence (Torres et al., 2013). The same study also acknowledged the need for more qualitative investigations to learn more about Cicloruta users' safety-related concerns (Torres et al., 2013). In addition to the strategies put forward by Torres et al. (2013), Barajas (2018) suggests planners be involved in helping to establish community-based solutions for improving safety as communities can often provide for more context-sensitive solutions to improving safety be it related to transport or otherwise.

Theme Four: Racial Profiling, Policing and Harassment

Building on the introduction of minorities and immigrants in theme one, it is important to discuss cycling-related barriers and concerns pertaining to profiling, policing and harassment felt by immigrant and minorities (particularly in the US). As mentioned in theme one, a study conducted with low-income Latino/a residents in the San Francisco Bay Area revealed several unique barriers and concerns felt by local Latino/a residents via in-depth interviews (Barajas, 2018). One interviewee in Barajas' study discussed concerns of documentation status and language ability as a barrier to cycling (Barajas, 2018). Another interviewee detailed experiences of harassment and threats to safety and personal security as a primary barrier to cycling, "most of my friends have bicycles ... they say it's difficult, that it makes them late and they come back late and there are bad people on the street—they rob them, they hit them" (Barajas, 2018, p. 10).

In addition to barriers and concerns facing immigrants, a recent phenomenon known as 'Biking While Black' demonstrates how people identified as black are disproportionately subject to racism, profiling and harassment from not only police, but other road users (Mitchell & Ridgeway, 2018). In recent years, research on profiling has shifted its focus towards police bias in SQF [stop, question, frisk] encounters, and finds that almost uniformly Black and Latino/a populations are subject to higher rates of SQF than population benchmarks (Mitchell & Ridgeway, 2018). As mentioned previously, an article assessing the fairness and effectiveness of bicycle stops in Tampa, Florida discusses an article that was published in the Tampa Bay Times titled "How riding your bicycle can land you in trouble with the cops – if you're black". The article noted that Tampa Police Department not only issued 2,504 bicycle citations - a total greater than the cities of Jacksonville, Miami, St. Petersburg, and Orlando combined, but of those ticketed, 80% were black yet only a quarter of Tampa's population is black (Mitchell & Ridgeway, 2018).

While Police officials frequently claim that the "observed disparities are caused by police efforts to combat crime in high-crime, minority neighborhoods" (Mitchell & Ridgeway, 2018, p. 467), results from this study reveal that such stops are not actually found to be all that effective in crime reduction (Mitchell & Ridgeway, 2018).

While there is no "ready-made" solution to combat longstanding, systemic racism that disproportionately subjects immigrants and minorities to harassment and policing tactics, it is important that planners and decision-makers be aware of these concerns and barriers, and consider them when trying to plan for such groups. With that said, there are several ways in which planners and decision-makers could help to minimize such tactics. One such way is to provide safe, secure infrastructure paired with language-appropriate signage of road rules and regulations to minimize the risk of breaking such rules and regulations. Another such way is to push for an elimination of SQF policies, or at the very least require transparency in who is being approached and why (Barajas, 2018; Mitchell & Ridgeway, 2018)

Theme Five: (In)adequacies in Planning Tools

To generate the conditions that provide for cycling equity, attention must be given to the types of methods, data, and tools being employed to assess it (Kent & Karner, 2018; Tucker & Manaugh, 2018). For example, "relying only on peak-hour bicycle volume counts could result in prioritizing commuter routes used by some, but not all current cyclists. Likewise, planning with data collected from smartphones would ignore cyclists who do not have access to that technology" (Kent & Karner, 2018, p. 1).

In recent years, several methods of analysis have been well regarded for their ability to assess equity, including accessibility and Level of Traffic Stress (LTS) analysis. Employed using the Network Analyst function in GIS, both accessibility and LTS

can be combined to provide a fairly robust equity analysis and can serve to prioritize projects by assessing the extent to which proposed projects could improve equitable outcomes. Planners are increasingly using LTS to quantify how comfortable a bicycle network is for cyclists, and accessibility to quantify how useful the network is for reaching destinations (Kent & Karner, 2018). For example, Kent & Karner's (2018) study employed an "equity of accessibility" assessment that prioritized projects in areas home to the most disadvantaged residents in Baltimore, Maryland. Tucker and Manaugh (2018) conducted a comparative assessment of neighbourhoods in Rio de Janeiro and Curitiba, Brazil to assess the extent to which bicycle lane provisioning has been equitable using LTS and accessibility. Grisé and El-Geneidy (2018) conducted an analysis of Quebec City's current and potential future cycling conditions and evaluated the extent to which future cycling routes would benefit socially disadvantaged groups.

Methods and tools used to assess equity in several other studies include Systems Dynamic Modelling (Macmillan et al., 2014), descriptive analyses of imagery found on cycling-related promotional materials and planning documents (Gavin et al., 2016; Osborne & Grant-Smith, 2017; Xie & Spinney, 2018), and qualitative interviews that investigate local barriers and concerns to cycling from a more in-depth perspective (Barajas, 2018). Alternatively, several Cycling Level of Service tools (CLoS) tools⁷ commonly employed to assess cycling conditions throughout the UK have been criticized for their ability to adequately assess equity. CLoS tools are often criticized for their undervaluation of personal security/social safety as it is not always regarded as one of the critical factors influencing one's decision to cycle. As Xie and Spinney (2018) note "in the Welsh Cycle Route Audit Tool (CRAT) of the 'Active Travel: Design Guidance' ... perceived safety and social safety are not regarded as part of the safety measurement. Rather, they are deemed as elements that influence the attractiveness of cycling. This is also the case for the

much-lauded Dutch CROW Manuel where differential experiences of social safety are barely mentioned" (p. 201). The authors proceed to note that the "absence of difference in CLoS tools may be symptomatic of a professional ethnocentrism related to the overwhelming male domination of transport engineering, design and planning professions in the UK" (Xie & Spinney, 2018, p. 201). While CLoS tools do not entirely fail in their ability to assess equity, the point here is to acknowledge that several of such tools inadequately account for certain concerns (e.g.: personal security/social safety) that are critical barriers for some of the most vulnerable groups.

Ultimately, no single method or tool will provide planners and decision-makers with all the answers, however, some methods or tools may provide more insight than others. In the pursuit of cycling equity, it is ultimately a combination of methods and tools that will best provide planners and decision-makers with the ability to generate plans and projects that effectively provide for equitable outcomes.

2.4 Key Takeaways

The purpose of this chapter was to answer two primary questions: what is cycling equity and how can planning practice provide for it? Findings from current academic literature revealed five key themes that serve to answer both of these questions, (1) Disadvantaged Groups and The Planning Process, (2) Politics and The Economy, (3) Safety and Security, (4) Racial Profiling, Policing, and Harassment, and (5) (In)adequacies in Planning Tools.

Key disadvantaged groups that planners and decision-makers should be mindful of when planning for cycling equity include women, low-income, elderly and children, and minority and immigrants. Among each group, there are both common and

unique concerns and barriers to cycling. Commonly expressed across all groups are concerns pertaining to physical safety and personal security, be they related to quality and presence of infrastructure or crime and violence. Unique concerns and barriers facing several disadvantage groups include the following:

Women Unique concerns and barriers facing women include assigned gender roles and responsibilities that oftentimes require travel with children and trip chaining. Physical appearance (e.g.: sweating, helmets) and image of femininity can also serve as a barrier to cycling, particularly for adolescent females.

Low-Income Unique concerns and barriers facing low-income groups include displacement from gentrification as cycling investments become increasingly regarded as an indicator and/or driver of gentrification.

Minority and Immigrants Unique concerns and barriers facing minorities and immigrants include racism, policing and harassment, as well as displacement from gentrification. Additional considerations to be mindful of when planning for cycling equity include political-economic forces shaping plans, projects and investment priorities. More specifically, planners and decision-makers need be mindful of (1) where investments are being prioritized, (2) who is benefitting from such investment and who will continue to benefit into the future, and (3) the relationship between investment decisions and its potential to drive or contribute to gentrification and displacement.

Planners must equip themselves with methods and tools of analysis that adequately assess equity, such as accessibility, Level of Traffic Stress (LTS), and qualitative fieldwork such as in-depth interviews and assessment of the quality of infrastructure and surrounding environment.

Key takeaways from this chapter are not unlike the conclusions

drawn in Golub et al.'s 2016 book, *Bicycle Justice and Urban Transformation: Biking for all?* which has been instrumental in the advancement of the cycling equity and justice movement (de Chardon, 2017; Barajas 2017; Deka 2018). *Bicycle Justice and Urban Transformation: Biking for all?* is a book that presents a collection of works authored and edited by scholars and practitioners at the forefront of the bicycle justice and equity movement, including, but not limited to: Aaron Golub, Melody Hoffman, Adonia Lugo and Gerardo Sandoval⁸. Key conclusions drawn include the need to (a) recognise the travel needs of diverse populations and make plans accordingly, (b) to promote participation of diverse populations and grassroots advocacy, (c) to make investments supporting travel needs of existing communities instead of using bicycling as a marketing tool to attract newcomers, (d) to re-define the meaning of safety and security based on experiences of diverse communities, and (e) to integrate bicycling into a broader community framework (Deka, 2018).

Given the findings discussed throughout this chapter, cycling equity can be defined as a situation where cycling is a safe, secure mode of travel that improves mobility and accessibility fairly, enabling all people to participate and flourish in socio-economic life. To provide for cycling equity, planners and decision-makers recognize and address the needs and concerns of disadvantaged groups by including such groups throughout the entirety of the planning process, and by employing methods of analysis that assess a plan or project's potential to generate equitable outcomes. Plans and projects are prioritized in areas home to the most disadvantaged but are shaped under the consideration of key concerns and barriers such as physical safety, personal security, racism, policing and harassment, and fear of displacement from gentrification affiliated with cycling investments.

CHAPTER THREE

The Pursuit of Cycling Equity: Current Themes in Canadian Transport Plans

A Critical Planning Review

3.1 Introduction

As cities on a global basis increasingly focus on promoting the use of cycling as both a feasible and desirable mode of travel, it is important to ensure equity is not only incorporated into plans but paired with policies, actions, or measures designed to operationalize it. As noted in the 2016 Report on Equity in Pedestrian and Bicycle Planning prepared for the FHWA, planners are well positioned to lead, facilitate and advocate for improvements that enhance the ability of underserved populations to travel by walking and cycling which can help reduce transport-based inequities and the negative impacts associated with them (Sandt, Combs & Cohn, 2016).

The incorporation of equity into bicycle planning is particularly important given the reliance of traditionally disadvantaged groups on such a low-cost mode of travel (Golub et al., 2016; Smart Growth America., 2017). Reinforcing this point are recent U.S. Census Bureau trends that found Hispanic, African American and Asian American populations are responsible for most of the growth in bicycling, increasing from 16 to 23 percent of all bicycle trips between 2001 and 2009 (The League of American Bicyclists, n.d.).

This chapter conducts a critical planning review to understand the extent to which equity is currently incorporated and operationalized in Canadian transport plans (insofar as they relate to cycling), and from such findings establish current best practices for doing so. The following chapter will first present the meth-

ods employed to collect and review plans, followed by a presentation and analysis of findings. Lastly, this chapter presents key takeaways and current best practices for incorporating and operationalizing equity based on the findings obtained from the review.

3.2 Methods and Preliminary Results

Methods employed to conduct the following review are largely inspired by two articles, namely, Manaugh et al.'s (2015) article, Integrating social equity into urban transportation planning: A critical evaluation of equity objectives and measures in transport plans in North America and Boisjoly and El-Geneidy's (2017) article, How to get there? A critical assessment of accessibility objectives and indicators in metropolitan transport plans. The scope of the review is limited to the municipal planning context and sought to investigate two of the most populous cities within each of the Canadian provinces. Whether or not cities are selected for review depends on the following criteria:

- Presence of a city-level active transport and/or cycling plan no older than 2008⁹, and
- If no active transport or cycling plan, presence of a city-level transportation master plan that is no older than 2008.

