Assessing and Measuring the Factors Affecting Mobility, Transportation Accessibility, and Social Need: Barriers to Travel among those with Low Income and Other Vulnerable Groups

Dr. Alan Walks
Department of Geography, and Program in Planning
University of Toronto

Abstract:

This report sheds light on the relationship between mobility and transportation accessibility, and social need, in the greater Toronto-Hamilton-Barrie-Oshawa area (GTHBOA), with a particular focus on the mobility and accessibility needs of low-income residents and other vulnerable social groups. The report is divided into two main sections. The first section analyzes custom data from the 2006 census in order to determine how forms and levels of mobility and accessibility, and social needs related to mobility and accessibility, are distributed both socially and spatially within the GTHBOA. This analysis was also used to identify five study areas with disproportionately lower levels of public transit use among lower-income residents than would be expected given prevailing mobility and accessibility patterns in the GTHBOA. The second section reports on the results of a survey conducted in these five study areas in the summer of 2014. The survey over-sampled low-income respondents and public transit users, and is meant to identify the main issues and barriers to mobility and accessibility facing different groups of low-income residents and other vulnerable social groups in the GTHBOA. The findings suggest that the barriers to mobility and accessibility are multi-faceted, and that they vary among different groups and in different places. Using the rich dataset derived from the survey, a series of ten key recommendations are made in relation to the public transit system which would reduce the barriers that low-income people and other vulnerable groups face in accessing affordable transportation in the GTHBOA.

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1. Introduction

The greater Toronto-Hamilton-Barrie-Oshawa area (GTHBOA), encompassing the Toronto, Hamilton, Barrie and Oshawa CMAs, effectively acts as one large metropolitan area and commuter shed. This has been one of the fastest growing regions in Canada over the last 20 years in terms of absolute population growth. The census of Canada shows that the total population of the region has grown from 4.80 million in 1991 to 6.85 million people in 2011, an increase of 2.05 million, or about 43 percent over the period. By 2011, over one fifth of Canada's population (20.5 percent) lived in this extended metropolitan region, up from 17.6 percent in 1991.[1]

Population growth, coupled with limited increases in transportation capacity, has led to challenges related to mobility and transportation accessibility in this extended region. These challenges are layered by an increase in income inequality over the period, which among other things has been characterized by the growth of low-income households and individuals, declining average incomes of immigrants residing in the region, and a trend toward the racialization of poverty and unemployment (Walks 2013). Low-income residents face additional barriers to mobility, as well as difficulties accessing the transportation network or taking full advantage of it, due to the level of resources available to them as well as to how they tend to be socially and spatially located with respect to the transportation system. As the distribution of income has become less equal, the level of spatial segregation based on income has also grown, with poorer residents facing fewer choices in the housing market, while wealthier residents can outbid the poor for neighbourhoods with high levels of accessibility (Walks 2013; Walks and Maaranen 2008). Metrolinx (2013) identified the provision of transportation alternatives for those who need them the most as one of a number of key priorities of The Big Move strategy being implemented in the greater region. Central to such alternatives was the provision of transportation choice for low-income households, children and their families, and seniors, as well as overall improvements to accessibility among different social groups as part of an overall inclusive approach to the building and monitoring of the larger transportation system (Metrolinx 2013). The research reported on herein relates to these goals.

This report sheds light on the factors relating to mobility and transportation accessibility in the greater Toronto-Hamilton-Barrie-Oshawa area (GTHBOA), with a particular focus on the mobility and accessibility needs of low-income residents. The report is divided into two main sections. The first section analyzes custom data from the 2006 census in order to determine how forms and levels of mobility and accessibility are distributed both socially and spatially within the GTHBOA. This analysis was then used to identify five study areas with disproportionately lower levels of public transit use among lower-income residents than would be expected given prevailing mobility and accessibility patterns in the GTHBOA. The second section reports on the results of a survey conducted in these five study areas in the summer of 2014. The survey over-sampled low-income respondents and public transit users, and identifies the main issues and

[1] Calculated by the author from the 1991 and 2011 census of Canada.

barriers to mobility and accessibility facing different groups of low-income residents and other vulnerable social groups.

The findings suggest that the barriers to mobility and accessibility are multi-faceted, and that to some extent they vary among different groups and in different places. Using the rich dataset derived from the survey, a series of ten key recommendations are presented for improving accessibility and reducing the barriers that low-income people and other vulnerable social groups face in using the public transportation system.

This report is divided into 6 sections. The next section defines the concepts of mobility and accessibility, notes how they are measured, and summarizes the literature concerning the factors relating mobility and accessibility, and social need. Section 3 then outlines the methods employed in the study reported on herein, which involves two separate stages: a first stage involving analysis of census data, and a second stage involving a survey of respondents residing in five study areas. The fourth section details the findings from the first of these stages of the research, concerning analysis of custom data from the 2006 census of Canada relating to mobility and transportation accessibility in the greater region. Section 5 then details the findings from the second stage of the research, involving a survey undertaken in the summer of 2014 in five key study areas within the region which aimed to understand the problems and barriers to travel facing low income and socially vulnerable populations in the greater region. Section 6, the final section, outlines ten recommendations that follow from the findings and analysis presented in the preceding two sections.

2. Measuring Transportation Mobility and Accessibility

Mobility and accessibility are related, yet distinct, concepts. Spatial mobility refers to actualized travel across space, whether over short or long distances, and whether for temporary and permanent sojourns (Kaufman 2002). Daily mobility, including that between place of residence and place of work or school (and return), is the most commonly studied form of mobility (Urry 2007). Spatial mobility can be measured simply as distance travelled. However, because the amount of time in the day available for travel is limited, often mobility measures involve analysis of distance travelled as a function of units of time, and thus speed. A focus on speed highlights the different mobility resources made available by different modes of transport, with the car seen as providing the highest levels of mobility among modes, primarily because it provides the fastest travel speeds, and because it is less impacted by scheduling constraints. However, over long distances and in places with insufficient rush hour road capacity (and thus high levels of congestion) high-speed rail is often faster. However, as Farber and Paez make clear (2011), mobility does not equate with accessibility. One could be highly mobile – travelling long distances at fast speeds in a particular city (using an automobile, or high-speed rail) – but without reaching any more destinations or participating in any more activities than someone moving slowly over short distances in another city (via walking or using public transit), mainly due to how spatially distributed such destinations are in each place (Ibid.).

Levels of mobility (actualized travel) can be compared amongst different transport modes, and across different population groups. Because mobility requires resources, those with lower incomes typically exhibit lower mobility in their daily routines. As well, certain other groups including seniors, children, and lone-parent families, demonstrate more limited mobility due to physical incapacities, or social needs related to family schedules and/or the need to be near family resources. The latter speaks to the potential, or capacity, for mobility, which is partly related to the personal characteristics of those aiming to be mobile. This is what Kaufman (2002, 37) calls motility, defined as the "capacity of a person to be mobile" and related to the "way in which an individual appropriates what is possible in the domain of mobility and puts this potential to use for his or her activities" (Kaufman 2002: 37). Motility involves the propensity for mobility as determined through the interaction of three aspects: 1) the choices and resources available for mobility, including those related to the availability of particular transport modes as well as to the accessibility of a particular transportation network as constrained by prevailing settlement patterns, 2) the physical and intellectual skills available to those who aim to be mobile, including those involving training, certification, the ability to understand and follow rules, and the ability to operate vehicles, to walk, and move, and 3) ability to appropriate information and resources related to the appropriateness of different kinds of mobility in different circumstances, adherence to prevailing attitudes, standards, customs, and to meet and apply life aspirations (regarding family and employment trajectories) to settlement decisions and mode decisions (Kaufman 2002, 38-39). The capacity to be mobile, or motility, is thus socially and culturally produced within a prevailing economic, political, social and cultural context. However, motility is much more difficult to operationalize and measure.

A number of factors affect mobility, motility, and accessibility. Cass, Shove, and Urry (2005) outline four specific dimensions that provide or limit access to different modes of transport. First of all is the financial dimension. To travel requires resources, both those directly associated with

the mode of transport (owning or renting a car, taxi, bike, public transit fare, fuel costs, etc) as well as those indirect costs that affect travel (appropriate clothing/footwear, storage, maintenance, licensing and registration, and any tax-subsidized infrastructure on which transport must run). Access to information, including schedules, often requires computers, cell phones, land-line based phone service, and/or internet access, which involves a financial cost.

Secondly, there is the *physical dimension*. This relates to the capacities and abilities to walk, bike, or drive (functional vision, ability to steer, get into/out the car, etc), the physical ability to move from one place to another (there must be an actual route with entrance/exit points, etc), and a distance that is transversable within a reasonable time. This physical aspect thus involves more than individual physical capacities, but also the hard infrastructure on which transportation systems run, and the physical arrangement of land uses.

A third dimension involves organizational capacity. This includes access to a car, or other vehicle that one does not own, when necessary, as well as the organization of the public transit system. Accessibility to the latter can be limited by restricted, infrequent trips, and mobility overall is influenced by how household schedules match up with those of others or of the public transit system. Another aspect of this involves the spatial organization of the transport system, both of public transit (direction, number of stops, linkages with other network lines and access points), as well as the roadway system (highways, access points, etc).

The fourth dimension is the temporal one. When public transit service is limited at certain times of the day, this affects potential and actual levels of mobility and accessibility. Job shifts that let out at odd hours thus have important affects in limiting mobility and accessibility for those who suffer from them. The ability of households to flexibly adapt their temporal schedules in relation to those of the transport system, in turn, affects overall mobility and accessibility levels, as do the timing and scheduling of public transit connections with other lines (or connections between different modes – i.e. park-n-ride) (Ibid.). To this list, one might highlight a number of social factors related to the ability of individuals to access and appropriate information about the larger transport system, including language abilities that allow one to read schedules and negotiate a given system, feelings of discrimination based on ethnicity, race, gender, or age that discourage travel, family status that will affect household schedules (i.e. if there are children of school age at home, etc), and feelings of comfort and safety, as well as broader social capital resources that enhance an individual's ability to call on others for help, including a lift in someone else's vehicle, or to borrow a vehicle or transit pass, when necessary. Not only do these social factors affect the abilities of those who might travel, but they also affect the locations to which they may wish or be able to travel. Travel decisions, as well as the capacities to be mobile and the ability to access different modes of transport, are all affected by these factors in combination.

Accessibility specifically refers to the ability to reach (or 'interact with') potential existing opportunities, including places of residence, employment, school, shopping, and recreation, that are spatially distributed (Hansen 1959; Paez, Scott, and Morency 2012). It is typically assumed that accessibility – a public good - is higher when such activities are closer and trips are shorter. Research in Canada has found that longer regular trips and commutes are associated with feelings of being rushed, trapped in a daily routine, lack of time, inability to assume family responsibilities and spend time with family, lack of sleep, and higher costs (see Turcotte 2011). A distinction is made in the literature between the level of accessibility that is provided to a set of

destinations by the existing transportation network (often referred to as "access by" that transportation network), and the level of accessibility to the main entrance points into that particular transportation network itself ("access to" transportation) (Moniruzzaman and Paez 2012). For instance, the level of accessibility in regards to a local public transit system could be measured in terms of the average distance from places of residence to places of employment through the public transit system (access by), or the level of accessibility could be measured as the average distance from place of residence to the nearest bus stop or train station (access to). Paez, Scott and Morency (2012) further differentiate between positive measures of accessibility, which seek to describe levels of accessibility as they currently exist, and normative indicators of accessibility, which evaluate accessibility against an 'ideal' level, to which policy aspires. The vast majority of accessibility measures take the first form, as only if an 'ideal' level of accessibility is given in advance can the latter measures be calculated.

Over time, a large number of different ways of measuring accessibility have been developed in the literature. Geurs and van Wee (2004) categorize accessibility measures into four basic concepts: 1) infrastructure-based measures, 2) location-based measures, 3) person-based measures, and 4) utility-based measures. Geurs and van Wee (2004) also distinguish between measures that can be used as economic indicators from those that can be used as social indicators, with the latter less common than the former. *Infrastructure-based measures* involve analyses of infrastructure capacity, use and congestion and are good at evaluating overall economic costs and benefits of infrastructure investment. For example, such measures can compare the amount of capacity and congestion in one system to another, and make recommendations for locating new infrastructure (exit ramps, public transit lines, etc) based on where capacity is low or congestion is high, in relation to the cost of providing such infrastructure. However, infrastructure-based measures are not good at taking land-use into account, nor the characteristics of those persons who use the system, and so are not appropriate for use as social indicators (Ibid.).

Location-based measures, of which there are a large number, typically involve analysis of distances or time spent moving between points of origin and destination, and are better at incorporating land-use and social behaviour into analyses of accessibility. These measures can involve single or multiple destinations, as well as actual or potential travel, and thus can provide information on journey lengths (for instance, the distances or travel times from multiple residential areas to an employment node or nodes), or cumulative opportunities (such as the number of employment nodes reachable within a certain distance or travel time of each place of residence). Location-based measures can provide the basis for either economic or social indicators, and hence for economic or social policy decisions, and are the most common measures used in urban planning and geographical analysis (Ibid., 133). Location-based measures are often easiest to operationalize, interpret and communicate. However, they typically do not incorporate information on travel *needs* or individual *perceptions* of travel quality (Ibid.).

Person-based measures, meanwhile, build on the time-based travel patterns of individuals and take into account how social needs combine with changes in social and other variables (employment, age, family status, among others, as well as land-use) to affect both travel-time budgets and travel decisions, and thus are the best measures for getting at the complex relationship between land-use, personal needs and behaviour (for example, in understanding how the need to care for an elderly parent might impact travel decisions for other purposes as well as residential or employment location decisions). However, person-based measures are the most

difficult to operationalize or use for evaluative purposes, are not very useful as economic indicators, and typically involve very detailed data (often week-long travel diaries, in which respondents write down their locations and modes of travel at each time in the day), making them the least common among the four types. Analysis built on surveys of individuals that ask them about their travel choices, needs, and behaviour, however, often incorporate elements of these person-based measures into the more common location-based measures.