Based on the above criteria, 17 cities from 9 of the 10 Canadian provinces are preliminarily selected for review. All provinces except for Prince Edward Island are included in this study. When only one city was selected from a province, such as in the case of

Newfoundland, Nova Scotia, New Brunswick and Manitoba, it was because only one city was deemed eligible for review given the criteria. Alternatively, in the case of Ontario, more than two cities are selected as Ontario has the largest population in Canada warranting the inclusion of a larger sample size. Plans written in English and French were analyzed and included in this study.

Table 1 includes the list of cities selected for review, including the city's population and size (Area/km²). Figure 3 depicts the geographical location of each of the studied cities.

City and Province	Population	Size (Area/ km ²)
Saint John's, Newfoundland	108,860 (2016)	446 km ²
Halifax, Nova Scotia <i>Now formally known as Halifax Regional Municipality (HRM)</i>	403,000 (2016)	97.23 km ² (Urban Core) 5,490 km ² (HRM)
Fredericton, New Brunswick	58,220 (2016)	132.6 km ²
Quebec City, Quebec	531,900 (2016)	484.1 km ²
Montreal, Quebec	1,705 million (2016)	431.5 km ²
Ottawa, Ontario	934,240 (2016)	2,778 km ²
Hamilton, Ontario	536,915 (2016)	1,138 km ²
London, Ontario	383,825 (2016)	420.6 km ²
Kingston, Ontario	123,795 (2016)	450.4 km ²
Toronto, Ontario	2,732 million (2016)	630.2 km ²
Winnipeg, Manitoba	705,245 (2016)	464.1 km ²
Regina, Saskatchewan	215,105 (2016)	180 km ²
Saskatoon, Saskatchewan	246,375 (2016)	228.1 km ²
Calgary, Alberta	1,239 million (2016)	825.3 km ²
Edmonton, Alberta	932,550 (2016)	684 km ²
Vancouver, British Columbia	631,490 (2016)	115 km ²
Kelowna, British Columbia	127,380 (2016)	211.8 km ²

Table 1: Canadian Cities Preliminarily Selected for Review

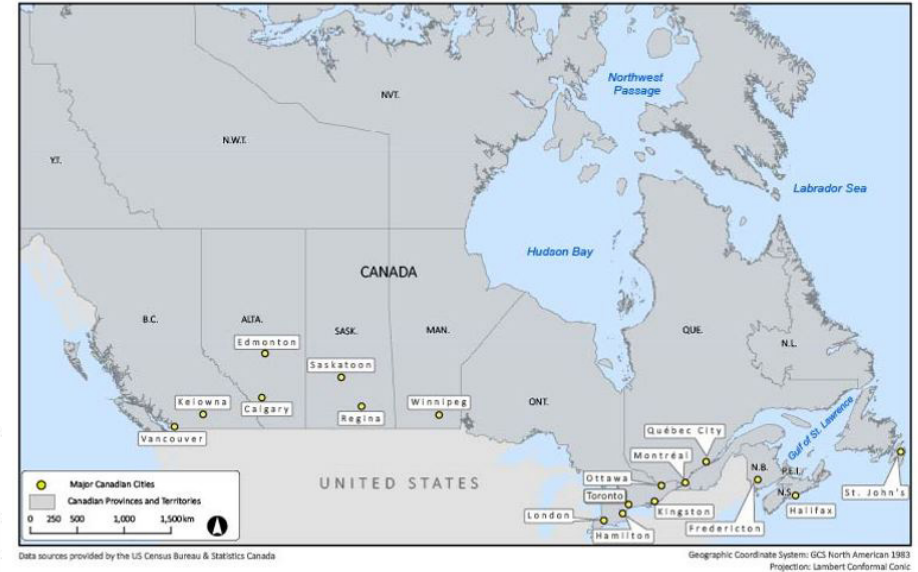


Figure 3: Location of Canadian Cities Preliminarily Selected for Review

From the 17 cities, 25 plans were initially selected for review including a mixture of active transport, cycling, and transport master plans. For each of the 25 plans, the following review process was applied to assess the extent to which equity is incorporated:

1. “Keyword in Context”: Do the words Equity, Justice or Fairness appear, in context, anywhere throughout plan?
2. To what extent is equity incorporated into the plans overarching (i.e.: not pertaining to any particular mode of travel) principles, goals or objectives?
3. To what extent is equity incorporated more specifically into cycling-related material (e.g.: cycling-related principles, goals or objectives)?

If the plan did not meet any of the above criteria, it was eliminated from any further evaluation. Of the 25 plans preliminarily selected for review, 17 plans were deemed to have incorporated

at least some degree of equity, with 8 having been excluded from any further evaluation. The remaining 17 plans were subject to further evaluation to assess the extent to which cycling-related principles, goals or objectives are paired with policies/actions/measures to operationalize it.

Table 2 provides a list of all selected plans, including whether it was included or excluded from further evaluation. Detailed findings from the review are provided in Appendix B.

3.3 Analysis of Findings

Findings from the review revealed four key themes, including (1) Socio-Spatial Network Analysis, (2) Consideration of Equity in Projects and Priorities, (3) Equity-oriented Funding mechanisms, and (4) Accessibility, Design and Safety which has three sub-themes including Accessibility, Universal Design for All-Ages and Abilities (AAA)/Complete Streets, and Personal Security. A summary of key findings are presented in Table 3. Table 3 can be found at the end of this section.

Theme one (Socio-Spatial Network Analysis) identifies spatial gaps in the existing cycle network, and identifies socio-demographic groups that currently benefit from the network, and those who could given improvements. By performing a socio-spatial network analysis, cities are more adept at knowing what currently exists, for who, and therefore what could exist, and for who.

Theme two (Consideration of Equity in Projects and Priorities) considers the extent to which individual projects can provide for equitable outcomes, and by prioritizing those projects which have been assessed to provide for equitable outcomes.

Theme three (Equity-oriented Funding Mechanisms) evaluates funding mechanisms for their potential to minimize the financial

City & Province	Plan	Included for Further Evaluation	Excluded from Further Evaluation
City of Saint John's, Newfoundland	Cycling Master Plan, 2009	●	
Halifax, Nova Scotia <i>Now formally known as Halifax Regional Municipality (HRM)</i>	Integrated Mobility Plan, 2018	●	
	Centre Plan, 2017	●	
	Halifax 2014-19 Active Transportation Priorities Plan, 2014		●
City of Fredericton, New Brunswick	Active Transportation Connections Plan, 2017 (update)		●
Quebec City, Quebec	Plan de Mobilité Durable, 2011	●	
	Vision des Déplacements à Vélo, 2016		●
City of Montreal, Quebec	Cycling Master Plan, 2016		●
	Transportation Plan, 2008	●	
City of Ottawa, Ontario	Ottawa Transportation Plan, 2013	●	
	Ottawa Cycling Plan 2013		●
City of Hamilton, Ontario	Transportation Master Plan, 2018	●	
City of London, Ontario	Cycling Master Plan, 2016	●	
	Transportation Master Plan, 2013		●
City of Kingston, Ontario	Active Transportation Master Plan, 2018	●	
City of Toronto, Ontario	Cycling Network 10 Year Plan	●	
City of Winnipeg, Manitoba	Pedestrian and Cycling Strategies, 2014	●	
City of Regina, Saskatchewan	Transportation Master Plan, 2017	●	
City of Saskatoon, Saskatchewan	Active Transportation Plan, 2016	●	
City of Calgary, Alberta	Transportation Master Plan, 2009	●	
	City of Calgary Cycling Strategy, 2011		●
City of Edmonton, Alberta	Transportation Master Plan, 2009	●	
City of Vancouver, British Columbia	Vancouver Transportation Master Plan, 2012	●	
	Active Transportation Promotion and Enabling Plan, 2016		●
City of Kelowna, British Columbia	Pedestrian and Bicycle Master Plan, 2016	●	

Table 2: Plans Selected for Review

burden of transport costs on those who are least able to pay.

Finally, theme four (Accessibility, Design and Safety) includes three sub-themes: Accessibility, Universal Design for All-Ages and Abilities (AAA)/Complete Streets, and Personal Security.

Sub-themes were selected as they can be supportive in the creation of increasingly equitable outcomes, but do not explicitly strive to do so.

Theme One: Socio-Spatial Network Analysis

Plans deemed to have *addressed* this theme include Winnipeg's Pedestrian and Cycling Strategies 2014, Saskatoon's Active Transportation Plan 2016 and Kelowna's Pedestrian and Bicycle Master Plan 2012. From these plans, Winnipeg and Saskatoon most effectively *operationalized* it.

Using GIS and Census data, **Winnipeg** operationalized this theme by performing an equity analysis that identified disadvantaged groups/communities that can benefit from having access to more transport options including low-income, indigenous and immigrant groups, and identified areas that are spatially deprived of infrastructure (City of Winnipeg, 2014). Figure 4 is a cumulative equity map that provides a look at the cumulative results of Winnipeg's equity analysis. This map identifies areas of Winnipeg where limited access to walking or bicycle facilities is made worse by the presence of groups subject to socio-economic disadvantage. The higher the score, the more likely it is that improvements will provide for equity. It is also worth noting that Winnipeg's plan is equipped with a detailed implementation and monitoring plan designed to monitor the implementation of plan objectives, and to inform where monetary and staff resources need to be allocated (see pages 290-297 of the plan).

Like Winnipeg, **Saskatoon** operationalized this theme by employing an equity analysis using GIS and Census Data. This analysis evaluated the current distribution of facilities and identified areas where limited access is present for disadvantaged groups. In other words, Saskatoon identified traditionally underserved and disadvantaged groups/communities that would benefit from having access to more transport options. (City of Saskatoon, 2016).



Figure 4: Winnipeg's Cumulative Equity Analysis Results

Source: City of Winnipeg, 2014

Theme Two: Consideration of Equity in Projects and Priorities

Plans deemed to have *addressed* this theme include Halifax's Centre Plan 2017, Montreal's Transportation Plan 2008, Hamilton's Transportation Master Plan 2018, Kingston's Active Transportation Plan 2018, Winnipeg's Pedestrian and Cycling Strategies 2014, Regina's Transportation Master Plan 2009 and Saskatoon's Active Transportation Plan 2016. From these plans, Winnipeg and Saskatoon most effectively *operationalized* this theme.

Winnipeg operationalized the inclusion of equity by prioritizing network improvements using a Multiple Account Evaluation (MAE). The MAE assessed each pedestrian and bicycle facility based on the following criteria: 1. Network Connectivity 2. Generators 3. Access to Transit 4. Level of Protection 5. Walking & Cycling Potential 6. Equity 7. Safety and 8. Network Spine (City of Winnipeg, 2014). Priority was given to projects that had the potential to contribute to the creation of equitable outcomes. Similar to Winnipeg, **Saskatoon** operationalized the inclusion of equity by identifying priority improvement locations based on a list of variables, including Network Connectivity, Trip Generators, Access to Transit, Level of Protection, Equity, Safety, Network Spokes and Potential. Each variable was scored on a five-point scale. After scoring each variable on a five-point scale, results were aggregated to generate an overall score for each new facility. The city then developed a project-ranking list. Areas with the greatest equity potential were given the highest score. (City of Saskatoon, 2016).

Theme Three: Equity-Oriented Funding Mechanisms

Plans deemed to have *addressed* this theme include Québec's Plan de Mobilité Durable 2011, Ottawa's Transportation Plan 2011 and Kelowna's Pedestrian and Bicycle Master Plan 2016. From these plans, Kelowna most effectively *operationalized* this theme.

Kelowna operationalized equity in funding by establishing criteria to assess the extent to which potential funding sources are equitable. More specifically, Kelowna asked, "is this revenue source equitable in terms of the geographic distribution of those who pay, relative to the area that will benefit, and in terms of income, by avoiding drawing overly upon those that can least afford to pay?" (City of Kelowna, 2016 p.49). Kelowna identified two types of funding that reflect at least some degree of equity, including General Funds/Taxation and Local Area Service Taxes.

The former tends to be equitable as lower valued properties pay less tax, and the latter the potential to promote spatial equity. Importantly, however, Kelowna notes that the latter mechanism risks imposing income inequity if those who vote "no" to project due to financial constraints are forced to contribute to the wishes of the majority (City of Kelowna, 2016 p. 52).

Theme Four: Accessibility, Design and Safety

Accessibility

Accessibility is a measure that evaluates the ease with which one can reach a destination and the number of desired destinations that exist (e.g.: grocery stores, banks, parks). When accessibility is improved for people and areas of disadvantage, equity can also be improved. More information pertaining to accessibility are detailed in Hansen's 1959 Publication: How Accessibility Shapes Land Use, and more recently, Geurs & van Wee's 2004 publication: Accessibility evaluation of land-use and transport strategies: review and research directions.

Plans deemed to have *addressed* this theme include Halifax's Integrated Mobility Plan 2018, Québec's Plan de Mobilité Durable 2011, Kingston's Active Transportation Master Plan 2018, Toronto's Cycling Network 10 Year Plan 2016, Winnipeg's Pedestrian and Cycling Strategies 2014, Regina's Transportation Master Plan 2009, Saskatoon's Active Transportation Plan 2014 and Kelowna's Pedestrian and Bicycle Master Plan 2016. In terms of *operationalization*, however, none of the plans that addressed this concept proposed an explicit method of measuring accessibility despite the existence of employable measures (see Hansen 1959).

Universal Design for All-Ages and Abilities (AAA)/ Complete Streets

Universal Design is a concept that ensures infrastructure (e.g.: transit, streets, and buildings) can be safely accessed and

utilized by people of all-ages and abilities. Seven principles of Universal Design guide the design of infrastructure and environments, including Equitable Use, Flexibility in Use, Simple and Intuitive Use, Perceptible Information, Tolerance for Error, Low Physical Effort, Size and Space for Approach and Use (NDA, 2014). Increasingly, Universal Design is being achieved through the implementation of “Complete Streets” policies. Complete Streets are those that can be safely accessed and utilized by all travelers, including people walking, cycling, taking transit or driving.

All plans addressed this theme. From these plans, however, Hamilton, Regina, Vancouver, London, Toronto and Halifax most effectively operationalized this theme.

In every plan, cities operationalized this theme by adopting, or recommending the adoption of a Complete Streets policy and/or accessibility design standards. Currently, the **City of Hamilton** is in the process of adopting a Complete-Livable-Better Streets policy (City of Hamilton, 2018). As stated in their 2009 plan, Regina intended on adopting two policies, including a universal accessibility policy and a Complete Streets policy that is tailored to fit the context of the City of Regina. The city further intended on establishing evaluation criteria that helps monitor the progress of achieving objectives of the Complete Streets policy. Once developed, the city intends on reviewing the policy as part of any updates to the city’s Transportation Master Plan to ensure any changes in user needs are accounted for (City of Regina, 2009). As of their 2012 plan, **Vancouver** intended on adopting and implementing plan and design guidelines that support a bicycle network that is comfortable for people of all-ages and abilities, as well as developing a cycling comfort index to help identify bicycle routes that currently do not meet proposed guidelines. Through this index the city can be informed of where new routes need to be added, and which existing routes are in need of up-

grade (City of Vancouver, 2012). **London** and **Toronto** have existing guidelines and standards pertaining to universal accessibility and complete streets (City of London, 2016; City of Toronto 2016). The City of Toronto is currently working on developing on-street bikeway design guidelines to be released in 2019 (City of Toronto, 2016). Lastly, **Halifax** intends on delivering their proposed Regional Centre all ages and abilities bicycle network by 2022, and intends on providing all ages and abilities bicycle connections to all Halifax transit terminals by 2022 (City of Halifax, 2018).

Personal Security

By minimizing the potential for criminal behavior (e.g.: personal attacks while walking or cycling) we can create environments that evoke greater feelings of personal and social safety which can incentivize more people to walk or cycle. Creating a secure environment is important for all travelers, but are particularly important for vulnerable groups such as women, children, and elderly.

Plans that *addressed* this concept include Saint John’s Cycling Master Plan 2009, Winnipeg’s Pedestrian and Cycling Strategies 2014, Regina’s Transportation Master Plan 2009, Saskatoon’s Active Transportation Plan 2016, Edmonton’s Transportation Master Plan 2009 and Calgary’s Transportation Plan 2009. All plans were deemed to have succeeded in *operationalizing* this theme.

In each plan, cities most effectively operationalized this concept by recommending, or continuing to ensure Crime Prevention through Environmental Design (CPTED) principles are implemented into pedestrian and bicycle facility design. Key principles of CPTED include improving visibility of underpasses with lighting and/or open design concepts and illuminating sidewalks, crosswalks, pedestrian corridors and pathways (City of Winnipeg, 2014). As acknowledged in Saint John’s Cycling Master

Plan, CPTED is an important consideration as “the fear produced by the possibility of crime can be at times as much of a barrier to cycling and AT [Active Transportation] activities as any physical barriers and depending on the situation, can be more difficult to address. This psychological barrier becomes even more pronounced with-in certain groups such as women, children, the physically challenged and senior citizens” (City of Saint John’s, 2009 p.33).

3.4 Key Takeaways and Current Best Practices

Based on the analysis of findings presented in the previous section, four plans (highlighted in yellow in table 3) emerged as having collectively addressed each of the four themes most effectively. Such plans include the following:

1. Winnipeg’s Pedestrian and Cycling Strategies, 2014
2. Saskatoon’s Active Transportation Plan, 2016
3. Regina’s Transportation Master Plan, 2009
4. Kelowna’s Pedestrian and Bicycle Master Plan, 2016

While none of these plans succeeded in addressing all four key themes by themselves, collectively they work to formulate current best practices for incorporating and operationalizing equity. Table 4 presents (1) the four overarching themes discussed throughout this chapter, (2) the plan(s) affiliated with the incorporation and operationalization of each, and (3) the practices employed by

Table 3: Summary of Key Findings from Critical Planning Review

CITIES & PLANS	THEME ONE Socio-Spatial Network Analysis		THEME TWO Consideration of Equity in Projects and Priorities		THEME THREE Equity-Oriented Funding Mechanisms		THEME FOUR Inclusive Design and Safety					
	Accessibility		Universal Design (AAA)/Complete Streets		Personal Security							
	Adrsd.	Oper.	Adrsd.	Oper.	Adrsd.	Oper.	Adrsd.	Oper.	Adrsd.	Oper.	Adrsd.	Oper.
Saint John’s, NL 1. Cycling Master Plan, 2009									●		●	●
Halifax (Halifax Regional Municipality), NS 2. Integrated Mobility Plan, 2018 3. Centre Plan, 2017							●		●	●		
Ville de Québec, QC 4. Plan de Mobilité Durable, 2011					●		●		●			
City of Montréal, QC 5. Transportation Plan, 2008		●	●						●			
City of Ottawa, ON 6. Ottawa Transportation Plan, 2011					●				●			
City of Hamilton, ON 7. Transportation Master Plan, 2018			●						●	●		
City of London, ON 8. Cycling Master Plan, 2016									●	●		
City of Kingston, ON 9. Active Transportation Master Plan, 2018			●				●		●			
City of Toronto, ON 10. Cycling Network 10 Year Plan							●		●	●		
City of Winnipeg, MB 11. Pedestrian and Cycling Strategies, 2014	●	●	●	●			●		●		●	●
City of Regina, SK 12. Transportation Master Plan, 2009			●				●		●	●	●	●
City of Saskatoon, SK 13. Active Transportation Plan, 2016	●	●	●	●			●		●		●	●
City of Edmonton, AB 14. Transportation Master Plan, 2009									●		●	●
City of Calgary, AB 15. Transportation Master Plan, 2009									●		●	●
City of Vancouver, BC 16. Transportation Plan, 2012								●	●	●		
City of Kelowna, BC 17. Pedestrian and Bicycle Master Plan, 2012	●				●	●	●		●			

each plan to effectively do so.

In summary, Winnipeg and Saskatoon’s plans were evaluated to have most effectively addressed themes one and two, Kelowna’s plan was evaluated to have most effectively addressed theme three, and collectively all four plans managed to address theme four, apart from the concept of accessibility. Overall, Winnipeg and Saskatoon’s plans are considered exemplars of how to best incorporate and operationalize equity into plans.

Table 4: Best Practices for Incorporating and Operationalizing Equity in Transport Plans

KEY THEMES	AFFILIATED PLAN(S)	BEST PRACTICE(S) FOR OPERATIONALIZATION
Socio-Spatial Network Analysis (Theme One)	Winnipeg's Pedestrian and Cycling Strategies, 2014	Equity Analysis using GIS and Census Data 1) Identify disadvantaged groups/communities that would benefit from having access to more transport options including historically underserved groups such as low-income, indigenous and immigrant groups. 2) Identify areas that are spatially deprived of infrastructure to ensure infrastructure is distributed evenly across the city.
	Saskatoon's Active Transportation Plan, 2016	Equity Analysis using GIS and Census Data 1) Examine current distribution of cycling facilities. 2) Identify areas where limited access to facilities is made worse by socio-economic challenges. In other words, identify traditionally underserved and disadvantaged groups/communities that would benefit from having access to more transport options.
Consideration of Equity in Projects and Priorities (Theme Two)	Winnipeg's Pedestrian and Cycling Strategies, 2014	Multiple Account Evaluation (MAE) 1) Assess each pedestrian and bicycle facility on a set of criteria, including Network Connectivity, Generators, Access to Transit, Level of Protection, Walking & Cycling Potential, Equity, Safety, and Network Spine. 2) Give the highest level of priority to projects with the highest score and emphasize priority on projects with the highest equity potential.
	Saskatoon's Active Transportation Plan, 2016	Cumulative Factor Scoring 1) Identify priority locations based on a list of variables, including: Network Connectivity, Trip Generators, Access to Transit, Level of Protection, Equity, Safety, Network Spokes and Potential) 2) Combine variables to generate an overall score for each new facility. Develop project-ranking list by score. 3) Give areas/projects with the highest equity potential priority.
Equity-Oriented Funding Mechanisms (Theme Three)	Kelowna's Pedestrian and Bicycle Master Plan, 2016	Equity Criteria Development 1) Establish criteria to assess the extent to which potential funding sources are equitable, asking questions such as “is this revenue source equitable in terms of the geographic distribution of those who pay, relative to the area that will benefit and in terms of income, by avoiding drawing overly upon those that can least afford to pay?” (City of Kelowna, 2016 p.49). 2) Brainstorm innovative and alternative funding mechanisms that best achieve this goal. Kelowna's top two recommendations include General Funds/Taxation and Local Area Service Taxes.
Inclusive Design and Safety (Theme Four)		
<i>Accessibility</i>	Winnipeg's Pedestrian and Cycling Strategies, 2014 Saskatoon's Active Transportation Plan, 2016 Kelowna's Pedestrian and Bicycle Master Plan, 2016	N/A
<i>Universal Design (AAA)/Complete Streets</i>	Regina's Transportation Master Plan, 2009	Adopt a Universal Accessibility and Complete Streets Policy 1) Adopt a lead-by-example policy to meet universal accessibility needs in transportation infrastructure and services (City of Regina, 2009 p.23) 2) Create a Complete Streets Policy using the Framework for Complete Streets that fits the context of Regina to allow planners and engineers to consistently design and operate streets with all users in mind (City of Regina, 2009 p.24). 3) Establish evaluation criteria and monitor the progress of achieving the objectives of the Complete Streets Policy. Criteria should include factors such as access to multiple modes of travel and travel safety statistics (City of Regina, 2009 p.24). 4) Review the Complete Streets Policy as part of future updates to the Transportation Master Plan to reflect changing travel patterns, needs, and urban contexts (City of Regina, 2009 p.24).
<i>Personal Security</i>	Winnipeg's Pedestrian and Cycling Strategies, 2014 Saskatoon's Active Transportation Plan, 2016 Regina's Transportation Master Plan, 2009	CPTED - Crime Prevention through Environmental Design Recommend or continue to ensure CPTED principles are implemented into facility design. Key principles of CPTED include improving visibility of underpasses with lighting and/or open design concepts and illuminating sidewalks, crosswalks, pedestrian corridors and pathways (City of Winnipeg, 2014).