Finally, *utility-based measures* are the most computationally complex, and typically use as inputs other accessibility measures to model aggregate travel choices and other activities/decisions as functions of each other (for instance, residential housing locations and school quality as functions of job accessibility) (Ibid. 131-136). These are often the best measures for answering questions relating travel to land-use or social behaviour at the aggregate level. However, while some researchers have incorporated some aspects of person-based measures into utility functions, including time available for activity participation and social interaction (Miller 1999; Farber et al., 2013), the complexity of such measures, and their aggregate quantitative form, inhibit interpretability and communicability, and largely limit their use to economic evaluations (Geurs and van Wee 2004).

Of these four types of measures, location-based measures are the most commonly used in the literature and, along with person-based measures, are the most appropriate for understanding the travel behaviour and needs of low-income residents. While there are a large number of location-based indices, most can be categorized into six basic types (Table 2.1), measures in terms of: 1) the distance between origins and destinations (with longer distances seen as reflecting lower accessibility), 2) the time it takes to travel between origins and destinations (with trips necessitating longer times seen as indicating lower levels of accessibility), and/or 3) the sum of cumulative opportunities within a given bounded area. A larger number of potential opportunities – say, places of work, or access points into the transportation network – within an area, or within certain distance of a particular location, indicate higher levels of accessibility.

Table 2.1: Operationalizing Location-Based Accessibility – Basic Concepts

Concept		Variables
Travel Distance		
	Access by	Distance to destination
	Access to	Distance to nearest access point (stop/ station, hwy exit, etc)
Travel Time		
	Access by	Time to destination
	Access to	Time to nearest access point (stop/ station, hwy exit, etc)
Cumulative Opportunity		
	Access by	Number/density of destinations/activities reachable from locale (within a given distance, or given travel time)
	Access to	Number/density of local access points (stops/ stations, hwy exits, etc) (within a given distance or given travel time)

Distance measures provide indicators of the physical separation of origins and destinations in standard units, but can only be calculated when both the place of origin and place of destination are known. In the Census of Canada, Statistics Canada derives measures of the length of the

commute in kilometres from the information on place of residence and place of work in the long form of the census (last conducted in 2006). However, distance measures cannot take into account alternate routes, the need for multi-function trips (say, to drop kids off at school before going to work), the number of transfers required between public transit systems, nor the time involved in travel which can differ depending on levels of congestion and time of day. An alternate indicator of accessibility involves analysis of the time involved in travel. This measure is effective at taking into account the diverse needs of the population, time of day constraints, prevailing levels of congestion, and problems with public transit routes and transfers. Time-based measures are preferable when conducting surveys in which individual respondents should not be identified, for which it could be inappropriate to collect place of residence and place of work information. Furthermore, most residents base their travel decisions on how long the trip will take, rather than the distance involved, so time is often a better measure of actual accessibility. Cumulative opportunity measures, meanwhile, relate to the potential for accessibility to entry-points into transportation systems (either via public transit stops/stations, or access to the road/highway system, access to a bike path system, etc), or to the number of potential destinations reachable by each place of origin. They are thus most appropriate for analyzing the accessibility characteristics of places (neighbourhoods, etc). Resulting measures can be weighted by the likelihood of accessing each individual entry point or destination, and the weights can be derived either through aggregate or average propensities, or individual propensities.

While accessibility measures often involve relatively constant physical metrics (the distance between a place of residence and a transit station is constant and not dependent on who might traverse it, for instance), in reality the ability to take advantage of prevailing levels of accessibility are always dependent upon the capacities of those who might be mobile. The actualization of accessibility in any given place or for any given person involves the interaction between (individual or collective) capacities to be mobile (or 'motility'), and the relationship between the geographic distribution of destinations and the reach of the existing transportation system. Furthermore, it is impossible for everyone to be located in the same place at the same time – thus, the actual distances and routes travelled will vary, even if just in a minor way, for each individual. When aggregated, patterns in prevailing levels of accessibility will be evident among different social groups. Thus, it is likely that the actualized level of accessibility, for instance between one neighbourhood and the main employment clusters will differ depending on which social group is being analyzed. One of the objectives of this study is to discern differences in levels of accessibility and mobility experienced by different marginalized groups and to explain why, according to these groups, such differences exist.

Mobility, Accessibility, and Social Need

There is by now a well-established literature investigating what is often termed 'transport disadvantage' (Hine 2004; Dodson et al. 2006; Currie and Delbose 2010), also referred to as 'transport deprivation' (Power 2012) or 'transport exclusion' (Hine and Mitchell 2001). A focus on social exclusion within the transportation literature has been common, particularly in the UK and Australia. Church et al. (2000) outlined seven ways that transportation might be related to social exclusion: 1) physical exclusion, in which the design of vehicles (automobiles, public transit vehicles, etc) prevents certain users from being able to access them; 2) geographical exclusion, in which residential location prevents people from being able to access transportation infrastructure, due to distance; 3) exclusion from facilities, relating to the lack of, or large

distances to, key facilities and amenities, like hospitals; 4) economic exclusion, in which the costs of travel inhibit those with lower incomes from being able to access transportation systems or certain destinations; 5) time-based exclusion, in which demands on time, coupled with the amount of time it would take to travel, act as a barrier to travel; 6) fear-based exclusion, in which safety and security concerns keep people from availing themselves of transport opportunities, and 7) exclusion based on privatized or securitized space, in which walls, fences, and guarded spaces prevent one from traversing a particular area (gated communities, military bases, etc). These factors may be mutually reinforcing, producing feedback loops between mobility systems, land use, and travel behaviour that augment transportation-based social exclusion (Lucas 2011).

There are generally two distinct strands in the literature related to these concepts. The first strand, more common outside the United States, is concerned with understanding the barriers that certain 'vulnerable' social groups face in accessing transport infrastructure, particularly public transit, and is often aligned with a research program seeking to understand and reduce "social exclusion" through transport-related enhancements. Such vulnerable groups typically include women in general, and single-parent families in particular, the elderly, racialized groups, immigrants, and low-income populations (Morency et al., 2011; Mercado et al., 2012). Such groups are thought to be at risk of social exclusion because they must depend far more on public transit, or on walking and biking, and so are constrained to travel when and where these modes might take them. Women, and low-income women in particular, are more dependent on public transit, not only due to lower incomes but also lower access to automobiles, greater childcare responsibilities that require them to work/stay closer to home, and lower rates of licensing (Hanson and Pratt 1991; Mensah 1995; Turner and Niemeier 1997; Limtanakook et al. 2006; McQuaid and Chen 2012). Recent immigrants in Canada (Heisz and Shellenberg 2004; Mercado et al. 2012) and the United States (Blumenberg 2008; Preston, McLafferty and Liu 1998; Chatman and Klein 2009) are also more reliant on public transit, as well as carpooling, cycling and walking, in part due to lower incomes and licensing rates, and have to structure their job search around locations accessible by these means. However, the effect tends to decline over time, with the odds of carpooling, cycling and transit use declining significantly within four to ten years (Pisarski 2006; Smart 2010). Also, despite generating lower car mileage than the native-born (Tal and Handy 2010), those immigrants who commute via automobile often commute longer distances (Chatman and Klein 2009). The elderly are more dependent on transit due to declining physical capabilities, as well as the fact they often do not (and cannot afford to) replace obsolete automobiles once they are retired and have no need to commute to work (Hensher 2007; Paez et al., 2007; Spinney, Scott and Newbold 2009). Low-income populations are doubly constrained by the fact they may not be able to afford to travel any significant distance even on public transit. When multiple variables overlap, the dependence on public transit increases, as does the influence of residential location on this level of dependence (that is, for such groups, social inclusion/ exclusion depends even more on whether one lives close to good-quality well-connected public transit). This strand of the literature has tended to be influential in showing where and how public transit facilities need enhancing if vulnerable populations are to be better served.

The second strand specifically relates transport disadvantage to lack of access to an *automobile*, which has been found to significantly limit accessibility to employment, accessibility to social contacts and regional amenities, and to lower levels of mobility overall (Currie and Delbosc 2010; Dodson et al. 2010; Clark and Wang 2010; Lucas 2011). In the United States, where this strand of the literature is more common, such research is often related to the concept of "spatial

mismatch", which refers to the mismatch between the residential location of low-income workers (often in lower-priced neighbourhoods in the inner cities) and their places of employment (often in the suburbs, with limited access by public transit) (Kain 1968; Holzer 1991; Ihlanfeldt and Sjoquist 1998; Martin 2004). Spatial mismatch is racialized in the United States, with Blacks the most spatially mismatched group, and with immigrants (mainly Hispanics) more spatially mismatched than whites (Liu and Painter 2012). A related research has found that limited access to automobiles among women in households with only one car limits their mobility, job prospects and social networks in relation to men (England 1991; Preston and McLafferty 1993), a situation that is augmented when women are also from a racialized community (Wyly 1996; Parks 2004). Time spent commuting has remained relatively stable among automobile commuters between the 1970s and late 2000s, but has increased among commuters using public transit (who are more likely to be women and members of racialized communities), a situation that Taylor and Ong (1995) refer to as "auto-mobile mismatch". The analysis of exclusion from automobility has been applied in other national contexts (such as the United Kingdom and Australia) to those living in rural or outer suburban areas which are far away from places of work and which have little public transit access, where large distances require even those with cars to travel less in order to save on fuel costs (Gray 2004; Chapple 2006; Delbosc and Currie 2011). The findings of this second general strand of the transport disadvantage literature have been influential in promoting policies that enhance access to automobiles, including car share programs and subsidized automobile finance programs (Cervero and Tsai 2003; Garasky, Fletcher and Jensen 2006). Indeed, such programs have been promoted as helping people move from 'welfare' to work (Lucas and Nicholson 2002; Ong 2002). The reasoning behind such programs is also increasingly being applied in contexts outside of the United States (Fol, Dupuy and Coutard 2007). Patacchini and Zenou (2005), for instance, draw on their empirical findings to argue that facilitating car access to immigrants and minorities in the United Kingdom would close the gap in job-search intensity, and in turn reduce differences in unemployment rates. As of yet, there is little evidence of a US-style spatial mismatch in Canada, nor have governments at any level (federal, provincial or municipal) supported car-subsidy programs as part of their welfare or 'workfare' programs.

Mobility, Accessibility, and Social Need in the greater Toronto region

The Toronto region has received some scholarly attention in regards to travel behaviour among vulnerable populations, and it is instructive to briefly review this recent literature. The overall travel patterns are explored by Morency et al. (2011), who evaluate the factors predicting total distance travelled (via all modes together) in Canada's three largest cities, and give special attention to three vulnerable groups – seniors, single parents, and low-income people. They derive their estimates from individual-level survey data (for Toronto, from the Toronto Transportation Survey – TTS), analyzed using spatial-expansion regression modelling procedures. As might be expected, having a license and owning a vehicle are two of the strongest general predictors of distance travelled, along with age (peaking among those 20-35 years old, then falling slowly afterward) and full-time employment. Local income levels are positively associated with longer travel distances, except at very high income levels at which point the effect diminishes (as the highest-income residents can often choose to live in elite neighbourhoods within short distance of the downtown). Having children at home is associated with an almost 15 percent reduction in annual distance travelled, a trend further exacerbated by also being a single parent. While having access to a private vehicle is associated with greater travel distances for most residents, the opposite is true for seniors for whom having a private

vehicle is associated with a sixteen percent reduction in trip distance. In Toronto, higher densities, and proximity to transit stops/stations, also increases distances travelled, with the exception of single-parent households, for whom having a transit stop/station within 500 metres is associated with a 13 percent reduction in travel distance (Ibid.).

Mercado et al. (2012) use multi-level logistic regression modeling techniques to predict transport mode use among low-income commuters in the provinces of Ontario and Quebec, using data at the individual level from the 2001 census of Canada, and spatial coding for municipality of residence and municipality of work. The results for Ontario show that commuters who work outside their municipality of residence are more likely to drive and less likely to use public transit, with a similar effect of age (older workers are more likely to drive than younger workers, and less likely to use public transit). Full-time workers are more likely to either drive or use public transit, while part-time workers are more likely to use other modes (particular carpooling – taking a ride in someone else's vehicle). Females are less likely to drive to work in comparison with men. While marital status is associated with greater driving, it is a generally weak predictor of mode choice overall. However, having more children in the household decreases the chances of using public transit, and increases the chances of driving to work, a trend that holds as well for single parents in Ontario, but not Quebec. Immigration status is an important variable, with recent immigrants (arriving in the ten years prior to the census) in particular more likely to use public transit and less likely to drive, but with this effect waning over time such that in Ontario longer-term immigrants (greater than ten years in the country) are slightly more likely to drive than the native-born (Ibid.). Unfortunately, this study did not parse out travel behaviour within each province, so it is not clear how these results vary across cities in Ontario.

Data from the 2005 General Social Survey is used by Turcotte (2008) to understand how social characteristics and neighbourhood population density affect transport mode share for daily trips across Canada's Census Metropolitan Areas (CMAs). Turcotte finds that men are far more likely to drive (69 percent) than are women (49 percent), even though both genders have similar proportions of trips taken by car (76 vs. 72 percent, respectively) with the difference a result of women being more likely to travel as passengers in cars (carpool). There is a relationship with age, with car use much lower among young adults (57 percent for those aged 18 to 24 years old) and seniors (67 percent among those 75 and older), and peaking in middle age (45 to 54 years of age). Immigrants are less likely to drive (45 percent versus 60 percent for the native-born) or to travel in cars (60 percent versus 75 percent). Driving is more common among those with a college or trade diploma (62 percent) than a university degree (59 percent), or those with or without a secondary school diploma (56 and 54 percent, respectively). The presence of children aged 5 through 12 is associated with higher rates of travel in a private vehicle, whether as driver or passenger (between 4 and 5 percent higher). Typically as household income increases, so does automobile use, with about two thirds of households with income above $60,000/year driving private vehicles for all trips, compared to only 39 percent for those with incomes less than $20,000. Car use tends to be higher for trips to work than for other activities, but this varies across CMAs (much of the data for individual CMAs is not stated in Turcotte's report).

Paez et al. (2013) specifically examine the travel patterns and accessibility to employment of single parents in the City of Toronto (not CMA). They use an index of cumulative opportunity (or rather, they compare two indices of cumulative opportunity) in order to compare the accessibility levels of single parents to other commuters, and the accessibility of single parents to

different kinds of jobs, across space within the City. They find that overall, single parents on the whole who live in the centre of the city (downtown Toronto) enjoy high levels of accessibility to employment (even higher than other groups) whereas single parents who live in more distant (inner suburban) locations suffer from lower levels of accessibility than other groups. However, the concentration of single parents is much higher in the latter areas, so that overall, single parents do not enjoy high levels of accessibility. Furthermore, female single parents enjoy even lower levels of accessibility than male single parents in general, and are even less likely to be concentrated in the downtown area. The level of accessibility for single parents is higher for those working in professional and managerial jobs than for blue-collar jobs. The same study compares levels of accessibility via private vehicles and via public transit, and finds that when single parents have access to private vehicles, their levels of accessibility are higher on average. The difference in accessibility levels between drivers and transit users among all single parents corresponds to the difference when only female single parents are analyzed. Yet, because of the lower average levels of accessibility among female single parents (in comparison with males), they found that the average level of accessibility for female single parents *with* private vehicles was roughly the same as for male single parents *without* private vehicles (i.e. who take public transit). They conclude that the results are sobering, since single parent households are more concentrated in places where accessibility is lower ("at deprivation levels") (Ibid. 835).

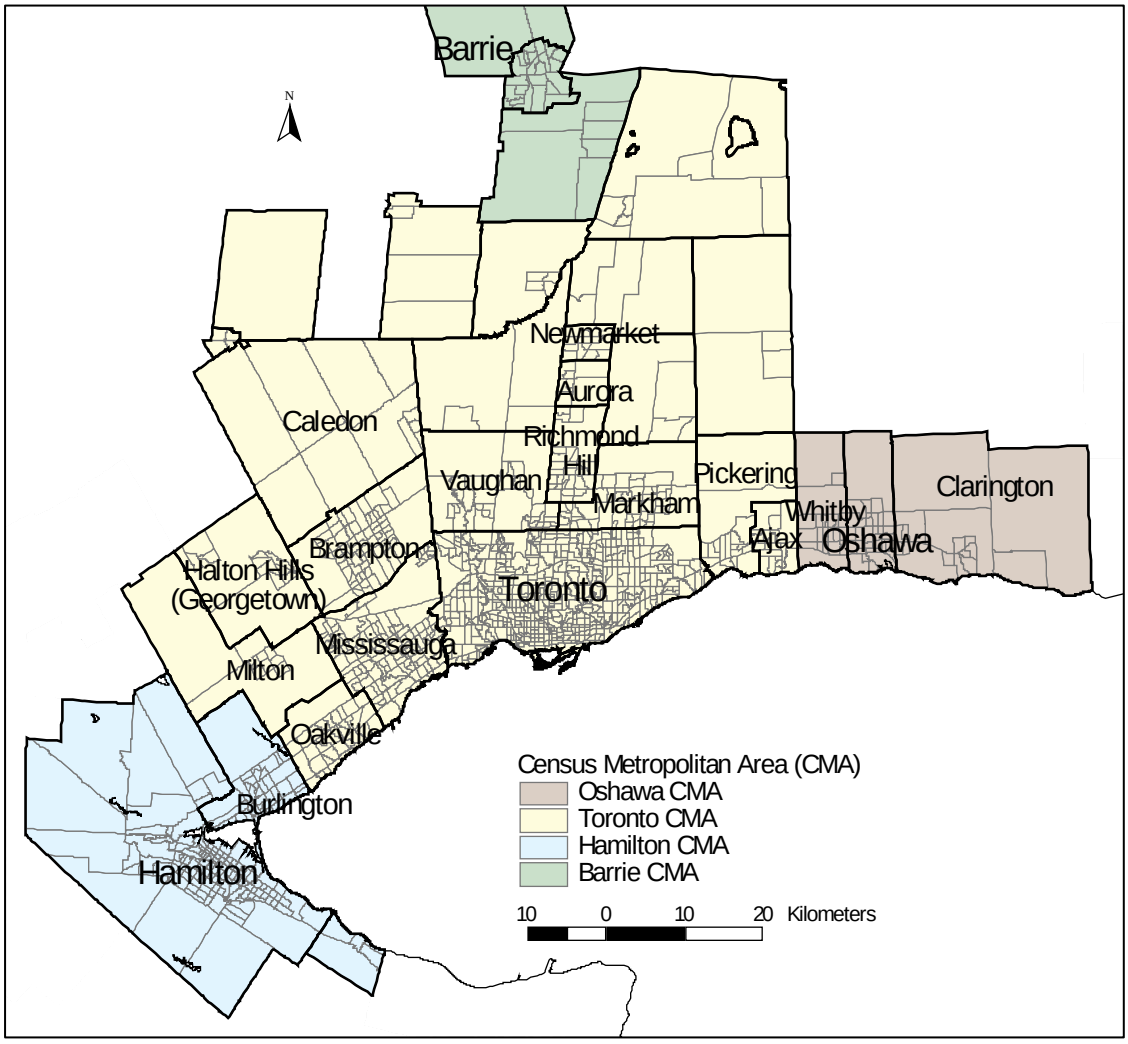
Foth, Manaugh, and El-Geneidy (2013) conduct a complex analysis of potential public transit accessibility for low-income commuters in parts of the Toronto CMA (the Cities of Toronto, Brampton, Mississauga, Vaughan, Richmond Hill and Markham) in 1996 and 2006, using data from the 1996 and 2006 census as well as specialized trip length estimates, at the census tract level. In the analysis, they analyze how accessibility to places or work, and to concentrations of employment, might be experienced by those who are socially disadvantaged, with the latter operationalized as a single standard index built from four variables: median household income, unemployment rate, proportion recent immigrants, and proportion spending more than 30 percent of income on rent. The latter index is then divided into deciles. Accessibility to places of work was determined by examining estimated average trip times from a matrix linking census tracts of residence to census tracts of actual workplaces (lower times were assumed to represent greater accessibility), while accessibility to employment concentrations was operationalized as a gravity-weighted average travel time from each census tract to the census tracts containing the greatest concentrations of: 1) all jobs, 2) low-skill jobs, and 3) other jobs. The findings are generally positive in showing higher levels of potential accessibility for the lowest (poorest) decile of their index, and they use them to argue that the public transit system in the Toronto region does a good job at meeting the commute needs of low-income workers in the region. They find that the most disadvantaged census tracts enjoyed greater potential accessibility using public transit to both employment concentrations, and the shortest average estimated travel times to actual places of work, than census tracts that have below-average levels of disadvantage. This demonstrated that the more socially disadvantaged tracts are located closer to the transit system than those of more social advantage (where, presumably, more people drive private vehicles). Furthermore, they argue that the situation for disadvantaged commuters improved between 1996 and 2006 in relative terms. Even though travel times increased for most commuters over time, the increase for those in the lowest decile of tracts (representing the most disadvantaged neighbourhoods, and by assumption, commuters) was less slower that for other deciles. However, there are some caveats that need to be understood in regards to this analysis. First of all, the rosy picture of changes over time is based on *relative* differences, but in fact, actual travel times mostly increased across tracts

over the study period, so in fact accessibility for most commuters declined in absolute terms, including for most of the lowest-decile tracts. Furthermore, one reason that the lowest-decile group of tracts saw the least increase in travel times, is that over this period a number of tracts in the suburbs, including those in Brampton and Mississauga, newly fell into the lowest decile - the most disadvantaged group - of tracts. It would appear that it is because of these new additions to the lowest decile in 2006, coupled with the fact that these tracts were closer to industrial areas of Peel, that the lowest decile of tracts did not experience as great an increase in travel times to places of work over the period relative to 1996. As well, it should be noted that the study did not examine the actual travel behaviour of low-income commuters. Instead, it examined the location (census tracts) of social disadvantage, and examined travel times to work as reported for all commuters who happen to reside in those locations (tracts). If, for instance, only higher-income residents of those tracts actually commuted, the study would not be picking up the travel behaviour of the lower-income residents. Saying this, the study demonstrates that for the most part, there is a positive spatial correlation between the location and accessibility of public transit services in the selected municipalities, and the spatial location of more socially disadvantaged populations, suggesting that there is no *overall* spatial mismatch between where disadvantaged people live and access to the public transit system (Ibid.). However, while the overall pattern presents a relatively positive story, such a spatial mismatch could still be present in specific locations within the region. As well, there could still be barriers to travel among low-income populations living in places with decent accessibility to the transit system.

3. Data and Method

This study seeks to understand the relationships between mobility and accessibility on the one hand, and social need on the other. In particular, it seeks to ascertain the challenges to accessibility and mobility facing lower-income and marginalized groups in the greater Toronto-Hamilton-Barrie-Oshawa area (GTHBOA), defined by the extent of these four CMAs (Figure 3.1). To shed light on these relationships and challenges, a two-stage strategy was followed. The first stage involved analysis of actual travel patterns as they occurred in the aggregate in 2006. The second stage involved a survey of respondents undertaken in the summer of 2014 in five key study areas. Each of these stages uses a different dataset, and has different objectives.

Figure 3.1 Extent of the Greater Toronto-Hamilton-Oshawa-Barrie Area (GTHBOA)



Stage 1: Analysis of the Commuting Patterns in the 2006 Census

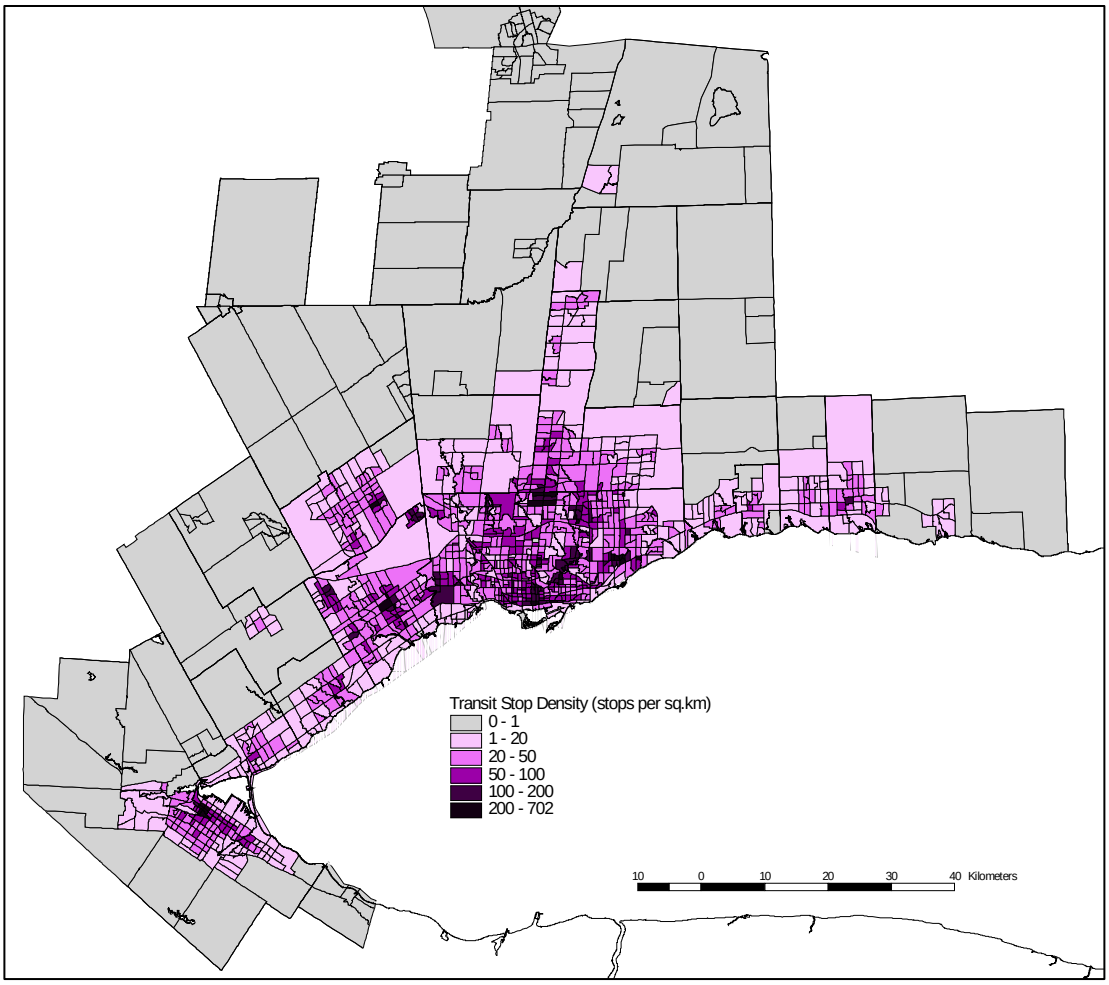
First, in order to understand the actual patterns of mobility and accessibility within the GTHBOA, custom data deriving from the 2006 census of Canada is analyzed. In the long form of the 2006 census, delivered to 20 percent of all Canadian households, respondents were asked to provide their residential address and the address of their place of work. Statistics Canada uses this data to calculate the distance commuted by each respondent, and then to classify commuters into different lengths of commute (less than 5km, between 5km and 9.9km, etc). The 2006 census also asked respondents what mode of transportation they used to get to work, and a series of other information related to age, gender, family status, immigration status, visible minority status, education, and income, among other things.