CHAPTER FOUR

Future Directions for Research and Practice

A Discussion and Conclusion

4.1 In Review: Findings from Chapters Two and Three

By conducting a systematic literature review, chapter two sought to answer two questions, what is cycling equity and how can planning practice provide for it? Given the findings discussed throughout chapter two, cycling equity can be defined as a situation where cycling is a safe, secure mode of travel that improves mobility and accessibility fairly, enabling all people to participate and flourish in socio-economic life. To provide for cycling equity, planners and decision-makers recognize and address the needs and concerns of disadvantaged groups by including such groups throughout the entirety of the planning process, and by employing methods of analysis that assess a plan or project's potential to generate equitable outcomes. Plans and projects are prioritized in areas home to the most disadvantaged but are shaped under the consideration of key concerns and barriers such as physical safety, personal security, racism, policing and harassment, and fear of displacement from gentrification affiliated with cycling investments.

Chapter three sought to understand the extent to which equity is currently being incorporated and operationalized in Canadian transport plans (insofar as they relate to cycling), and from such findings establish current best practices for doing so. In total, 17 plans were evaluated from 16 cities in 8 of the 10 provinces. Findings from the critical planning review revealed four key themes pertaining to the incorporation and operationalization of equity, including (1) Socio-spatial Network Analysis, (2) Consideration of Equity in Projects and Priorities, (3) Equity-oriented Funding Mechanisms, and (4) Accessibility, Design and Safety, including three sub-themes: Accessibility, Universal Design for All-Ages and

Abilities (AAA)/Complete Streets, and Personal Security. Four plans emerged as having collectively addressed each of the four themes most effectively, including (1) Winnipeg's Pedestrian and Cycling Strategies, 2014, (2) Saskatoon's Active Transportation Plan, 2016, (3) Regina's Transportation Master Plan, 2009, and (4) Kelowna's Pedestrian and Bicycle Master Plan, 2016. Winnipeg and Saskatoon's plans evaluated to have most effectively addressed themes one and two, Kelowna's plan was evaluated to have most effectively addressed theme three, and collectively all four plans managed to address theme four, apart from the accessibility sub-theme. Best practices for incorporating and operationalizing equity into transport plans as formulated by the plans reviewed for the purposes of this study can be referred to in table 4.

4.2 Identifying Gaps in Research and Practice

A comparative look at the findings from chapter two and three reveals whether and to what extent transport plans addressed themes from research, and whether and to what extent themes from transport plans are addressed in research. By understanding the gaps between what is being researched and what is being practiced, researchers and practitioners can be better informed of which areas are in need of investigation. Table 5 highlights if and how the themes from chapter two are addressed in the four transport plans identified as having best incorporated and operationalized equity in chapter three. Table 6 highlights if and how themes from chapter three are addressed in the literature from chapter two. Highlighted in yellow are areas where either research or practice could direct their attention so as to advance the pursuit of cycling equity.

Table 5: Research Insights for Planning Practice

CHAPTER TWO Key Themes	Addressed in Top Four Transport Plans?	Addressed in Top Four Transport Plans?	Addressed in Top Four Transport Plans?	If Yes or Somewhat, How?
	YES	SOMEWHAT	NO	
THEME ONE Disadvantaged Groups and the Planning Process		●		The social component of theme one (socio-spatial network analysis) serves to recognize disadvantaged groups. However, the extent to which certain groups identified as disadvantaged were adequately involved throughout the entirety of the planning process cannot be confirmed.
THEME TWO Politics and The Economy		●		Prioritization of projects in disadvantaged neighbourhoods (theme two) helps to offset investment inequity. However, none of the plans acknowledge the risk of gentrification affiliated with cycling investment and promotion.
THEME THREE Safety and Security	●			Safety and Security is well discussed in all plans via two sub-themes housed within theme four, namely: Universal Design for AAA/Complete Streets and Crime Prevention through Environmental Design (CPTED).
THEME FOUR Racial Profiling, Policing and Harassment			●	
THEME FIVE (In)adequacies in Planning Tools		●		Winnipeg and Saskatoon do perform an equity analysis; however, it does not appear that they employ an overly technical method of analysis such as accessibility and LTS. Further, no plans include insight gathered specifically from disadvantaged groups in the local context.

Table 6: Planning Practice Insights for Research

CHAPTER THREE Key Themes	Addressed in Research?	Addressed in Research?	Addressed in Research?	If Yes or Somewhat, How?
	YES	SOMEWHAT	NO	
THEME ONE Socio-Spatial Network Analysis	●	●		Theme five ((In)adequacies in Planning Tools) discusses methods and tools that help to assess the extent to which projects/plans can provide for equitable outcomes. Examples of such methods include accessibility, LTS and qualitative insight from interviews.
THEME TWO Consideration of Equity in Projects and Priorities	●	●		Theme six ((In)adequacies in Planning Tools) discusses the need to prioritize projects that provide for equitable outcomes as established by some form of method or tool
THEME THREE Equity-oriented funding mechanisms			●	
THEME FOUR Accessibility, Design and Safety				
<i>Accessibility</i>	●	●		Theme six ((In)adequacies in Planning Tools) discusses how accessibility measures and LTS can be employed in varying contexts to assess accessibility, and therefore equity.
<i>Universal Design for All-Ages and Abilities (AAA)/Complete Streets</i>	●	●		Theme three discusses the importance of both physical safety and personal security.
<i>Personal Security</i>	●	●		Theme three discusses the importance of both physical safety and personal security.

4.3 Recommendations for Future Research and Practice

Based on the insights from planning practice (Table 6), it is recommended that researchers direct their attention towards investigating transport funding/financing mechanisms. None of the research collected throughout the systematic literature review in chapter two investigated who and how new cycling projects are funded and financed. By investigating transport funding/financing, researchers may shed some light on alternative mechanisms that can help planners and decision-makers minimize the need to draw overly upon those who are least able to pay.

Based on insights from research, it is recommended that planners and decision-makers direct their attention to a number of research areas that could help them more effectively incorporate and operationalize cycling equity. As such, this study has provided several recommendations to ensure cycling equity can be achieved.

Disadvantaged Groups and The Planning Process While plans evaluated throughout chapter three discuss, to varying extents, the level of

consultation that was undertaken in the generation of the plan, it is hard to know the extent to which planners managed to involve disadvantaged groups throughout the entirety of the planning process. For these reasons, it is recommended that planners not only establish who their disadvantaged groups are, but identify meaningful ways to engage with them throughout the entirety of the planning process, not simply at the beginning.

Politics and The Economy It is critical that planners and decision-makers be aware of the relationship, be it real or perceived, between cycling investments and gentrification. In none of the plans were concerns pertaining to gentrification mentioned or evaluated. By being cognoscente of such a relationship, planners and decision-makers may be better able to address potential concerns (particularly those who are low-income) and minimize the potential negative impacts of gentrification.

Racial Profiling, Policing and Harassment Nowhere in any of the plans was it expressly stated that profiling, policing and harassment was a factor considered throughout the planning process. Reasons for this may be two-fold. In one case, profiling, policing and harassment is not addressed as it is not considered to be an issue. In the other case, profiling, policing and harassment may very well be an issue, but planners did not think to consider it when developing their transport plan(s).

(In)adequacies in Planning Tools Planners should evaluate whether, and to what extent they are employing methods and tools to assess equity, and what methods and tools can be employed into the future to provide a more robust equity assessment. Examples of methods and tools include accessibility and level of traffic stress analysis, and collaboration with local residents to better understand the needs and concerns of current and potential cyclists on a local scale.

4.4 Final Word

As cities on a global basis increasingly focus on promoting the use of cycling as both a feasible and desirable mode of travel, it is critical that planners and decision-makers ensure the needs and concerns of its most disadvantaged residents - those who are, or who could be most reliant on cycling as a less-costly mode of travel - are effectively recognized and addressed. To do so, planners and decision-makers must have a clear understanding of what cycling equity is, why it is important, and how it may be achieved.

Findings discussed throughout the entirety of this research have not only provided a comprehensive understanding and definition of cycling equity, but also how planning practice can provide for it. At present, several Canadian transport plans are regarded as having best incorporated and operationalized equity. Such plans include Winnipeg, Saskatoon, Regina and Kelowna's active transport plans. Helping to improve current and future planning practice, this study has explored academic research that offers a plethora of insight that can inform planners on how to better incorporate and operationalize equity into practice.

To conclude, it is critical that researchers and practitioners, including planners and decision-makers at all levels of government, either begin, or continue to learn from one another and work collectively to advance the pursuit of cycling equity. It is also critical that planners and decision-makers either begin, or continue to recognize both the benefit and importance of collaborating with local residents so to provide more effective, context-specific solutions to local needs and concerns.

Looking to the future, avenues that may reveal more information pertaining to how planning practice can provide for cycling equity is by interviewing planners, decision-makers and com-

munity members in local contexts to better understand local needs and concerns as well as how such needs and concerns are being addressed (or failing to be addressed) beyond what is stated in planning documents. Conducting a comparative study between what was planned and what was realized (especially in the case of older plans) can serve to illuminate the challenges and opportunities planners and decision-makers have faced when attempting to implement its stated objectives. Such a study may require the cooperation of local planners to understand why (or why not), and how objectives were realized. By conducting such a study, planners and decision-makers who have struggled to implement objectives may be able to learn from other places who've had success implementing similar objectives. Potential limitations to this study include not being able to find a planner or decision-maker who is willing or able to cooperate. Lastly, expanding upon the type of literature review conducted in this study may elicit more findings. A literature review may be expanded to include additional keyword combinations such as Equity and Active Transportation. Grey literature may also be reviewed as increasingly there are reports being developed on the subject of equity and how it can be more effectively incorporated into planning and policy-making. Examples of such reports include Safe Routes to School National Partnership Report titled At the Intersection of Active Transportation and Equity (2015), and a report titled Pursuing Equity in Pedestrian and Bicycle Planning (2016) prepared for the U.S. Department of Transportation Federal Highway Administration.