Custom data was ordered from Statistics Canada containing special cross-tabulations of this information from the 2006 census. It was this custom dataset that was analyzed in the first stage of the analysis reported on herein. The resulting dataset involves cross-tabulations of transport mode and length of commute with these other socio-demographic data aggregated at the level of census tracts, providing a very rich window on the social composition of commuters in Canadian cities. Census tracts are spatial units with populations ranging from 1,000 to 6,000 people, with boundaries that follow well-defined features (rivers, rail lines, major roads), and are often used as proxies for neighbourhoods. Note that the federal government refused to allow the long form of the 2011 census to be administered, instead replacing it with a voluntary online National Household Survey (NHS). Unfortunately, problems involving low response rates, poor data quality, and lack of ability to assess the validity of the NHS data makes it a less desirable resource for assessing relationships between variables than the 2006 census (Hulchanski et al. 2013; Walton-Roberts et al. 2014). For this reason the 2006 census is analyzed in this first stage of the analysis. One limitation of the census data is that it only measures the commute and not other trips, and for this reason it is not a useful dataset for examining the travel patterns of the unemployed, or of those retired from the labour market.

In this first stage of the research, the 2006 custom census data was analyzed with two objectives in mind:

First of all, differences in transportation mode, levels of accessibility, and mobility, are examined among different income groups (particularly between those commuters who have low income and those without low income), and among different social groups known to experience marginalization within housing and labour markets, particularly immigrants and lone-parent families. Patterns of transportation mode choice among different groups, and differences in mode choice and mobility, are mapped in order to demonstrate where in the GTHBOA certain modes (e.g. public transit) are disproportionately under-used and/or where choice is limited.
Once this was complete, the transit stop density for local transit services was calculated (Figure 3.2), and gravity indices were constructed for distance to the stops and stations pertaining to the regional transit systems: the GO train and GO bus system (Figure 3.3), as well as the subway system of the Toronto Transit Corporation (TTC), and the Viva Bus Rapid Transit (BRT) system. The latter are of course restricted to the City of Toronto, and the Region of York, respectively.

Figure 3.2: Local Transit Stop Density (stops per square km), by Census Tract

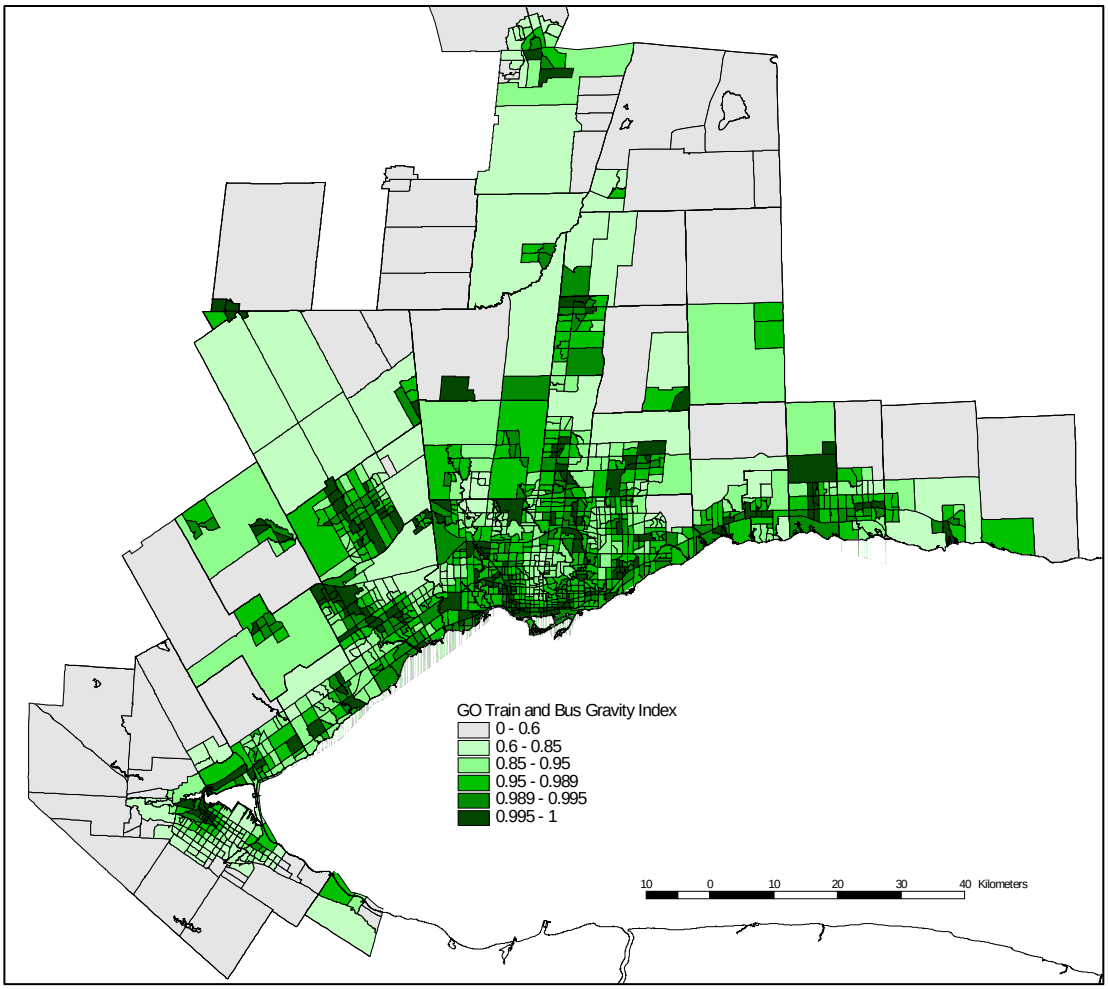


Source: created by the author from data supplied by Metrolinx and the University of Toronto Cities Centre
Note: Unfortunately, the local transit stop density was not available for the Barrie CMA

These indices were added to the 2006 census data, calculated at the level of census tracts, for analysis of their relationship to transit use. OLS regression models were then estimated in order to show how prevailing levels of accessibility as measured through distance to transit stops and stations, density of stops/stations, and distance to highway infrastructure, are related to social need as represented by low income, immigrant status, and family status, among other variables.

Secondly, the 2006 custom census data was analyzed in order to identify clusters of neighbourhoods (census tracts) where public transit use among more marginalized groups is lower than would be expected, and thus where it might be fruitful to survey the population to ascertain the barriers to travel among these groups. To identify these areas, the residuals resulting from the regression equation discussed above were analyzed and mapped. Areas where these residuals were negative, suggesting that public transit use in these areas was even lower than would be predicted given the proximity to local and regional transit, the local social composition, and the prevailing travel patterns of different groups, were then identified.

Figure 3.3: Combined GO Train and Bus System Gravity Index



Source: created by the author from data supplied by Metrolinx and the University of Toronto Cities Centre

This analysis identified a number of key clusters of census tracts where public transit use was unpredictably low in relation to their social composition and levels of accessibility to transit. In consultation with Metrolinx, five of these clusters were then selected for further study that reflect differences in location, accessibility, modal mix, and social composition within the region (Table 3.1). The second stage of the analysis involved a survey of residents in these five study areas.

Stage 2: Analysis of the 2014 Survey

In order to understand the challenges to travel within the GTHBOA facing low income and marginalized groups, a survey was administered in the summer of 2014. This survey was confined to the five key study areas identified at the end of the first stage as revealing unpredictably lower public transit use. The survey asked a number of questions related to the challenges and barriers to travel in the region. This includes open-ended questions pertaining to what barriers the respondents face in getting around, how easy it is to get to work and other places using public transit and/or using a car, what needs to be fixed, changed or added to the

transportation system, and what public transit agencies specifically need to do help people use transit. These questions allowed survey respondents to answer at length about the issues they see as most important. As well, a number of likert-scale questions were asked in relation to specific issues related to public transit, driving and walking, which allow for comparison of the relative importance of each issue in relation to other issues. Finally, a number of questions regarding household structure and size, gender, age, income, immigration and migration status, access to transit and private vehicles and time spent commuting, among other things, were asked in the survey. A copy of the questionnaire can be found in Appendix D.

Table 3.1: Study Areas Selected for Survey Analysis

Study Areas	Neighbourhoods/ Definition
Hamilton Mountain Centre	Hamilton mountain area between W5th and Upper Ottawa St, north of Fennell Ave.
W Brampton/ Georgetown	Georgetown proper, and Brampton west of McLaughlin, and Brampton north of Sandlewood Parkway and west of Hurontario
SE Mississauga	Lakeview, Orchard Heights, and Applewood Neighbourhoods in Mississauga
E Woodbridge	From Islington Ave. to Weston Rd, Hwy 7 to Major MacKenzie Rd. in Vaughan
Agincourt	Agincourt Neighbourhood in Scarborough, Toronto

As the survey is intended to shed light on the challenges facing groups with more social needs, the sampling method was purposefully oriented to over-sampling lower-income respondents and to recruiting in areas where those with more social need might be found. A three-pronged strategy was developed for this purpose. First of all, surveys were administered in person at community centres, recreation centres, public libraries, and seniors centres in each of the study areas. These included Georgetown Gellert Community Centre, Cassie Campbell Recreation Centre, Carmen Corbassen centre, Al Palladini Community Centre, Century Gardens Community Centre, Huntington Park Recreation Centre, Sackville Hill Senior's Centre, Agincourt Recreation Centre, Sherwood Library, Concession Library, Vaughan Immigration Centre, and Vellore Village Community Centre. Secondly, an agreement was made with Tim Horton's Corporation to allow the research assistants administering the survey to recruit outside of Tim Horton's locations within each study area, with some respondents then completing the survey in person while others took the survey with them and returned it either directly to the researcher or via the post. Thirdly, purpose-built apartment buildings and town houses were randomly selected in each study area, including those containing social housing tenants, and a mail drop of the survey was conducted to every second mailbox in those buildings, with a stamped return-addressed envelope attached to the survey for easy return via the post. In all cases, respondents were given a smal honorarium for agreeing to take/answer a survey (even if they decided to withdraw or decline to answer any questions).

Of course, any survey such as this cannot help but also reach respondents that do not have low income, and it is important to include such respondents in order to ascertain in a statistically rigorous way what issues might be specific only to low-income people. The objective was therefore to obtain minimum of 50 completed surveys from low-income respondents in each study area, in order that quantitative analyses of the results attain statistical significance. Low

income in this case was defined as income below the contemporary LICO – low income cutoff – value for each family size, as determined by Statistics Canada (see Appendix B). In the end, approximately 28 percent of respondents in the survey are classified as low income, which is roughly ten percentage points higher than the proportion of the regional population classified as low income by the 2006 census, and roughly double the low-income measure (LIM) rate for all of Canada (13.8 percent) reported by Statistics Canada for 2012 (Statistics Canada 2012). Another 22 percent of survey respondents did not provide any income information (a number of these respondents will also have low income, but since they did not report income it is impossible to know how many), with the result that roughly half of the survey population reported not having low income. Overall, a total of 1,370 surveys were administered, including through the mail drops. In the end, 1,021 sufficiently completed and reliable surveys were returned from across all five study areas, for an effective response rate of 74.5 percent (not including those who were approached in person but who declined to take or answer a survey, the numbers of whom were not recorded).

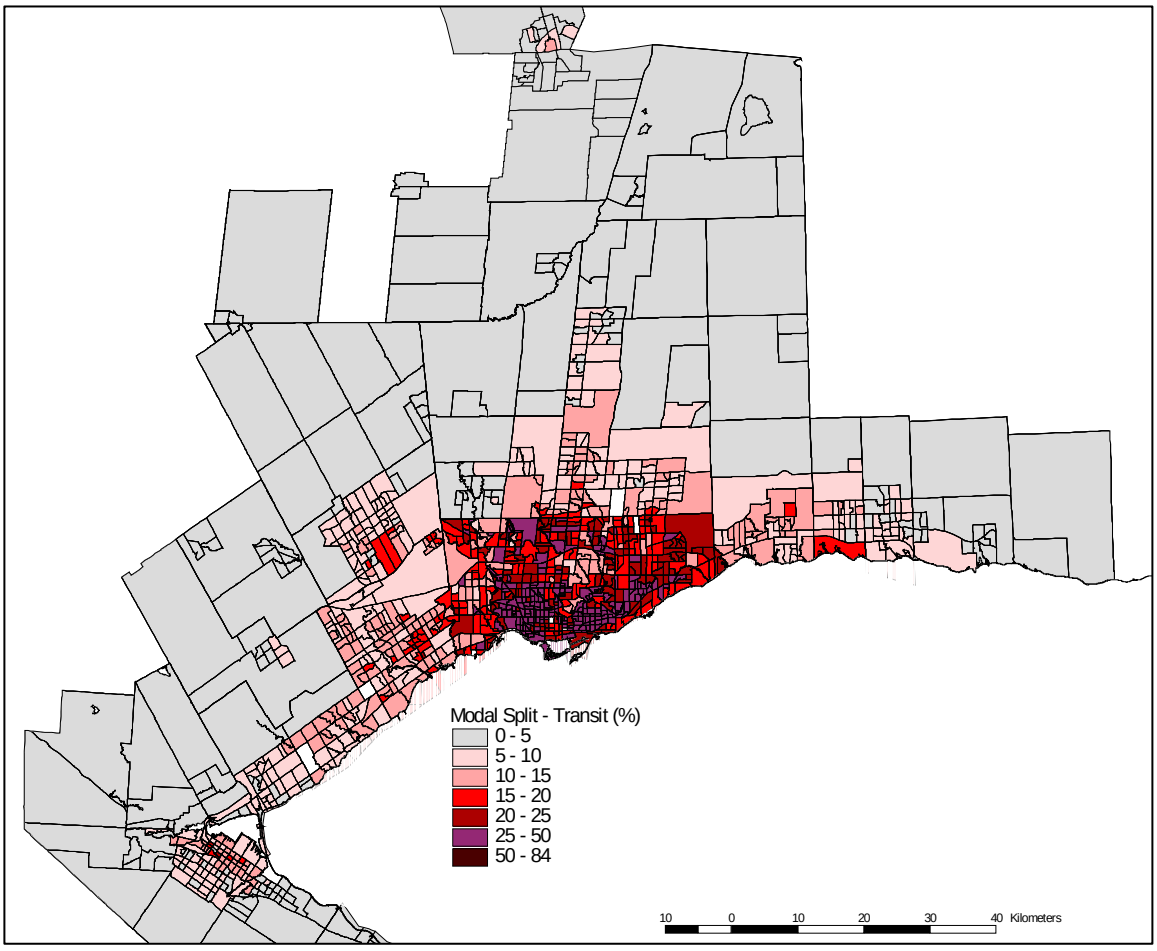
Data from this 2014 survey was analyzed both quantitatively and qualitatively. The issues, barriers and challenges raised by respondents in the open-ended questions were grouped according to theme, and further analyzed based on whether they were disproportionately raised by certain social groups, and how and whether they related to other issues raised by others in similar situations. Tests of statistical significance are applied to uncover which barriers and issues are disproportionately mentioned by either those with low income or public transit users, as well as by other specified vulnerable groups: women, families with children, single parents with children at home, seniors, and immigrants. From this data, a comprehensive set of factors affecting the ease of travel in the GTHBOA is established, and their relative levels of importance are compared. In addition to the surveys, one combined focus group was held in early September for respondents invited from the Georgetown/West Brampton, South East Mississauga, and East Woodbridge study areas. The additional information this provided adds depth to the survey data, with some of the stories told by those attending selectively quoted below in this report.