ENDNOTES

- 1 Disadvantaged groups typically include, but are not limited to: women, low-income, minority and immigrants, elderly and children.
- 2 Just Sustainability is “the need to ensure a better quality of life for all, now and into the future, in a just and equitable manner, whilst living within the limits of supporting ecosystems” (Agyeman, Bullard & Evans, 2003 p. 5).
- 3 Important to note is the slight difference between equity and justice. As written in (Pereira, Schwanen, & Banister, 2016), equity demands the consideration of particular circumstances in ethical judgements, and proportionality between individual’s costs and benefits. Justice, however, can generally be understood as a moral and political ideal that relates to the recognition of different groups in society (for instance, #BlackLivesMatter or #MeToo).
- 4 Utilitarian cycling refers to cycling for the purposes of travel, rather than for purposes of recreation. In other words, utilitarian cycling typically refers to cycling for the purposes of going to or from a specific destination such as work or school.
- 5 Accessibility is a measure that evaluates the ease with which one can reach a destination, and the number of desired destinations (e.g.: grocery stores, banks, parks). Two common Accessibility measures include Gravity-based and Cumulative. More information pertaining to Accessibility is detailed in Hansen’s 1959 Publication: How Accessibility Shapes Land Use.
- 6 A number of US laws either stood, or continue to stand to support the pursuit of equity in transportation, including the Federal transportation bill TEA-21 (Transportation Equity Act for the 21st Century) active from 1998-2003, the Federal SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) from 2005 to 2009, and ultimately, the Freedom of Movement and the Right to Travel as part of the US constitution. (U.S Department of Transportation, n.d.,a; U.S Department of Transportation, n.d.,b; Sanchez & Brennan, 2010)
- 7 CLoS is an audit tool developed by Transport for London to assess the quality of existing and new cycling provisions. Provisions are given a score out of 100. Safety is scored out of 48; Directness is scored out of 8; Coherence is scored out of 6; Comfort is scored out of 20; Attractiveness is scored out of 12; and Adaptability is scored out of 6. Good (Dutch-quality) schemes should be scoring between 70 and 80 out of 100 (Cycling Embassy of Great Britain, n.d.)
- 8 Aaron Golub is Associate Professor in the Nohad A. Toulan School of Urban Studies and Planning at Portland State University, Oregon, USA. Melody L. Hoffmann is a mass communication instructor at Anoka Ramsay Community College near Minneapolis, Minnesota, USA. Adonia E. Lugo is an urban anthropologist and co-founder of the Bicultures network, USA. Gerardo F. Sandoval is Associate Professor at the Department of Planning, Public Policy and Management and the Co-Director of the Center for Latino/a and Latin American Studies at the University of Oregon, USA. (Golub et al., 2016 p. 2). Golub, Hoffman, Lugo and Sandoval are also the four editors of this book.
- 9 If the city did in fact have an active transport and/or cycling plan but was found to be lacking in detail, a review of the city’s Transportation Master Plan was also conducted (provided it was no older than 2008).

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APPENDICES

APPENDIX A

Literature Search Methods and Findings (Full)

Online Database	Words Searched	# of Results	# of Relevant Results (narrowed search)	RESULTS	Journal	Author(s)	Year	Name of Article	Notes
SCOPUS (TITLE, ABSTRACT, KEYWORDS)									
	Cycling AND Equity	51	18						
					Mobilities	Aldred, R	2015	A Matter of Utility? Rationalising Cycling, Cycling Rationalities	
					Transport Reviews	Aldred et al.	2017	Cycling provision separated from motor traffic: a systematic review exploring whether stated preferences vary by gender and age	
					Transport Reviews	Aldred et al.	2016	Does More Cycling Mean More Diversity in Cycling?	
					Work	Castanon et al.	—	The profile of cyclists in the city of Juiz de Fora	Not included: Quality issue
					International Journal for Equity in Health	Davison et al.	2013	Bicycle helmet use and bicycling-related injury among young Canadians: An equity analysis	
					Journal of Transport Geography	Frater & Kingham	2018	Gender equity in health and the influence of intrapersonal factors on adolescent girls' decisions to bicycle to school	
					International Journal of event and festival management	Fullagar & Pavlidis	2012	"It's all about the journey": Women and cycling events	Not included: Relevance
					Transportation Research Part F: Traffic Psychology and Behavior	Goodman & Aldred	2018	Inequalities in utility and leisure cycling in England, and variation by local cycling prevalence	
					Social Science and Medicine	Goodman et al.	—	Effectiveness and equity impacts of town-wide cycling initiatives in England: A longitudinal, controlled natural experimental study	Not included: Relevance
					Social Science and Medicine	Goodman et al.	—	Corrigendum to "Effectiveness and equity impacts of town-wide cycling initiatives in England: A longitudinal, controlled natural experimental study" [Soc Sci Med 97 (2013) 228–237]	Not included: Relevance
					Journal of Transport and Land Use	Grise & El-Geneidy	2018	If we build it, who will benefit? A multi-criteria approach for the prioritization of new bicycle lanes in Quebec City, Canada	
					Journal of Transport Geography	Houde et al.	2018	A ride for whom: Has cycling network expansion reduced inequities in accessibility in Montreal, Canada?	
					Transfers	Joshi & Josheph	2015	Invisible cyclists and disappearing cycles: The challenges of cycling policies in Indian Cities	
					Area	Koglin	2011	Planning for cycling = planning for equity: A response to Cupples and Ridley 'Towards a heterogeneous environmental responsibility: Sustainability and cycling fundamentalism' (2008)	
					Environmental Health Perspectives	MacMillan et al.	2014	The societal costs and benefits of commuter bicycling: Simulating the effects of specific policies using system dynamics modeling	
					Journal of Transport Geography	Osbourne et al.	2017	Constructing the cycling citizen: A critical analysis of policy imagery in Brisbane, Australia	

Online Database	Words Searched	# of Results	# of Relevant Results (narrowed search)	RESULTS	Journal	Author(s)	Year	Name of Article	Notes
					American Journal of Public Health	Torres et al.	2013	The ciclovía and cicloruta programs: Promising interventions to promote physical activity and social capital in Bogotá, Colombia	
					International Journal of Sustainable Transportation	Tucker & Manaugh	2018	Bicycle equity in Brazil: Access to safe cycling routes across neighborhoods in Rio de Janeiro and Curitiba	
	Cycling AND Justice	48	4						
					Transportation	Barajas	2018	Supplemental infrastructure: how community networks and immigrant identity influence cycling	
					Urban Mobilities in the Global South	Sagaris & Arora	2017	Cycling for social justice in democratizing contexts: Rethinking "sustainable" mobilities	
					Energy Research and Social Science	Smith	2016	Cycling on the verge: The discursive marginalisation of cycling in contemporary New Zealand transport policy	
					Urban Geography	Stehlin & Tarr	2017	Think regionally, act locally?: gardening, cycling, and the horizon of urban spatial politics	
	Cycling AND Fairness	15	0						
	Cycling AND Equality	49	3						
					Travel Behavior and Society	Bastian & Borjesson	2018	The city as a driver of new mobility patterns, cycling and gender equality: Travel behaviour trends in Stockholm 1985–2015	
					Journal of Transport Geograph	Prati	2018	Gender equality and women's participation in transport cycling	
					Travel Behavior and Society	Xie & Spinney	2018	"I won't cycle on a route like this; I don't think I fully understood what isolation meant": A critical evaluation of the safety principles in Cycling Level of Service (CLOS) tools from a gender perspective	
	Bicycle AND Equity	50	4 (after duplicates removed)						
					Travel Behavior and Society	Abesahl et al.	2018	Gender gap generators for bicycle mode choice in Baltimore college campuses	
					Transportation Letters	Gavin et al.	2016	A brief study exploring social equity within bicycle share programs	
					International Planning Studies	Ibsen & Olsen	2018	Bicycle urbanism as a competitive advantage in the neoliberal age: the case of bicycle promotion in Portland	
					International Journal of Sustainable Transportation	Kent & Kärner	2018	Prioritizing low-stress and equitable bicycle networks using neighborhood-based accessibility measures	
	Bicycle AND Fairness	7	1						
					Police Quarterly	Mitchell & Ridgeway	2018	Assessing the Fairness and Effectiveness of Bicycle Stops in Tampa	
	Bicycle AND Justice	29	0 (after duplicates)						
	Bicycle AND Equality	21	0						

Online Database	Words Searched	# of Results	# of Relevant Results (narrowed search)	RESULTS	Journal	Author(s)	Year	Name of Article	Notes
	Bicycle AND Equity AND Gender	9	0 (after duplicates)						
	Bicycle AND equity AND Minority	1	0						
	Bicycle AND Equity AND Immigrant	2	0 (after duplicates)						
WEB OF SCIENCE (Core Collection - Title)									
	Cycling AND Equity	36	1 (after duplicates)						
					Journal of Transport & Health	Braun et al.	—	Social (in)Equity in Access to Cycling Infrastructure: Examining the Distribution of Bike Lanes with Respect to Area-Level Sociodemographic Characteristics in 23 Large US Cities	Note: Not Yet Published
	Cycling AND Fairness	8	0						
	Cycling AND Justice	26	0						
	Cycling AND Equality	12	0 (after duplicates)						
	Bicycle AND Equity	6	0 (after duplicates)						
	Bicycle AND Fairness	1	0 (after duplicates)						
	Bicycle AND Justice	7	4						
					Journal of the American Planning Association	Barajas	2017	Bicycle Justice and Urban Transformation: Biking for All?	
					Local Environment	de Chardon, C. M.	2017	Bicycle justice and urban transformation	
					Transport Reviews	Deka	2018	Bicycle justice and urban transformation: biking for all?	
					Urbanities-Journal of Urban Ethnography	Hoffman & Lugo	2014	Who is 'World Class'? Transportation Justice and Bicycle Policy	
	Bicycle AND Equality	1	0						
WEB OF SCIENCE (Core Collection - By Topic)									
	Bicycle AND Equity AND Immigrant	2	0 (after duplicates)						
	Bicycle AND equity AND Minority	1	0						
	Bicycle AND Equity AND Gender	8	0 (after duplicates)						

APPENDIX B

Critical Planning Review Findings (Full)

Province, City and Plan	Description of City	Overarching OR Cycling-Related Principles/Goals/Objectives	Policies/Actions/Measures	Comments
NEWFOUNDLAND				
City of Saint John's				
Cycling Master Plan, 2009 https://www.stjohns.ca/sites/default/files/files/publication/Cycling%20Master%20plan%5B1%5D_0.pdf	<i>The City of Saint John's is the capital and largest city of the province of Newfoundland and Labrador (population est. 109,000, 2016). It is located along the north eastern Atlantic Coast along the Avalon Peninsula.</i>	Objective To create conditions for network users that promotes safety of use and accessibility for all ages, skill levels and mobility types. (p.14)		While nowhere does the term equity appear throughout this plan, addressing the need for improved accessibility and crime prevention, particularly for vulnerable groups such as women and children can be said to implicitly reflect principles of equity.
		Part 3: Developing the Network: 3.5 Crime Prevention Through Environmental Design (CPTED) The fear produced by the possibility of crime can be at times as much of a barrier to cycling and AT activities as any physical barriers and depending on the situation, can be more difficult to address. This psychological barrier becomes even more pronounced within certain groups such as women, children, the physically challenged and senior citizens. (p.33)	It is recommended that St. John's adapt generalized CPTED procedures and design awareness when developing the cycling network but implement specific auditing practices as may be necessary and on a site by site basis. (p.35)	
NOVA SCOTIA				
Halifax (HRM)				
Integrated Mobility Plan, 2018 https://www.halifax.ca/sites/default/files/documents/about-the-city/regional-community-planning/IMP_report_171220-WEB.pdf	<i>Halifax Regional Municipality, also known as Halifax, is an amalgamation of what were four former municipalities (Halifax, Dartmouth, Bedford and Halifax County) making up the largest city/region in the province of Nova Scotia (population est. 400,000, 2016). The majority of people live and work within what's called the "Regional Centre", a peninsular area along the Atlantic Coast and Halifax Harbour.</i>	Pillar of Integrated Mobility: Sustainable Sustainable mobility is socially responsible. Every resident in the region needs to move, yet the existing transportation system makes mobility easier for some and more difficult for others. It is important to consider the needs of all community members, including children, seniors, low-income residents, those who prefer not to drive and people with mobility challenges. (p.29)		In terms of equity, HRM acknowledges the importance of incorporating equity into planning (in this case, the Integrated Mobility Plan and Draft Centre Plan), however, at the current moment, the plans lack concrete equity-oriented actions and measures to successfully operationalize equity, although in the future it appears as though HRM intends on developing an equity analysis program, and update its project selection criteria to better respond to equity considerations.
		Foundational Policies: Integrated Planning 2.1.1 Objective Provide direction to guide key overarching aspects of the transportation system including accessibility, safety, partnerships, project evaluation and data collection. ACCESSIBILITY Providing a level of accessibility to all users, despite physical /cognitive disabilities or limitations, is an important consideration for mobility in the region. Many residents are affected by accessibility concerns and with an aging population, the amount of people with mobility limitations will increase. (p.34)	The provincial government has strengthened accessibility requirements. The Act Representing Accessibility in Nova Scotia (Bill 59) was given Royal Assent on April 28, 2017. The goal of this Act is to improve accessibility by preventing and removing barriers faced by people with disabilities. A provincial standard will be created and the municipality will be required to develop an accessibility plan. (p.35) Action 3: Prepare and implement a Municipal Accessibility Plan for mobility in the region with respect to the built environment, transit, transportation infrastructure and the delivery of goods and services. (p.35)	
		Foundational Policies: Complete Streets 2.3.1 Objective Meet the needs of all ages, abilities and travel modes in the design and maintenance of streets. (p.57)	Action 31: Adopt the Complete Streets approach to inform the design and maintenance of streets. (p.69)	
		Mode Specific Policy: Active Transportation 3.1.1 Objective Encourage walking and bicycling by building complete and connected networks that respond to the needs of urban, suburban and rural communities, for all ages and abilities. (p.85)	Action 71 Update the criteria for selecting new active transportation projects to better respond to equity considerations, demand, future development, coverage and other factors. (p.96) Action 72: Deliver the Regional Centre all ages and abilities bicycle network by 2022 (see Figure 17). Action 73: Deliver all ages and abilities bicycling connections to all Halifax Transit terminals by 2022. (p.96)	
Centre Plan 2017 (Draft) https://www.shapeyourcityhalifax.ca/1041/documents/6261		Part 2: General Policies: Equity Analysis During planning or review processes, an equity focused analysis seeks to provide a flexible, yet structured approach to routinely and consistently identify and determine the possible impacts of Municipal policies, services and infrastructure projects on different socio-economic, cultural, or population groups. (p.29)	Develop an equity analysis review program for all HRM planning and land use services, and for the planning of all municipal infrastructure projects. The analysis should provide recommendations to remove any access or inclusions barriers that may impact these groups. (p.29)	Although this is not a transportation specific plan, it is the only planning document that reflects the priorities of the "Regional Centre" (the urban core of HRM), of which are aligned with the priorities set forth in the IMP discussed above.
		Key Theme 2.5: Mobility 2.5.2 Complete Streets This approach to the planning, design, operations and maintenance of roadways enables safe, convenient and comfortable travel and access for users of all ages and abilities regardless if they are on foot, on a bike, using transit or in a private vehicle. Not every street should, or can, be a complete street, but rather a network of complete streets should be created. (p.63)		

Province, City and Plan	Description of City	Overarching OR Cycling-Related Principles/Goals/Objectives	Policies/Actions/Measures	Comments
		Key Theme 2.5: Mobility 2.5.1 General Policy Direction A well-functioning transportation system that is integrated, connected to places where people want to go and is accessible for people of all ages and abilities contributes to greater personal mobility and quality of life. The Centre Plan utilizes a sustainable approach to mobility that prioritizes pedestrians. (p.64)		
Halifax 2014-19 Active Transportation Priorities Plan, 2014 https://www.halifax.ca/sites/default/files/documents/transportation/transportation-projects/AT_Plan_Final_July222014_000.pdf		N/A	N/A	
NEW BRUNSWICK				
City of Fredericton				
Active Transportation Connections Plan, 2017- (update) http://www.fredericton.ca/sites/default/files/roads-parking/city_of_fredericton_active_transportation_connection_plan_smaller_e-mail_size.pdf		N/A	N/A	
QUEBEC				
Ville de Quebec				
Plan de Mobilité Durable, 2011 https://www.ville.quebec.qc.ca/apropos/planification-orientations/transport/docs/PlanMobilitDurable.pdf	<i>La Ville de Quebec is the second largest city in the province of Quebec (population est..532,000, 2016) and is located in the east of the province along the north shore of the Fleuve Saint-Laurent where it meets the Riviere Saint-Charles.</i>	Principe 1.2 (Pourquoi un plan de mobilité durable?) Assurer l'équité sociale dans un contexte de changements majeurs dans l'économie mondiale des transports. (p.17)		
		Strategie 5.3 Se déplacer autrement – multiplier le choix des modes de déplacement Efficacité, équité et développement durable Le transport alternatif est au cœur de la mobilité durable. C'est en créant les conditions pour faire de la marche, du vélo et du transport en commun des moyens de déplacement bien intégrés aux modes de vie que les villes et les régions relèveront le défi d'une accessibilité à faibles coûts économiques, environnementaux et sociaux. (p.53) 5.3.4 La mobilité réduite et l'accessibilité universelle La capacité à se déplacer est une condition importante dans une société qui se soucie de la pleine participation sociale, professionnelle et académique de tous ses membres. Le groupe de travail est d'avis que les mesures prises et les moyens mis en place pour offrir le maximum d'options et de combinaisons de modes pour se déplacer doivent tenir compte de la diversité des personnes qui habitent ou transitent sur le territoire de la région. (p.78)		
		7.2 Des sources de financement variées, équitables et stables : La mise en œuvre d'un plan d'une telle envergure nécessite un apport financier majeur que les villes n'ont pas les moyens d'assumer seules. Les sources de financement doivent par conséquent être variées et équitables. Certaines d'entre elles devront être également récurrentes pour assurer l'efficacité et la pérennité des mesures qui seront adoptées en vue de la réalisation du Plan. (p.124)		
Vision des déplacements à vélo, 2016 https://www.ville.quebec.qc.ca/apropos/planification-orientations/transport/docs/vision_deplacements_velo.pdf				
City of Montreal				
Cycling Master Plan, 2016 https://ville.montreal.qc.ca/pls/portal/docs/page/transport/fr/media/documents/plan_cadre_velo_ang_final_fr.pdf		N/A	N/A	

Province, City and Plan	Description of City	Overarching OR Cycling-Related Principles/Goals/Objectives	Policies/Actions/Measures	Comments
Transportation Plan, 2008 http://ville.montreal.qc.ca/pls/portal/docs/PAGE/TRANSPTS_FR/MEDIA/DOCUMENTS/TRANSPORTATION%20PLAN%202008_COM.PDF	<i>The City of Montreal is the largest city in the province of Quebec, and the second largest city in Canada (population est. 1.7 million, 2016). It is situated on the Island of Montreal which is located in the southern portion of the province along the Saint Lawrence River.</i>	Strategic Objective PROVIDING OPTIMAL TRANSPORTATION CONDITIONS IN TERMS OF TIME, COMFORT, ACCESSIBILITY, SAFETY AND COST Personal mobility is vital to meeting social and economic needs, particularly in terms of getting to work, to healthcare services and to educational, training or cultural activities. The transportation system should, accordingly, provide a better level of performance and lower costs. Public transit and active forms of transportation should under such circumstances be favoured because they help improve the environment and quality of life and distribute associated costs and services on an equitable basis. (p.40)		While this plan integrates the notion of equity in its strategic objective, it fails to be operationalized, lacking concrete equity-oriented actions and measures throughout the remainder of the document.
ONTARIO				
City of Ottawa				
Ottawa Transportation Plan, 2013 https://documents.ottawa.ca/sites/default/files/documents/tmp_en.pdf	<i>The City of Ottawa (population est. 934,000, 2016) is the largest municipality in the National Capital Region (NCR) of Ontario, and the second largest city in the province of Ontario. It is situated along the Ottawa River in the south eastern corner of the province and borders the province of Quebec.</i>	Goal: Provide adequate and equitable funding Seek and/or establish funding sources that are stable and predictable (p.9)		Equity is virtually non-existent throughout this plan, with the exception of Chapter 9: Invest Responsibly which acknowledges the need for adequate and equitable funding. However, upon reading Chapter 9, there is no further explicit mention of the word equity, or a presence of equity rhetoric. Resultingly, this begs the question: what is the City of Ottawas understanding of equity, and how do they intend on operationalizing it?
		Section 7.1 Design and Build Complete Streets Streets are the backbone of Ottawa's transportation system and its economy: they serve pedestrians, cyclists, public transit, trucks, automobiles and emergency services, while also providing space for utilities. Within the realm of road planning, design and operation, the needs of these various users compete for the scarce resources of time, space and money. In managing its road network for the greatest public benefit, the City frequently must make difficult trade-offs. (p.64)	Action 7-1 Adopt a "complete streets" policy for road design, operation and maintenance (p.64)	
Ottawa Cycling Plan 2013 https://documents.ottawa.ca/sites/default/files/documents/ocp2013_report_en.pdf		N/A	N/A	
City of Hamilton				
Transportation Master Plan, 2018 (update and review of 2007 plan & includes updated Cycling Master Plan) https://d3fpllf1m7bbt3.cloudfront.net/sites/default/files/media/browser/2018-10-24/tmp-review-update-final-report-oct2018.pdf	<i>The City of Hamilton is one of the largest cities in the province of Ontario (population est. 536,000, 2016). It is located in the southern region of the province, along the westernmost edge of Lake Ontario.</i>	Desired Outcome: 1. Sustainable and Balanced Transportation System A balanced system is characterized by elements such as connectivity, accessibility, choice and equitable accommodation for all modes of transportation and for users regardless of age, ability or income. (p.51)	Policy 4.2.5 Complete-Livable-Better Streets Complete-Livable-Better (CLB) Streets is an approach to right-of-way design (inclusive of streets) that balances the needs of all uses and users regardless of age, ability or mode of transportation in an equitable manner. (p.79) Action 35 Adopt a CLB streets policy for road design, operation and maintenance. The CLB streets approach emphasizes routine accommodation in order to ensure designs consider the needs of users of all ages and abilities (p.94) Initiative: Everyone Rides Initiative Pilot (2017) (bike share equity program that provides subsidized passes) (p.107)	Hamilton's Transportation Master Plan does an adequate job of integrating principles of equity both implicitly and explicitly, and has clearly made an effort to operationalize it through the development of programs such as the Everyone Rides Initiative.
		Desired Outcome 2: Healthy and Safe Communities The provision of a sustainable and balanced transportation system that focuses on public transit, active transportation and accessibility will enable healthier transportation choices and improve the health of individuals and the overall health of the City. In addition to physical activity, other important health indicators related to transportation planning include collisions (i.e. road safety), access and equity, eating patterns, GHG emissions and air quality. (p.102)		
		Chapter 5: Healthy and Safe Communities Policy 5.1.3 Accessibility The City should be sensitive to providing an inclusive transportation system that takes into account diversity. According to the Ontario Human Rights Commission (OHRC), equity is, "A distinct process of recognizing differences within groups of individuals, and using this understanding to achieve substantive equality in all aspects of a person's life." (p. 106-107)	The TMP review and update recognizes the continued importance of AODA (Accessibility for Ontarians with Disabilities Act) compliance in the future. The City's Multi-Year Accessibility Plan (2013–2017) provides details about accessibility initiatives that the City has or is undertaking. It includes a report on steps taken to identify, remove and prevent barriers to people with visible and invisible disabilities, and sets out how the City assesses its proposals for by-laws, policies, programs, practices and services. (p.106) As emerging technologies are considered for adoption, a test for age-friendliness, accessibility and equity should be a requirement. (p. 107)	
City of London				