4. Findings I: Travel Patterns in the GTHBOA: Analysis of the 2006 Census

The first stage of this research project involved analysis of custom data from the 2006 census, in order to ascertain whether and how a) mobility and accessibility differ among groups of commuters in the Greater Toronto-Hamilton-Barrie-Oshawa Area (GTHBOA), b) low income and other indicators of social vulnerability relate to differences in mode share and accessibility at the neighbourhood level, and c) which areas (neighbourhoods) in the GTHBOA reveal lower transit use than might be expected given their levels of accessibility and social composition, and thus would be good places for further exploration of the barriers to mobility among marginalized groups. The results in this section are derived from analysis of data at the census tract level.

It is important to first understand the basic patterning of transit use in the GTHBOA. As expressed through modal split data, public transit ridership is largely centred on the City of Toronto, with particular strength in and around the old pre-war inner city areas (the old City of Toronto), areas covered by the City's subway system, and in poorer neighbourhoods, which are structured in a shape resembling 'U' starting at both ends of old inner city and branching north-east and north-west from there (Figure 4.1).

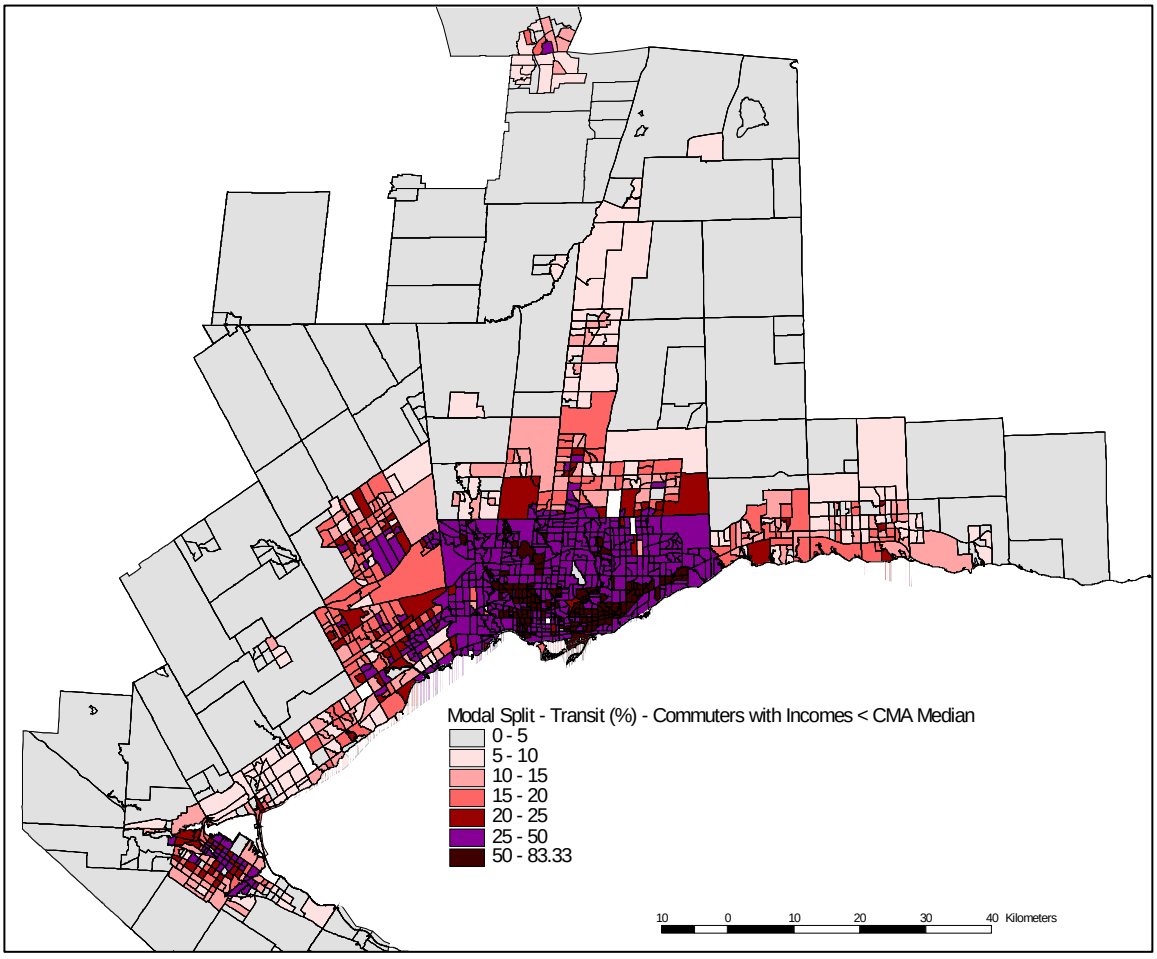
Figure 4.1: Proportion of Daily Commuters who use Transit (%) 2006



Source: created by the author, from custom data of the 2006 Census of Canada

When the analysis is restricted to only those who have incomes less than the CMA median, the pattern of modal split is even more centred on the City of Toronto, and not surprising a higher proportion of this group uses transit for commuting (Figure 4.2). In most of the City of Toronto, more than 25 percent of such commuters use transit, with many census tracts in the inner city and along certain portions of the subway routes (and even beyond them) reporting modal splits of more than 50 percent for transit. As well, older areas of Richmond Hill, Malton (north-east Mississauga), central Mississauga, parts of Brampton, and older Hamilton (below the Mountain), show modal splits above 25 percent. Meanwhile, in much of the outer and newer areas of the '905' suburbs, transit use among those with incomes less than the median is much lower, typically below 10 percent.

Figure 4.2: Proportion of Commuters with Incomes less than the Median using Transit (%) 2006



Source: created by the author, from custom data of the 2006 Census of Canada

A general trend is that as incomes increase, the modal share going to transit declines among commuters. Outer suburban areas are the first places to see a shift away from transit among those with higher incomes, followed by built-up municipalities of the 905 area with stronger transit systems and many immigrants and renters, such as Mississauga and Brampton, as well as Barrie and Oshawa. Meanwhile, the cores of the oldest Cities of Toronto and to a lesser extent

Hamilton are places where at least 30 percent of high-income commuters still use transit (see Figures C1 through C5 in Appendix C). The spatial patterning of transit modal shares among commuters who are immigrants, and single parents, meanwhile largely mirrors those for all commuters with a strong orientation toward higher transit use within the City of Toronto, albeit with some scattered pockets of higher suburban transit use (see Figures C6, C7 in Appendix C).

4.a Indicators: Accessibility to Work

As noted in section 2.a above, a common measure of accessibility involves analysis of the distance between place of residence and place of work, with longer distances indicating lower levels of accessibility. The 2006 census derived this distance, which is here cross-tabulated with selected transport mode and social variables. The results show clear differences in levels of distance-based accessibility to work across different modes, by household structure, and between low-income commuters and others. Table 4.1 shows the proportion of commuters in each of four mode-based categories (drivers, passengers, public transit users, and "others" which include those who walk and cycle to work), revealing some distinct patterns. First of all, as distance to work rises, the proportion of commuters who drive a vehicle to work with the GTHBOA increases, from a low of 50 percent (among all commuters) for the shortest commutes, to a high of 73 percent for the longest commutes (25km and over). The opposite pattern is present for those who commute as passengers in other cars and trucks, falling from 11.2 percent for the shortest trips (under 5 km) to only 5.9 percent for the longest trips (25 km and over). A strong effect of distance occurs among those using 'other' transport modes to get to work, with the drop-off occurring starkly at the 5 km point (falling from 19.1 percent, to between 0.9 and 3 percent for distances above 5km). In contrast to these patterns, public transit is disproportionately used to travel intermediate distances to work, particularly distances between 5 km and 15 km, although even in the case of the latter at no time is public transit used for the majority of commute trips.

In addition to these basic patterns, there are specific patterns associated with different household types, immigrants, and low-income commuters. Immigrants, while displaying similar overall patterns to non-immigrants, are nonetheless more likely to take public transit than the native-born, particularly for longer trips. At the same time, immigrants are slightly less likely to commute in cars or trucks, except for long trips (25 km or greater) in which they are more likely to commute as a passenger in someone's else's vehicle.

There are distinct patterns among different household types, which in the data reflect the commuting behaviour of heads of households. While the heads of all households are more likely to drive as distance increases, couple households with children under 18 years of age at home are disproportionately more likely to drive to work, by upwards of 20 percent in comparison with other households, and much less likely to use public transit or other modes. Households without children at home, meanwhile, display a much steeper increase in the tendency to drive with higher commute distance, coupled with opposing patterns for other modes, and the smallest proportions taking rides as passengers. Lone-parents, meanwhile, reveal a general tendency toward shorter trips, higher public transit use (except for the longest commutes), and lower likelihoods of driving commutes greater than 5 km, than other households. In interpreting these data, it might be remembered that many households, except for lone-parent households, contain more than one worker/commuter, and the head of the household often commutes longer distances than other members of the household.

Finally, there is a clear tendency for lower-income commuters (those with incomes below the LICO) to disproportionately favour modes other than driving for short commutes, and public transit for medium-distance trips (upwards of 40 percent for commutes between 5 and 15 km), although the majority of low-income commuters still drive for all trips greater than 15 km. Low-income commuters working more than 30 hours per week, meanwhile, are more likely to drive than those only working part time, and are about twice as likely to commute as passengers in other vehicles for longer commutes (10.2 percent) than commuters who do not have low income.

Table 4.1: Mode Share (%) by Distance Commuted, GTHBOA, for Selected Groups

Mode	Under 5km	5 km – 9.9 km	10 km – 14.9 km	15 km – 24.9 km	25 km and over	All Distances
Drive Car/Truck						
Total – All commuters	50.0	64.2	68.8	72.5	72.7	63.4
Those with Incomes < LICO	32.7	47.0	49.4	57.1	62.4	45.1
w/ Incomes < LICO & Empl. 30+ hrs/wk	38.4	53.4	54.9	62.1	70.5	50.8
Immigrants (Foreign Born)	49.0	61.8	64.2	65.8	69.1	60.9
Households w/ no Kids*	46.7	66.4	75.0	83.1	88.4	71.4
Couple Households w/ Kids at Home*	69.8	82.2	85.2	88.9	90.9	84.9
Lone-Parent Family Households*	49.6	62.6	66.0	73.3	79.0	63.9
Passenger in Car/Truck/ Taxi						
Total – All commuters	11.2	8.9	7.1	6.3	5.9	8.4
Those with Incomes < LICO	9.5	8.9	7.3	7.2	8.6	8.6
w/ Incomes < LICO & Empl. 30+ hrs/wk	9.0	8.9	8.2	8.4	10.2	8.9
Immigrants (Foreign Born)	7.6	7.7	7.7	6.9	8.7	7.7
Households w/ no Kids*	4.0	3.3	2.5	2.3	2.0	2.8
Couple Households w/ Kids at Home*	5.5	3.5	2.3	2.2	1.7	2.8
Lone-Parent Family Households*	5.7	3.9	4.0	4.2	3.7	4.4
Public Transit						
Total – All commuters	19.1	24.8	22.8	20.3	18.4	21.4
Those with Incomes < LICO	30.4	40.9	40.0	34.1	24.7	33.8
w/ Incomes < LICO & Empl. 30+ hrs/wk	27.3	36.6	35.9	29.5	18.2	30.3
Immigrants (Foreign Born)	23.4	27.7	27.5	26.6	22.2	25.6
Households w/ no Kids*	24.6	28.4	21.7	14.1	8.7	19.4
Couple Households w/ Kids at Home*	11.9	13.3	11.9	8.7	7.0	10.1
Lone-Parent Family Households*	26.6	31.7	28.7	21.7	15.6	25.6
Other (Bike, Walk, Boat, Plane, etc)						
Total – All commuters	19.7	2.1	1.3	0.9	3.0	7.1
Those with Incomes < LICO	27.4	3.2	3.3	1.6	4.3	12.5
w/ Incomes < LICO & Empl. 30+ hrs/wk	25.3	1.1	1.0	0	1.1	10.0
Immigrants (Foreign Born)	20.0	2.8	0.6	0.7	0	5.8
Households w/ no Kids*	24.7	1.9	0.8	0.5	0.9	6.4
Couple Households w/ Kids at Home*	12.8	1.0	0.6	0.2	0.4	2.2
Lone-Parent Family Households*	18.1	1.8	1.3	0.8	1.7	6.1

Source: Calculated by the author from custom data tables from the Census of Canada 2006
Notes: (*) Commute distance for household-based variables calculated using the commute of the household head

In general, short commutes are more predominant than long commutes (Table 4.2). Approximately 30 percent of commutes are less than 5 km in length, while only 16 percent are 25 km or longer. This is the basic pattern across social groups, and across modes, with the exception of heads of couple-family households who drive to work. The latter are more likely to commute longer distances, and the proportion of such commuters rises with distance. It is not surprising, then that the heads of couple-family households reveal the highest average commute distances, particularly couple-family households with children at home who drive (average of 17.1 km

commute, one way), but also heads of households without children at home (average of 16.2 km). Lone parents who take public transit are more likely to experience shorter commutes (under 10 km), while those who drive are more likely to have longer commutes (over 15 km). But among all modes, as well as among just drivers, the *average* distances for lone-parent commuters are virtually identical to those for all commuters. Among those who commute as passengers in other cars or trucks, the pattern is particularly oriented to short commutes, with over half of all commutes in the passenger mode, across social groups and household types, less than 10 km.