Province, City and Plan	Description of City	Overarching OR Cycling-Related Principles/Goals/Objectives	Policies/Actions/Measures	Comments
Cycling Master Plan, 2016 https://www.london.ca/residents/Environment/EAS/Documents/London%20ON%20Bikes%20-%20Full%20Report%20-%20Final%20September%202016.pdf	<i>The City of London is a mid-sized city in the province of Ontario (population est. 384,000, 2016), and is located just north of Lake Erie near the Michigan-U.S. Border.</i>	Objective # 3 Provide facilities that are considered comfortable for people of all ages and abilities including youth and seniors. (p.21)		
		Complete Streets Within London there is significant interest in the design and implementation of complete streets. Most recently the City's updated Official Plan makes reference to the development of a complete streets design manual. Consideration for how cycling is considered in the complete streets context will vary depending on the location but there are significant opportunities for coordination as the City moves forward with the implementation of the Rapid Transit strategy. (p.32)		
		Accessibility When designing off-road pathway facilities, the City should refer to the Built Environment Standards to ensure that the needs of all user groups are accommodated. The requirements of the AODA must be met to the greatest extent possible, given the context of each route location, the surrounding environment and type of trail experience that is desired. (p.36)	The City of London adheres to the Accessibility Standards for Customer Service as well as the Integrated Accessibility Standards. The City is implementing their Accessibility Plan 2013 – 2017 to meet legislative deadlines. The City of London has also developed a technical design document – Facility Accessibility Design Standards (FADS) which empowers staff to design beyond the minimum requirements set out in the Ontario Building Code. These design standards speak to the design of trails and footbridges as well as pathways but makes no reference to access to cycling. (p.36)	
Transportation Master Plan, 2013 https://www.london.ca/residents/Roads-Transportation/Transportation-Planning/Pages/Smart-Moves-2030-Transportation-Plan.aspx		N/A	N/A	
City of Kingston				
Active Transportation Master Plan, 2018 https://www.cityofkingston.ca/documents/10180/17995653/Projects_WalknRollKingston_DraftReport.pdf/fec89519-a0ac-424b-ae31-4db4c425a049	<i>The City of Kingston is a small-mid sized city in the province of Ontario (population est. 123,000, 2016), and is located on the far east end of Lake Ontario at the beginning of the Saint-Lawrence River.</i>	Principle # 3 - Equity All residents and visitors, regardless of age, gender or socioeconomic background should be able to travel throughout the City using any active transportation option they choose.		While it is encouraging to see equity as a key principle, I believe the definition of equity employed in this plan is not in fact reflective of equity, but rather, equality. For these reasons principles 3 and 4 (Equality) could have been combined. Further, no actions or measures were included to facilitate the operationalization of equity despite it being a key principle (although, as mentioned previously, its description is more reflective of that of equality).
		Principle # 4 - Equality An inclusive environment where all ages and all abilities would have access to active travel choices for all seasons and have the opportunity to participate in the active modes of their choice.		
		Principle # 5 - Accessibility The community should have the ability to access routes that are secure, accessible, and convenient, including supporting facilities (such as bicycle parking, maintenance stands and benches), and implement universal design criteria to improve accessibility for all travel choices. (p.18)	An iterative process was used to inform the selection of candidate routes for the active transportation network. This process included field investigations, indicator mapping and spatial analysis. (p.49) Cycling Facility Design Cycling facility density is an important factor in identifying areas that are accessible by bike. By visualizing areas with less access to cycling facilities, the study team was able to identify potential network connections to improve access for cyclists. (See Figure 14 - P.52). Recommendation The City should strive to exceed the standards outlined in the Accessibility for Ontarians with Disabilities Act as it pertains to the design and construction of active transportation facilities. (p.73)	
City of Toronto				
Cycling Network 10 Year Plan https://www.toronto.ca/services-payments/streets-parking-transportation/cycling-in-toronto/cycle-track-projects/cycling-network-10-year-plan/	<i>The City of Toronto is the largest city in Canada with a population of 2.7 million (est. 2016). It is located in southern Ontario near the western edge of Lake Ontario.</i>	The Ten Year Cycling Network Plan provides a vision for which streets may be linked together to form a cohesive, connected network of cycling routes. The detailed design for each cycling route will be undertaken leading up to the year that the project is scheduled for construction. (p.63)	The City of Toronto developed Complete Streets Guidelines to provide a holistic approach for how we design our city streets. This builds on many of the City's existing policies, guidelines and recent successful street design and construction projects. Complete streets are streets that are designed to be safe for all users, such as people who walk, bicycle, take transit or drive, and people of varying ages and levels of ability. They also consider other uses like sidewalk cafés, street furniture, street trees, utilities, and stormwater management. (p.11)	

Province, City and Plan	Description of City	Overarching OR Cycling-Related Principles/Goals/Objectives	Policies/Actions/Measures	Comments
			The City of Toronto is preparing On-Street Bikeway Design Guidelines, planned for completion in 2019. This new resource is being informed by design guidelines, including facility type selection, from Ontario Traffic Manual Book 18 Bicycle Facilities, the National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide, and from other jurisdictions. The City of Toronto also has their own Multi-Use Trail Design Guidelines. (p.64)	
City of Winnipeg Pedestrian and Cycling Strategies, 2014 http://winnipeg.ca/publicworks/pedestriansCycling/strategiesActionPlan/pdf/strategy.pdf	<i>The City of Winnipeg is the largest city in the province of Manitoba (population est. 705,000, 2016) and is located at the intersection of the Assiniboine and Red Rivers in the South Eastern corner of the province.</i>	Inspiration Statement (Guiding Vision) Equitable access to walking and cycling provides greater transportation choices for residents and visitors in neighbourhoods across Winnipeg. This will improve personal mobility, promote healthy living, and reduce greenhouse gas emissions, thus contributing to quality of life and community well-being.(p.viii)		Not only does this strategy incorporate principles of equity throughout the document, it provides a comprehensive equity analysis that helps to operationalize projects on an equitable basis. Winnipeg's strategy has also been coupled with a fairly detailed implementation table for each of the actions housed within their six strategic directions. The table is presented on pages 290-297 and includes the following information: Priorities; Support Guiding Goals; Opinions of Cost; Primary Responsibility. The document also contains a Monitoring plan (pages 322-326) in hopes of implementing the plan as intended, and to help inform where monetary and staff resources need to be allocated. Each strategic direction is equipped with "measures of success" and related indicators.
		Strategic Direction 1 : Improve Connectivity Key Direction 1B: Expand and Enhance the Bicycle Network Four guiding principles have been used to guide the development and prioritization of Winnipeg's bicycle network: network connectivity, equity, cycling demand and potential, and cost efficiency. (p.150)	The bicycle network plan strives to achieve equity in two ways – through bringing cycling infrastructure to populations with limited transportation choices, and by distributing infrastructure evenly throughout the city. Population Equity. There are communities in Winnipeg that would especially benefit from increased transportation options, and a more comprehensive and accessible bicycle network can increase mobility for all populations. In particular, the cycling network must be designed to serve historically under-served populations, including low income households, aboriginal populations, immigrant populations, and people over 65 years old and under 19 years old who have unique mobility needs. Geographic equity. The bicycle network should provide equitable coverage throughout the City, allowing residents in all areas of the City to have reasonable access to the bicycle network. Also, the bicycle network should be designed to distribute high quality facilities across the city so residents can reach all destinations.(p.153)	
		Overarching Goal # 2: Active, Accessible & Healthy Make daily walking and cycling convenient, accessible, active, healthy travel modes for people of all ages and abilities. (p.ix) Strategic Direction 3: Improve Safety and Accessibility Walking and cycling facilities should be safe and usable by people of all ages and abilities, including seniors, children, and people with disabilities. For pedestrians and cyclists, fragmented infrastructure (including sidewalks, pathways, and bicycle routes), uncomfortable environments, low-accessibility infrastructure, and challenging street crossings can make it more difficult and less desirable to walk or cycle. These types of conditions create safety concerns, either real or perceived, which are very influential on whether someone chooses to walk or cycle to their destination. In fact, pedestrians and cyclists alike are considered 'vulnerable road users' since they are subject to higher risk than drivers and transit users, and this lack of perceived safety can effectively discourage walking or cycling. (p.202)	Key Actions Improve visibility of underpasses with lighting and/or open design concepts. Provide illumination along sidewalks, crosswalks, pedestrian corridors, bicycle routes and pathways where deemed appropriate. Continue to follow standards to ensure CPTED principles are followed in pedestrian and bicycle facility design. (p.227)	
		Overarching Goal # 3: Safe, Efficient & Equitable Winnipeg's Pedestrian and cycling networks will be designed, maintained and developed to ensure accessible, safe, and efficient use for all users, while balancing needs of different users and trip types sharing the networks. (p. ix)	To help inform the development of improvements to Winnipeg's pedestrian and bicycle networks, several different types of analyses were conducted. Equity was one of them. Equity Analysis – Considers communities in Winnipeg that would especially benefit from increased transportation options, including access to a safer pedestrian and cycling network. (p.76) Equity factors used in evaluation are presented in table 2.5 on page 86.	

Province, City and Plan	Description of City	Overarching OR Cycling-Related Principles/Goals/Objectives	Policies/Actions/Measures	Comments
			<p>Part 5: Implementation Plan: 5.1.4 Network Prioritization</p> <p>An objective, systematic, GIS-based prioritization methodology was developed for the Pedestrian and Cycling Strategies. The prioritization methodology incorporates the guiding principles identified earlier in this report and includes a Multiple Account Evaluation (MAE) that assesses each pedestrian and bicycle facility on each individual criterion. The MAE methodology includes eight criteria: 1. Network Connectivity 2. Generators 3. Access to Transit 4. Level of Protection 5. Walking & Cycling Potential 6. Equity 7. Safety 8. Network Spine (p.302).</p> <p>Results from such an analysis are presented on pages 310-311. It is clear that the highest level of priority is within and around some of the neighbourhoods identified within the equity analysis.</p>	
SASKATCHEWAN				
City of Regina				
Transportation Master Plan, 2017 http://www.designregina.ca/wp-content/uploads/TransportationMasterPlanNOV201.pdf	<i>The City of Regina is the second largest city (population est. 215,000, 2016) in the province of Saskatchewan, and is located south east of Saskatoon in the south east region of the province.</i>	<p>Guiding Principles Social Equity</p> <p>Transportation strategies will aim to promote equitable access to mobility, develop safe and healthy communities, and maximize opportunities for all residents in Regina. (p.7)</p>	<p><i>*Policies/Actions selected for Guiding Principle Accessibility could also be considered for Guiding Principle Social Equity* see below.</i></p>	While equity is a guiding principle of this plan, it is not explicitly included in any other goals or policies throughout the plan other than transit. That being said, tangential principles and themes such as Goal 19 could be understood to implicitly reflect principles of horizontal equity, or, equality, which is better than having nothing related to equity whatsoever.
		<p>Guiding Principles Accessibility</p> <p>The TMP will continue advancing towards an inclusive, universally accessible transportation system that is responsive to changing demographics, mobility needs, and best practices in universal and barrierfree design. (p.7)</p>	<p>Policy/Action 1.10 Adopt a lead-by-example policy to meet universal accessibility needs in transportation infrastructure and services (p.23)</p> <p>Policy/Action 1.15 Create a Complete Streets Policy using the Framework for Complete Streets (Appendix D) that fits the context of Regina to allow planners and engineers to consistently design and operate streets with all users in mind.</p> <p>Policy/Action 1.18 Establish evaluation criteria and monitor the progress of achieving the objectives of the Complete Streets Policy, once developed. Criteria should include factors such as access to multiple modes of travel and travel safety statistics.</p> <p>Policy/Action 1.19 Review the Complete Streets Policy, once developed, as part of future updates to the TMP to reflect changing travel patterns, needs, and urban contexts. (p.24)</p>	
		<p>Goal 17: A comprehensive citywide bikeway network will connect people to destinations and activities.</p> <p>Rationale: Filling gaps in the existing network and developing a comprehensive citywide network that features a variety of on-street and off-street facilities will help support active modes through increased accessibility. In addition to recreational use the city's multi-use pathways should be strategically expanded to help support utilitarian trips, such as commuting to school or work. (p.42)</p>	<p>Policy/Action 4.12 Expand the current multi-use pathway network</p> <p>This will require establishing an evaluation system to determine the location and timing for network expansion. Priority should be placed on creating pathways to destinations such as schools and activity centres, and improving connections between the pathway network and on-street facilities (Appendix A). (p.42)</p>	
		<p>Goal 19: The city will be safe for pedestrians and cyclists in all four seasons.</p> <p>Rationale: Safety is paramount in the design, maintenance and year round operation of pedestrian and cyclist facilities. Consideration needs to be given to providing safe and accessible walking and cycling routes year-round to increase usability. (p.44)</p>	<p>Policy/Action 4.33 Integrate Crime Prevention through Environmental Design (CPTED) considerations into sidewalk, pathway and pedestrian corridor design.</p> <p>Policy/Action 4.34 Improve underpass conditions to increase safety for active modes including increasing lighting and providing sufficient space to accommodate pedestrians and cyclists on busy arterial roadways. (p.44)</p>	
The City of Saskatoon				
Active Transportation Plan, 2016 https://www.saskatoon.ca/sites/default/files/documents/2016-06_atp_summary_report_final_08-26_submission_-_combined_rfs.pdf	<i>The City of Saskatoon (population est. 246,000, 2016) is the largest city in the province of Saskatchewan and is situated along the South Saskatchewan River found within the central region of the province.</i>	<p>Part 2: Shaping Influences: 2.4 The Market for Active Transportation</p> <p>A demand analysis was undertaken to understand overall active transportation demand, as well as a potential analysis to identify neighbourhoods with the greatest potential to promote more walking and cycling. 'Demand' is described as existing active transportation usage, whereas 'potential' is referring to future active transportation usage. An equity analysis was also undertaken examining the distribution of pedestrian and bicycle facilities in relation to under-served populations and finally, an analysis of the Level of Traffic Stress (LTS) was used to understand the appropriateness and comfort of road infrastructure. (p.14)</p>	<p>Equity Analysis</p> <p>The equity analysis examined the distribution of pedestrian and bicycle facilities in relation to underserved populations and identified areas where limited access to walking or bicycle facilities is compounded by socio-economic challenges.</p> <p>The result of this analysis identifies under-served areas in the city where there is opportunity to strategically invest in areas that have high demand today, the greatest potential to increase future use of active transportation and where there are higher concentrations of people who are more dependent on active transportation for moving around. (p.17)</p>	Very effective incorporation of an equity analysis at the outset of the planning stage. Includes clear results from analyses that support and prioritize the operationalization of equity (for both cycling and walking) across key parts of the city <i>most in need</i> . Additionally Appendix C of this plan is an action prioritization table that reviews key themes and actions, and their associated timeframe, method of implementation and department responsibility .

Province, City and Plan	Description of City	Overarching OR Cycling-Related Principles/Goals/Objectives	Policies/Actions/Measures	Comments
			<p>Part 5: Implementation Plan: 5.3 Network Prioritization</p> <p>An objective, Geographic Information System (GIS)-based prioritization methodology was used to identify priority locations based on a list of variables. Each variable was scored on a five-point scale and the results were combined to generate an overall score for each new walking and cycling facility in Saskatoon. By combining these scores, a project ranking list was developed. (p.94)</p> <p>Variables Network Connectivity, Trip Generators, Access to Transit, Level of Protection, Equity, Safety, Network Spokes and Potential. Each variable contains scoreable information about each proposed route's ability to address an existing and future need within Saskatoon.</p> <p>Equity. This variable assesses the greatest potential to improve access to traditionally underserved populations. Areas with the greatest equity potential were given the highest score. (p.94-95)</p>	
		<p>Vision</p> <p>In 2045, Saskatoon is a leading city for active transportation, where walking and cycling are convenient, comfortable, attractive, fun and normal ways of moving around the city yearround for residents and visitors of all ages and abilities. Saskatoon has developed an active transportation network, policies and programs through supportive partnerships that provide transportation choices and contribute to the city's robust economy, cultural and recreational experiences, environmental health, safety, physical beauty and neighbourhood connectivity. (p.32)</p>	<p>Action</p> <p>Develop a complete and connected bicycle network for all ages and abilities throughout Saskatoon. (p.46-49)</p> <p>Figure 31 presents the proposed bicycle network with suggested facility types, including AAA and non-AAA routes. The suggested bicycle facilities identified on the network map in this report are based on road classification, neighbourhood context and existing conditions, including right-of-way width, number of motor vehicle lanes, traffic volumes and on-street parking. Design and implementation of each proposed bicycle facility would require a more detailed assessment of facility type and consultation with adjacent land owners. (p.47)</p> <p>Action</p> <p>Follow the standards of CPTED to ensure principles are followed in active transportation facility design (p.65)</p> <p>Action</p> <p>Continue to address personal safety concerns on existing underpasses with lighting improvements and/or design enhancements. (p.65)</p>	
ALBERTA				
City of Edmonton				
Transportation Master Plan, 2009 https://www.edmonton.ca/city_government/documents/land_sales/TransportationMasterPlan.pdf	<i>The City of Edmonton is the second largest city in the province of Alberta (population est. 932,000) and is located centrally and along the North Saskatchewan River. Despite being located centrally within the province, it is said to be the northernmost city in the Canadian provinces with a population of nearly 1 million.</i>	<p>Strategic Goal: Access and Mobility</p> <p>The transportation system is interconnected and integrated to allow people and goods to move efficiently throughout the city and to provide reasonable access with a variety of modes for people across demographic, geographic, socio-economic and mobility spectrums. (p.18)</p>	<p>Actions</p> <p>Develop and maintain a city-wide bicycle transportation network</p> <p>Integrate bicycles with transit facilities and services.</p> <p>Provide secure and Connect bicycle infrastructure throughout the region. (p.57)</p>	While nowhere in this plan was equity mentioned explicitly, it did provide strategic goals that implicitly reflect principles of equity, including strategic goals and actions geared towards the promotion and enabling of accessibility and safety.
		<p>Strategic Goal: Health and Safety</p> <p>The transportation system supports healthy, active lifestyles, and addresses user safety and security including access for emergency response services, contributing to Edmonton's livability. (p.21)</p>	<p>Action</p> <p>Designing and constructing bicycle facilities in accordance to Crime Prevention Through Environmental Design principles. (p.57)</p>	
City of Calgary				
Transportation Master Plan, 2009 http://www.calgary.ca/_layouts/cocis/DirectDownload.aspx?target=http%3a%2f%2fwww.calgary.ca%2fTransportation%2fTP%2fDocuments%2fCTP2009%2fcalgary_transportation_plan.pdf&noredirect=1&sf=1	<i>The City of Calgary, one of Canada's largest cities (population est. 1.2 million, 2016), is located in the southern portion of the province of Alberta along the eastern foothills of Canada's Rocky Mountains.</i>	<p>Transportation Goal #3: Provide affordable mobility and universal access for all.</p> <p>Citizens must be provided with a range of affordable travel options regardless of income or ability, including walking, cycling, public transit, and taxis. The built environment and transportation infrastructure should incorporate (p.10)</p>		While these objectives are more reflective of horizontal equity, or, equality, it nonetheless acknowledges the importance of accommodating the city's disadvantaged populations and the importance of enabling citizens the ability to participate in the economic and social activities of the city.

Province, City and Plan	Description of City	Overarching OR Cycling-Related Principles/Goals/Objectives	Policies/Actions/Measures	Comments
		Objective 3.7 Complete Streets Increase the attractiveness, convenience and safety of all modes of transportation by creating a new selection of multi-modal streets that emphasize different modes of transportation, incorporate elements of green infrastructure and function in the context of surrounding land uses. (p.45)		
		Objective 3.10 Transportation safety Continue to enhance safety for all users of the transportation system, accommodate increased walking, cycling and transit use by addressing the safety concerns of network users, and support emergency management processes. (p.60)	CPTED design guidelines, and emergency management considerations, should be incorporated into the planning and design of all transportation infrastructure. (p.62)	
		Objective 3.11 Universal Access Ensure access and freedom of mobility for all Canadians, providing all citizens with the opportunity to travel and participate in public life. The transportation system should offer choices for all people, regardless of their income, age, literacy, mental and physical ability or cultural background. An accessible transportation system that incorporates walking, cycling, transit, carpooling, private vehicle use and other options offers all citizens the opportunity to participate in the economic and social activities of the city. (p.63)	Universal design principles should be applied in the planning, design, operation and maintenance of all transportation infrastructure and services. (p.63)	
City of Calgary Cycling Strategy, 2011 http://www.calgary.ca/Transportation/TP/Documents/cycling/Cycling-Strategy/2011-cycling-strategy-presentation.pdf		N/A	N/A	
BRITISH COLUMBIA				
City of Vancouver Vancouver Transportation Master Plan, 2012 http://vancouver.ca/files/cov/Transportation_2040_Plan_as_adopted_by_Council.pdf	<i>The City of Vancouver is the largest city in the province of British Columbia (population est. 631,000) and the largest city in the Metro Vancouver Region (formerly Greater Vancouver Regional District - population est. 2.5 million, 2016). It is located in the south west coast of the province, in what's known as British Columbia's Lower Mainland region.</i>	Direction Cycling Make cycling safe, convenient, comfortable, and fun for people of all ages and abilities. (p.27)	C1.1.1. Adopt and implement planning and design guidelines to support a network of routes that feel comfortable for people of all ages and abilities (AAA) C1.1.2. Develop a cycling comfort index to help identify routes that do not meet design guidelines for people of all ages and abilities (AAA), and to inform design approaches for new routes and route upgrades. (p.26)	While the term equity appears a number of times throughout Vancouver's Transportation Plan, none of it pertains to overarching goals or cycling, but rather transit and walking. The most relevant component that may perhaps be implicitly reflective of equity in terms of cycling is the acknowledgement that cycling should be convenient and comfortable for people of all ages and abilities.
Active Transportation Promotion and Enabling Plan, 2016 https://vancouver.ca/files/cov/active-transportation-promotion-and-enabling-full-plan.pdf		N/A	N/A	
City of Kelowna Pedestrian and Bicycle Master Plan, 2016 https://www.kelowna.ca/sites/files/1/docs/related/pbmp_final_draft.pdf	<i>Situated in British Columbia's Okanagan Valley along Okanagan Lake, The City of Kelowna is the largest city (population est. 127,000, 2016) in the Regional District of Central Okanagan (population est. 194,000, 2016).</i>	Objective: Funding Support walking and cycling programs and infrastructure with effective and equitable investment. (p.3)	Chapter 5: Investment Options Criteria was used to assess each of the potential funding sources (p.49) Assessment Criteria # 5: Equity Is this revenue source equitable in terms of the geographic distribution of those who pay, relative to the area that will benefit and in terms of income, by avoiding drawing overly upon those that can least afford to pay? (p.49) Potential funding sources that reflect a certain degree of equity are: General Funds/ Taxation, and Local Area Services (for more details see Table 5.5 on p.52)	Overall, Kelowna's plan does a good job of incorporating equity into the financing and investment aspect of their plan. Not only do they acknowledge the need for equitable investment, they investigate the equity of potential funding sources.
		Chapter 3: Active Transportation Vision 3.2 Future Active Transportation Network A safe and functional network of pedestrian and bicycle facilities is important in encouraging travel by active modes. Users generally want to access the same locations by walking and cycling as they do by driving. (p.29)	The Active Transportation Vision seeks to improve safety, connectivity, and accessibility by: Improving the quality and attractiveness of pedestrian and cycling facilities by establishing a low-stress Primary Network for users of all ages and abilities; Reducing conflicts due to truck, transit, and bicycle network overlaps; Enhancing route connectivity and continuity with new routes through gap areas; Adding connectivity through high speed, high vehicle traffic volume areas with new connections and direct routes, including grade-separated crossings where appropriate. (p.30)	