Table 4.2: Proportion of Commuters by Distance Travelled (%), and Average Distance Commuted (km), GTHBOA, for Selected Groups

Mode	Under 5km	5 km – 9.9 km	10 km – 14.9 km	15 km – 24.9 km	25 km and over	All Distances	Average Distance
All Modes							
Total – All commuters	29.6	22.9	14.9	16.4	16.1	100.0	12.2 km
Those with Incomes < LICO	39.9	24.3	14.1	12.5	9.2	100.0	9.7 km
w/ Incomes < LICO & Empl. 30+ hrs/wk	37.1	24.7	15.3	13.6	9.3	100.0	10.1 km
Immigrants (Foreign Born)	27.3	24.8	16.9	18.1	13.1	100.0	11.9 km
Households w/ no Kids*	22.3	20.7	15.7	19.6	21.8	100.0	14.2 km
Couple Households w/ Kids at Home*	13.8	18.9	16.5	22.8	28.1	100.0	16.5 km
Lone-Parent Family Households*	27.4	24.4	15.8	16.8	15.7	100.0	12.3 km
Drive Car/Truck							
Total – All commuters	23.4	23.2	16.2	18.8	18.4	100.0	13.4 km
Those with Incomes < LICO	29.6	25.9	15.8	15.9	12.8	100.0	11.4 km
w/ Incomes < LICO & Empl. 30+ hrs/wk	28.1	25.9	16.5	16.6	12.9	100.0	11.7 km
Immigrants (Foreign Born)	22.1	25.1	18.0	19.7	15.0	100.0	12.8 km
Households w/ no Kids*	14.6	19.2	16.5	22.8	26.9	100.0	16.2 km
Couple Households w/ Kids at Home*	11.3	18.3	16.6	23.8	30.0	100.0	17.1 km
Lone-Parent Family Households*	21.2	23.9	16.3	19.2	19.3	100.0	13.7 km
Passenger in Car/Truck/ Taxi							
Total – All commuters	39.6	24.3	12.6	12.2	11.3	100.0	10.1 km
Those with Incomes < LICO	40.3	24.4	12.9	11.8	10.6	100.0	9.9 km
w/ Incomes < LICO & Empl. 30+ hrs/wk	36.7	24.9	15.3	12.1	10.8	100.0	10.2 km
Immigrants (Foreign Born)	32.0	27.1	15.2	15.3	10.3	100.0	10.7 km
Households w/ no Kids*	31.3	23.9	13.8	15.7	15.3	100.0	11.2 km
Couple Households w/ Kids at Home*	27.4	23.6	14.0	18.1	17.0	100.0	12.7 km
Lone-Parent Family Households*	35.0	21.8	14.3	15.7	13.1	100.0	11.8 km
Public Transit							
Total – All commuters	26.9	27.0	16.2	15.8	14.0	100.0	11.9 km
Those with Incomes < LICO	35.8	29.4	16.7	12.2	5.9	100.0	9.2 km
w/ Incomes < LICO & Empl. 30+ hrs/wk	33.4	29.8	18.1	13.2	5.5	100.0	9.4 km
Immigrants (Foreign Born)	24.9	26.6	18.2	18.9	11.4	100.0	11.8 km
Households w/ no Kids*	28.2	30.2	17.6	14.3	9.7	100.0	10.7 km
Couple Households w/ Kids at Home*	16.4	25.1	19.4	19.5	19.6	100.0	14.2 km
Lone-Parent Family Households*	28.4	30.2	17.7	14.2	9.5	100.0	10.6 km

Source: Calculated by the author from custom data tables from the Census of Canada 2006

Notes: (*) Commute distance for household-based variables calculated using the commute of the household head. All Modes includes those not listed in the above Table, including walking, biking, boat, and other modes.

Among public transit users, the general trend is toward shorter commutes than taken by drivers (by 1.4 km on average, or about 11 percent shorter), and notably with greater proportions of commuters travelling between 5 km and 25 km than via other modes. Heads of households with no children at home, as well as lone parents, are even more likely than other public transit commuters to experience shorter commutes (roughly 10 percent shorter than for all commuters), while couple-family households with children once again reveal the longest commutes (but still shorter than if they were to drive to work). Immigrants reveal shorter commutes on average than

do those who were born in Canada, but the difference is small and immigrants are less likely to have commutes less than 5 km (and are more likely when commuting as a passenger in another car or truck to have longer commutes).

As might be expected, low-income commuters are much more likely than others to commute over short distances, and reveal the shortest average commutes among the categories in Table 4.2. Low-income commuters reveal the steepest decline in commute shares as one moves from short distances to long distances, and approximately two thirds of all low-income commuters who use public transit have commutes less than 10 km (compared to 54 percent among all commuters). Those who commute as a passenger in another vehicle are more likely to also have low income, and this is one reason why the levels of accessibility to work as represented by the commute distance profiles of low-income commuters mirror those for all passenger (carpool) commuters. However, this is not nearly as true for public transit users or drivers, among whom low income commuters are a minority. In terms of average distance, it is not clear that driving enhances overall accessibility for low-income commuters, nor even for all commuters, since the average distances among drivers are longer than for those using other modes. At the same time, it is also likely that many of the places of work to which many low-income commuters drive may not be easily accessible via public transit systems (in the sense that public transit may not actually go there, or go there during the times of day required), and so are compelled to drive.

In terms of income, within most of the household types and social categories, there is a general pattern whereby those with longer commutes have longer trip distances (Table 4.3). This finding adheres to the assumptions behind the classic trade-off models of accessibility to employment, whereby those with more income can afford larger and more peaceful places of residence that are typically located further away from concentrations of employment. However, while this classic trade-off model often calls up the image of the car driver commuting from a distant low-density suburb, in fact the steepness of the income gradient across distance categories, and thus the positive relationship between distance commuted and income, is strongest here among public transit users. Among those who commute via public transit, the average income of those commuting 25 km and longer is virtually twice that for those commuting less than 5 km, while among drivers the difference is only 30 percent. Passengers in other vehicles have income-distance gradients more like, but steeper than, drivers (with those commuting longer earning roughly 50 percent more). The relationship between income and distance commuted is strongest for lone parents, suggesting that for this group, income constitutes an important facilitator (and low income a significant barrier) to accessing employment opportunities that are far afield. Meanwhile, other than the lower average incomes experienced by immigrants (roughly 9 percent below that for all commuters), the relationship between income and distance travelled to work among immigrants is very similar to that for non-immigrants, suggesting that the classic trade-off model applies just as much to immigrants as a whole, as to others.

However, the pattern is different among those whose incomes are below the LICO, and particularly among those with incomes below the LICO who work at least 30 hours per week, suggesting a breakdown of the classic accessibility trade-off model for the working poor. Among this group, there is much less difference in average incomes across the distance categories. Regardless of mode, those with the highest average incomes commute middling distances, and except for drivers it is actually those who commute the longest distances (25 km or longer) that reveal the lowest average incomes (and even among drivers, income drops off at long distances).

This suggests that the interaction between housing and job markets in the GTHBOA is not allowing some of those with low incomes to live sufficiently close to work, even though it would make most economic and social sense for them to do so, and even though for the most part the transit system spatially maps well to the location of low-income neighbourhoods (Foth, Manaugh, and El-Geneidy 2013). This is a problem partly caused by the gentrification of neighbourhoods within Toronto's inner city where low-income rental housing used to be located, and the displacement of affordable rental units to more distant suburbs further away from places of work, as well as the decline of traditional blue-collar work in the old core of Hamilton, forcing low-income workers in such places to commute further to find work.

Table 4.3: Average Income ($) by Distance Travelled, GTHBOA, for Selected Groups

Mode	Under 5km	5 km – 9.9 km	10 km – 14.9 km	15 km – 24.9 km	25 km and over	All Distances
All Modes						
Total – All Commuters	39,472	48,800	49,292	52,458	60,294	48,596
Those with Incomes < LICO	10,373	11,668	11,981	11,530	10,647	11,230
w/ Incomes < LICO & Empl. 30+ hrs/wk	11,582	12,452	12,809	11,921	11,142	11,988
Immigrants (Foreign Born)	36,229	41,220	44,347	46,924	55,500	43,316
Households w/ no Kids*	73,754	84,709	91,177	100,026	114,923	84,183
Couple Households w/ Kids at Home*	100,122	119,633	109,144	113,053	125,603	110,723
Lone-Parent Family Households*	43,877	55,010	54,828	60,828	72,667	49,343
Drive Car/Truck						
Total – All Commuters	49,166	56,832	55,909	57,680	63,921	56,364
Those with Incomes < LICO	10,989	12,400	12,552	11,690	11,266	11,747
w/ Incomes < LICO & Empl. 30+ hrs/wk	10,905	12,717	12,987	11,638	11,242	11,881
Immigrants (Foreign Born)	44,728	48,403	51,168	51,930	59,192	50,408
Households w/ no Kids*	90,242	97,513	101,742	106,999	118,511	104,969
Couple Households w/ Kids at Home*	108,601	125,700	113,581	116,149	125,096	119,298
Lone-Parent Family Households*	52,230	64,686	61,481	66,608	75,496	63,977
Passenger in Car/Truck/ Taxi						
Total – All Commuters	22,130	27,708	28,794	30,309	34,160	26,730
Those with Incomes < LICO	9,677	9,685	11,303	10,110	9,808	9,953
w/ Incomes < LICO & Empl. 30+ hrs/wk	11,788	10,568	12,143	11,534	10,302	11,342
Immigrants (Foreign Born)	25,829	28,639	29,747	32,331	36,475	29,300
Households w/ no Kids*	64,520	65,282	65,020	71,945	86,644	69,348
Couple Households w/ Kids at Home*	90,074	81,321	79,463	79,182	99,418	86,159
Lone-Parent Family Households*	36,514	44,160	44,054	47,040	51,038	42,826
Public Transit						
Total – All Commuters	30,358	36,166	36,471	41,111	60,352	38,880
Those with Incomes < LICO	10,893	11,324	11,510	11,779	10,153	11,188
w/ Incomes < LICO & Empl. 30+ hrs/wk	12,165	12,543	12,703	12,712	11,726	12,427
Immigrants (Foreign Born)	26,339	29,351	32,749	38,677	52,050	33,617
Households w/ no Kids*	57,978	58,955	59,299	64,859	90,039	62,604
Couple Households w/ Kids at Home*	80,696	92,656	83,119	88,316	139,565	97,188
Lone-Parent Family Households*	35,317	38,208	41,974	45,311	61,570	41,308

Source: Calculated by the author from custom data tables from the Census of Canada 2006

Notes: All income values represent average per-capita incomes, except for (*) which represent average household incomes.

4.b The Predictors of Transit Use At the Neighbourhood Level

OLS forward regression modeling procedures were employed to predict transit use (percent mode share) at the neighbourhood (census tract) level in the GTHBOA (Table 4.4). The dependent variable is the proportion of commuters in each census tract that commutes via public transit. Two blocks of independent variables were entered in the models, estimated separately at first,

and then together in combination. First, a block of variables related specifically to physical accessibility *to transit* was entered. This includes a measure of cumulative opportunity - local transit stop density (in stops per square km, for all municipalities in the GTHBOA), population density (persons per square hectare), and separate gravity indices for distance to each of the main transit service lines – GO train and bus, York region BRT (bus rapid transit) and the Toronto subway system. A second block of variables was separately entered related to the social composition of the population within census tracts, calculated from the 2006 census of Canada (with those variables that contribute to the model fit included by the model in forward sequence, until the model fit, as represented by the r square, is maximized). While a large number of social variables were entered (all as continuous variables), only those that were selected for inclusion in one of the models by the forward method are reported in Table 4.4. Population density is included in the first block here, as it represents both a measure of transit demand, and a proxy for transit-amenable and walkable urban form, since density is strongly associated with transit use across national and urban contexts (Newman and Kenworthy 1999). Also, population density correlates highly with a number of social variables (low income, immigrant status, etc), and including it in the second block would mean it taking precedence over a number of these social variables in the second models. Finally, both blocks were entered simultaneously in a third model. This overall method was performed twice: first for the dateset containing all commuters, and then again for the custom dataset containing the mode share for those with incomes less than the CMA median income. This produced a total of six separate OLS models (Table 4.4).

It is notable that all of the independent variables entered in the first block – those pertaining to physical accessibility to transit – remained as factors predicting transit use in the models. Indeed, physical accessibility to transit was found to better predict transit mode than was social composition. Block A variables on their own explained 76.6 percent of the variation in transit mode for all commuters and 70.4 percent of the variation in transit mode for commuters with incomes less than the GHTBOA median, whereas block B variables on their own explained 68.4 percent of the variation in transit mode for all commuters, and 66.1 percent of the variation in transit mode for lower-income commuters. Of the variables indicating physical accessibility, the two with the strongest effects are proximity to the Toronto subway system, and population density. Proximity to the GO train, the York BRT, and to local transit stops, each exerted a more moderate effect on transit mode share, while proximity to a GO bus stop exerted a moderate negative effect, meaning that the closer a census tract is to a GO bus stop the *lower* the resulting transit use, once other factors are controlled for. This reflects the fact that GO bus stops tend to be located where other services (which are already shown to exert moderate to strong effects) are more lacking, and so are more likely to be found in lower-density and automobile-dependent places (sometimes lonely parking lots) where they likely draw from a much larger catchment.

Among the independent variables entered in the second block of variables, upwards of 12 were selected by the forward regression method for inclusion in the models based on statistically-significant effects. Of these, the strongest results involved the positive effects of rental tenure, single-parent families, and immigrants (census tracts with more of each of these groups reveal higher public transit use than other tracts). There are also positive effects of higher proportions of seniors (aged 65+), those with low levels of education (less than grade 9), visible minorities, the presence of children at home (new families are more likely to be living in newer housing), and among all commuters, the rate of low income. While the strength of many of these social variables declines when both blocks of variables are entered, it is notable that the coefficients for

the proportion single-parent families increases. This is an indication that neighbourhoods housing this latter group reveal disproportionate demand for public transit service (Table 4.4).

Table 4.4: OLS Regressions Models – Predicting Transit Mode Share (%) in the GTHBOA

	All Commuters			With Incomes < Median $		
Variable	Block A	Block B	Both A+B	Block A	Block B	Both A+B
Block A: Transit Accessibility Measures						
Toronto Subway – Gravity Index[1]	2.067***		1.855***	2.552***		2.329***
York Region BRT – Gravity Index[1]	0.770***		0.470***	0.969***		0.641***
GO Train – Gravity Index[1]	1.147***		0.695***	1.333***		0.831***
GO Bus – Gravity Index[1]	-0.634***		-0.596***	-0.665***		-0.659***
Transit Stop Density Index (stops per sq. km)	0.033**		0.015***	0.045***		0.021***
Population Density per square hectare	0.086***		0.040***	0.082***		0.019***
Block B: Socio-Demographic/ Housing (%)						
Housing Tenure - Rented		0.270***	0.132***		0.340***	0.170***
Housing - Single-Detached Housing		-0.128***	-0.029***		-0.180***	-0.062***
Housing - Apartments greater than 5 stories		-0.113***	-0.050**		-0.145***	-0.065***
Education – Less than Grade 9		0.214***	-		-	-
Education – High School Diploma		-0.507***	-0.116***		-0.657***	-0.127*
Family Status – All w/ Kids at Home		0.302*	-		-	-
Family Status – Lone-Parent Families		0.317**	0.436***		0.443	0.476***
Age – Seniors (Age 65+)		0.184**	-		0.276***	-
Occupation – Employed in Manufacturing		-0.752***	-		-0.708***	0.226**
Immigration Status – Foreign Born		0.197***	0.170***		0.220***	0.190***
Minority Status – Visible Minority		0.101***	-		0.134***	-
Income – Average Household Income (by $10k)		-	-0.183***		-	-0.184**
Income - % Low Income (< LICO)[2]		0.104*	0.018		[2]	[2]
Constant	5.797***	18.223***	5.690***	7.186***	25.066***	7.474***
R Square	0.766	0.684	0.861	0.704	0.661	0.823

Source: Calculated by the author from custom data ordered from the 2006 census of Canada.
Notes: Units of analysis are census tracts. Coefficients are the result of OLS forward regression (only those variables with statistically-significant effects are selected for inclusion in the model, in a one-by-one forward-step progression until the addition of no more variables improves the model fit). Variables that do not get added to the model due to this forward method are indicated by "-". Those variables that the researcher left out of the method in any given model are left blank. Census tracts are the units of analysis. Coefficients represent the percent change in each variable associated with a one percent increase in transit mode. ([1]) The gravity indices used in these models assumes no "pull" effects beyond 10 km, but reducing to zero the gravity indices for census tracts more than 10km away from public transit access nodes. This assumption is necessary for dealing with the fact some services (BRT, TTC Subway) end at the borders of particular municipalities, and so should not have effects beyond those borders. ([2]) The variable for low income was only included in the models predicting transit use among all commuters, and was left out of the models predicting transit use among those with incomes less than the median income. Significance *p<0.05 **p<0.01 ***p<0.001

Meanwhile, there are a few negative relationships, including those for basic levels of education (those with a high school diploma but not higher), and neighbourhood proportions of single-family detached housing, where private vehicle use predominates. One interesting finding is that when entered separately, the independent variable for the proportion working in manufacturing occupations reveals a strong negative effect, but when all blocks of variables are entered together, the sign for this variable changes to positive in the model for lower-income commuters. The negative sign in the block B model reflects the fact that many manufacturing workers live near the edges of the city in automobile-dependent and lower-density neighbourhoods. The change of sign in the combined models, meanwhile, show that once the social and physical characteristics

of these neighbourhoods are controlled for, there is more demand for transit among communities housing lower-income manufacturing workers. This suggests that there might be latent demand that could be met by expansion of public transit services in such communities. Another interesting finding is that census tracts with higher proportions of housing in apartments greater than five stories reveal a lower transit mode share than other housing types, both before and after controlling for population density and physical accessibility variables. This is a reflection of the fact that a number of very high-density rental-apartment communities have been built on the fringes of the Toronto region in less accessible and automobile-dependent locations. These are areas that would theoretically be best served by public transit, and the negative sign reflects a failure of public policy to adequately coordinate land-use planning for higher-density rental districts with accessibility to the public transit network. This finding suggests that areas with a mix of tenures and apartment forms, mainly found within the inner city, have the highest transit use.

Overall, the combined models (in which all the variables in block A and block B were included) explained 86.1 percent of the variation in transit use among census tracts when all commuters are examined, and 82.3 percent of the variation in transit use for lower-income commuters. This is a very high level of explanatory power, and suggests that the models have captured the vast majority of factors relating to mode share. It is interesting that while the strength of many of the independent social variables increases when it is lower-income commuters that are being examined (although without the variable for low income rate, the overall r square is lower), the strength of the variables for physical accessibility become weaker for predicting transit use among lower-income commuters. This demonstrates that the physical characteristics of neighbourhoods, including transit stop density and the distance to the nearest transit stop, matter less for low-income households than for households that do not have low income.

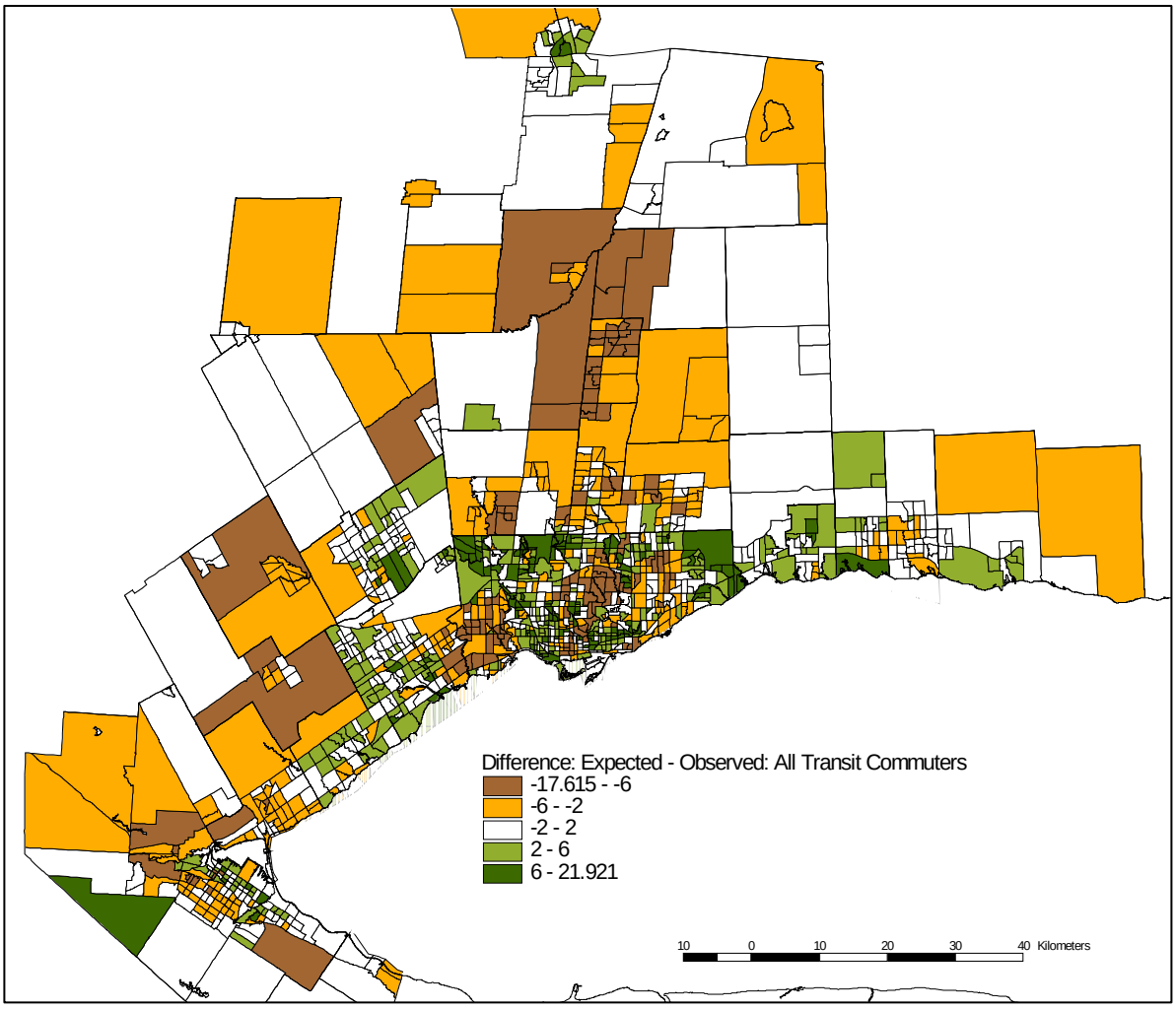
Nonetheless, the fact that the inclusion of the social composition variables in block B raised the amount of variation in transit use that could be explained by only between 11.1 percent (for all commuters) and 14.4 percent (for lower-income commuters) shows that much of the variation in transit use is due to physical accessibility to transit. The remaining 14 to 18 percent of the variation in transit use that could not be explained by any of the models, meanwhile, is due to as-yet unmeasured effects and/or variables that could not be included in the models estimated herein. Such effects could include place-based problems related to specific transit systems, including lack of frequency, lack of access points, lack of connectivity, scheduling issues, and problems transferring between transit systems, as well as lack of coordination of transit networks with places of employment, problems related to specific transit systems (including costs, customer service issues), as well as self-selection of those with preferences for particular modes (say, car drivers) into particular locales.

4.c. Descriptive Indicators for the Five Study Areas

The OLS regression models presented in Table 4.4 were used to select study areas for subsequent further analysis. The residuals of the combined models predicting transit mode share show whether actual transit use is higher or lower than is expected by the models within census tracts. The residuals for each model were then mapped, in order to locate census tracts where transit use was even lower than predicted by these models. Figure 4.3 maps the residuals from the OLS model for all commuters within census tracts in the GTHBOA. Negative residuals (in yellow and

brown shades) indicate that actual transit use is even lower than that predicted by the variables included in the combined model in Table 4.4. Areas that reveal transit mode shares below what is predicted by the model include Georgetown and west Brampton, much of Milton, Dundas, much of the Hamilton Mountain area in Hamilton, south-east Mississauga and south-west Etobicoke, east Woodbridge in Vaughan, much of Bradford, Aurora and Newmarket, parts of Markham, Agincourt in north Scarborough, parts of south-west Scarborough, parts of Oshawa, and many of the wealthy areas in the centre of the city, including Forrest Hills, Leaside, the Bridle Path and York Mills areas. (For an alternative perspective, Figure C8 in Appendix C shows the average residual across all the OLS models).

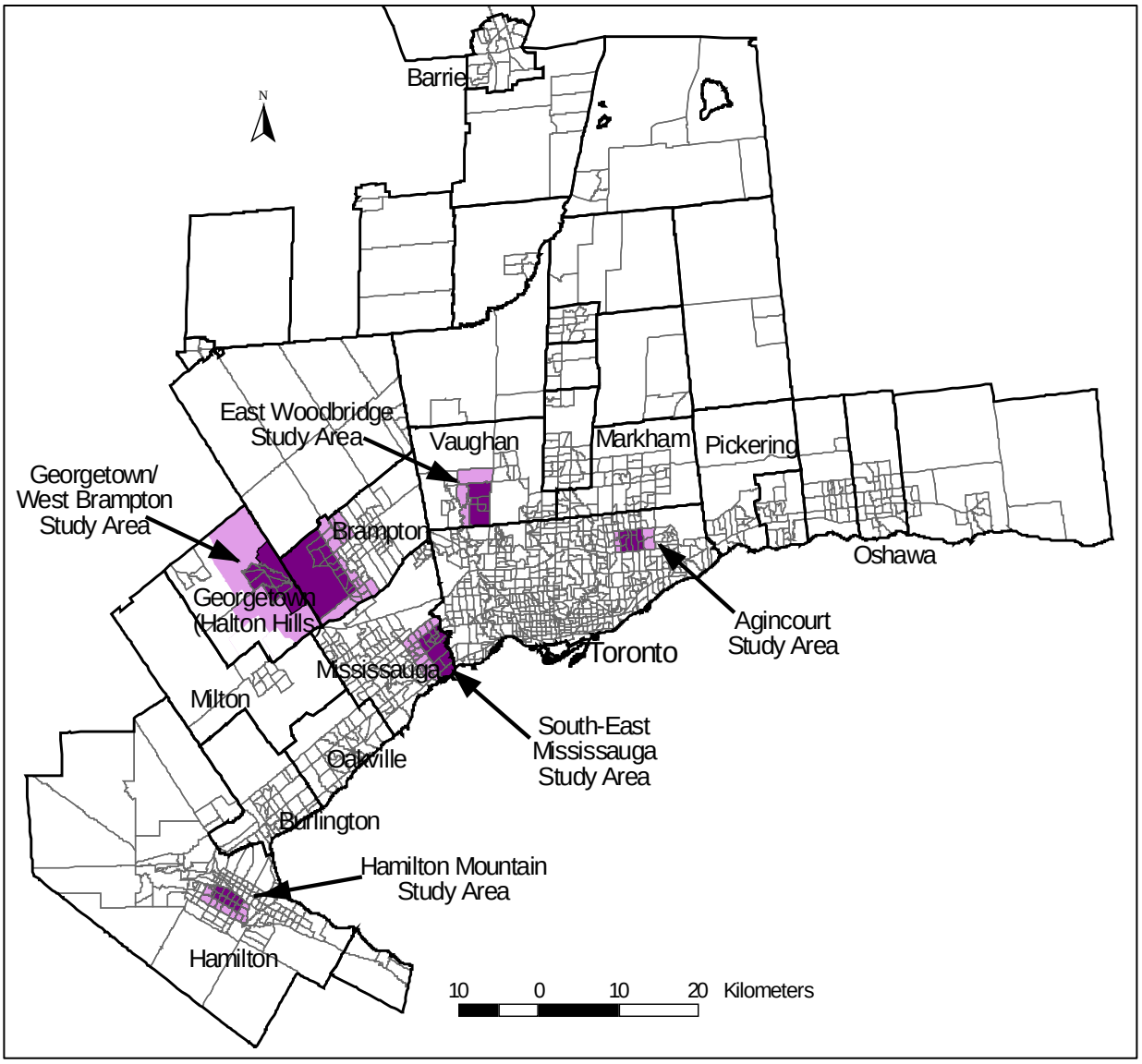
Figure 4.3: Difference between Expected (Predicted) and Actual (Observed) Transit Use



Source: Created by the author. Notes: Values are the residuals resulting from the combined model in Table 4.4

In consultation with members of Metrolinx, five of the areas experiencing disproportionately lower transit use than expected were identified, and singled out for further analysis (Figure 4.4). These five areas reflect much of the diversity of social and physical landscapes in the GTHBOA, including those within the Cities of Toronto and Hamilton, and those in suburban areas where automobile use is more common.

Figure 4.4: Map of the Five Study Areas



Basic descriptive indicators show how these five study areas compare with other areas in the GTHBOA (Table 4.5). The Hamilton Mountain study area is relatively similar to overall trends in the larger City of Hamilton (with similar proportions of foreign born, visible minorities, families with children, rates of unemployment, and low income), but has more seniors, single-parent family households, slightly more rental housing, and lower average incomes. Georgetown/ west Brampton, meanwhile combines two fairly different areas (Georgetown, a relatively self-contained area, and west Brampton, a newer part of the larger City of Brampton). While having a similar housing stock to the whole 905 suburbs, this study area is younger, with more families and fewer seniors, more single parents and multi-family households, higher education levels but lower incomes (and slightly higher rates of unemployment and low income), and higher proportions of immigrants and of visible minorities (particularly South Asians, and to a lesser extent, Blacks). East Woodbridge is of similar vintage, but much wealthier, with an older

population, very little rental housing, virtually no apartment buildings over five stories, fewer single parents, and high proportions of immigrants but disproportionately lower concentrations of visible minorities (a greater proportion of the immigrants in this study area are of Italian or other European descent). South-east Mississauga, which includes the Lakeview, Orchard Heights, and Applewood neighbourhoods, has a slightly older population than in the rest of the 905 suburbs, below-average incomes (and higher rates of low income) coupled with a mixed ethnic background but a high proportion of immigrants (almost half the population). South-east Mississauga is notable for having a significant proportion (one-third) of its housing stock in rental tenure, and in apartments greater than five stories. Finally, Agincourt of the five areas has the largest proportion of visible minorities – almost 80 percent, well above the City of Toronto average of 44 percent – as well as immigrants (58 percent). Close to half (46 percent) of the population are of Chinese descent. Incomes are lower than the City average, while unemployment and low-income rates are high (the low-income rate of 28 percent is particularly high). More than a quarter of the housing stock is in rental tenure, as well as in apartments greater than five stories, but family structures are very similar to the City of Toronto averages (Table 4.5).

Table 4.5: Basic Socio-Demographic Data, GTHBOA and Study Areas

Variables, 2006 Census	GTHBOA	416	905*	Hamilton CMA	Hamilton Mountain	WBram/ Georgetwn	SE Mississ.	East Woodbridge	Agincourt
Family Status									
Families w/kids Home	5.3	5.4	5.4	5.1	4.7	6.3	5.0	3.8	5.0
Lone-Parent Families	6.5	6.7	6.3	6.4	6.9	7.1	6.2	3.2	6.6
Multi-Family HH	3.8	3.7	4.4	1.9	1.3	7.8	4.0	7.1	8.4
Married	51.1	47.1	55.4	50.0	49.6	56.1	53.2	60.5	56.0
Seniors	12.5	13.5	10.7	14.8	19.8	8.6	14.0	12.7	15.4
Minority Status									
Foreign Born	38.9	48.2	34.6	24.6	24.7	40.0	49.7	45.1	57.8
Visible Minority	32.8	44.0	28.6	11.9	12.6	41.8	31.7	14.9	78.6
Chinese	7.3	10.8	5.5	1.7	1.6	1.4	4.7	1.4	45.9
South Asian	9.4	10.9	10.1	2.6	1.4	24.0	10.6	5.7	15.9
Black	5.8	8.1	4.5	2.5	2.5	9.0	4.2	1.0	5.4
Education									
Education < Grade9	12.4	12.8	11.4	14.7	15.3	14.3	13.0	17.8	14.7
Education < High Sch.	23.7	21.3	25.3	26.3	29.6	28.5	24.7	23.6	25.1
Housing Stock									
Housing Rented	29.8	42.4	18.2	27.2	31.0	18.7	32.8	5.0	27.2
Apartments > 5 Stories	20.2	32.2	10.6	13.7	15.8	8.5	33.0	0.9	26.2
Income/ Unemployment									
Average HH Income $	88,459	86,064	95,198	74,898	61,449	89,848	76,170	110,709	64,928
Low Income (<LICO)	17.6	23.5	11.9	17.1	17.6	12.1	17.5	8.4	27.9
Unemployed	6.7	7.6	5.9	6.4	6.4	6.1	6.8	4.6	9.5

Source: Calculated from the 2006 Census of Canada
Notes: (*) 905 area includes Barrie and Oshawa CMAs, in addition to the rest of the Toronto CMA outside of the City of Toronto (416).

Each of the five study areas reveals a distinct transport mode profile (in 2006) (Table 4.6). The Hamilton Mountain is somewhat unique in revealing a population that is both (slightly) less likely to drive their own private vehicles (compared to the entire Hamilton CMA) but also less likely to use public transit (while other modes are more represented). Also, while lower-income commuters - with incomes less than the median, as well as those with incomes below the LICO who are working more than 30 hours per week - in this study area have higher public transit use than in the CMA at large, those with above-median incomes in the study area have lower

propensities to use transit. Commuters travelling shorter distances (under 10 km), and lower-income commuters in general, are more likely to use public transit than their counterparts elsewhere in the Hamilton CMA. Meanwhile, commuters in Georgetown/west Brampton, and in east Woodbridge, are more likely to drive, and less likely to use public transit (in comparison with the rest of the 905 suburbs), except for low-income commuters travelling less than 10km in Brampton, who have similar profiles. Commuters in south-east Mississauga, on the other hand, reveal greater public transit use than commuters elsewhere in the 905 suburbs, with mode shares roughly half way between those for the 905 and those for the 416 (City of Toronto) – in fact not dissimilar to the averages across the GTHBOA. Finally, Agincourt reveals generally lower transit use than other areas within the City of Toronto, although it has the highest transit mode share of the five areas in this study (the exception is higher-income commuters travelling more than 10 km, who in Agincourt are more likely to use transit than their counterparts elsewhere in the City of Toronto).

Table 4.6: Commute Mode Share by Income Status and Commute Distance, GTHBOA and Study Areas

Variable (%)	GTHBOA	416	905*	Hamilton CMA	Hamilton Mountain	WBram/ Georgetwn	SE Mississ.	East Woodbridge	Agincourt
Transportation Mode									
Drive to Work	63.4	50.1	76.1	76.1	74.8	78.0	70.5	84.0	58.1
Public Transit to Work	21.4	36.3	11.7	8.7	7.3	9.5	18.1	6.2	29.7
Other Mode to Work	15.2	13.6	12.2	15.1	17.9	12.5	11.4	9.8	12.2
Transit Mode Share by Income Level									
< 50% median income	30.7	46.4	17.7	19.0	21.9	17.9	24.2	8.9	37.3
50% to median income	28.3	42.0	15.2	17.8	18.5	14.3	22.3	9.1	30.7
median to 2x median	19.8	35.4	11.0	9.7	9.6	8.0	17.3	5.4	26.9
>twice median income	15.0	25.1	9.3	4.2	2.7	5.7	14.9	2.9	21.8
Transit Share by LICO & Employment Status									
<LICO & working 30+hrs /week	27.6	37.7	16.4	21.6	24.1	12.0	22.7	8.5	30.7
Transit Share by Commute Distance and Income Level:									
All Incomes:									
Commute < 10km	19.4	35.1	7.9	10.4	14.1	7.3	15.2	3.4	23.7
Commute > 10km	22.2	34.6	14.9	9.4	7.2	11.0	23.6	9.8	37.2
Below Median Income:									
Commute < 10km	25.0	42.5	12.1	15.0	21.2	12.9	21.2	6.2	31.1
Commute > 10km	27.2	44.9	16.3	10.3	11.9	13.3	25.6	11.6	38.7

Source: Calculated by the author from custom tables ordered from the 2006 Census of Canada
Notes: (*) 905 area includes Barrie and Oshawa CMAs, in addition to the rest of the Toronto CMA outside of the City of Toronto (416). Only those with a fixed commute distance are included in these calculations – those who have no fixed place of work, who work from home, or who work outside of Canada, are not included.

These five study areas provide a basis from which to inquire into the barriers that limit or shape transit use in the GTHBOA among different social groups. It is in these five study areas that the subsequent survey was conducted, as described in the next section.

5. Findings II: 2014 Survey of Residents in Five Study Areas

A survey of residents living in each of the five study areas identified for further analysis in the previous section was conducted in the summer of 2014 (May through August). The survey included both open-ended questions that allowed respondents to articulate their concerns free of any prompts, as well as standardized questions that asked respondents to identify or rank specific issues related to their experience with the transportation system.

5.a The Demographics of the 2014 Survey

As noted above in the data and methods section, the survey methodology deliberately involved the over-sampling of lower-income respondents in each study area, so that the needs and experiences of low-income people would be sufficiently represented and the numbers of lower-income respondents would be sufficient to produce statistically-significant results. A total of 1,021 reliable surveys were collected through this process, with 283 of the respondents (27.7 percent) meeting the definition of low income as discussed in the data and method section (Table 5.1). An additional 220 respondents (21.5 percent) did not report income and income status could not be determined (because the respondent refused to answer the question or did not know, and the respondent did not live in social housing). The proportion of respondents who did not report their income is normal for surveys of this kind. A number of these respondents will also have low income, and non-reporting of income is more common among those with low income, however because income is not reported it is not possible to tell exactly who among the respondents who did not report income might meet the criteria for low income. Non-reporting of income was higher in east Woodbridge, which had both the highest average incomes as well as the greatest share of survey respondents reporting low income (the latter is the result of an especially active attempt to locate low-income respondents in the area in the face of a relatively smaller low-income share of the population). In Agincourt, a larger proportion of survey respondents live in social housing, and a number of these respondents also did not report their income, but the methodology used to classify income status assumes that those living in social housing will be low income, and so they were classified as having low income.

Table 5.1: Income Status

Study Area		Low Income	Not Low Income	Income Not Reported	TOTAL
Hamilton Mountain	#	59	131	62	252
	%	23.4	52.0	24.6	100.0
W Brampton/ Georgetown	#	51	112	43	206
	%	24.8	54.4	20.9	100.0
SE Mississauga	#	50	122	37	209
	%	23.9	58.4	17.7	100.0
E Woodbridge	#	66	66	63	195
	%	33.8	33.8	32.3	100.0
Agincourt	#	57	87	15	159
	%	35.8	54.7	9.4	100.0
TOTAL All 5 Study Areas	#	283	518	220	1,021
	%	27.7	50.7	21.5	100.0

Notes: Low income status was determined by comparing respondents' reported income to Statistics Canada's low-income cutoffs for 2006. Income not reported includes cases in which respondents did not know or refused to divulge their income. All those living in social housing who did not report income in the survey are assumed to be low income for the purposes of this research, and so are classified here as low income.

Survey respondents are disproportionately likely to use public transit (Table 5.2) as their most common mode of transportation (whether for work or school, or for those who do not work or attend school, for other trips), in comparison with the modal split for all commuters as documented in the 2006 census (Table 5.2). Overall, just under 50 percent of respondents in the survey reported that their most common mode was to drive, whereas across the GTHBOA just under two thirds reported in the 2006 census that they drove to work. Roughly one third of survey respondents said their most common mode was to use public transit, compared with about 22 percent who said they used public transit to commute to work in the 2006 census. These differences in transport mode share are mostly due to the over-sampling of lower-income residents in the survey, as low income people are more likely to use public transit and less likely to drive than higher income residents. Some of the difference is also due to the different questions asked in the census in comparison with the survey. The census only asks about mode of commuting, and thus leaves out those who are unemployed, those attending school, and seniors who are retired. The method used in the survey includes these latter groups, and each of these groups is more likely to use public transit.

In addition to driving and using public transit, 9.4 percent of survey respondents said they used other modes (walking, bicycling, boat, or taking a ride as a passenger in someone else's car or a taxi), slightly less than the 13.6 percent reported for commuting in the 2006 census. In addition, approximately 8.3 percent did not report any mode (either refused to answer or did not know). As might be expected, a higher proportion (44.7 percent) of survey respondents in Agincourt, which is located within the City of Toronto and serviced by the Toronto Transit Corporation (TTC), reported that public transit is their most common mode, while respondents in the West Brampton/ Georgetown cluster were least likely to report that public transit was their most common mode. Refusal rates were highest in south-east Mississauga and east Woodbridge.

Table 5.2: Most Common Transport Mode

Study Area		Public Transit	Drive Car/Truck	Other Mode	Refused/ DK/NA	ALL MODES
Hamilton Mountain	#	69	137	29	17	252
	%	27.4	54.4	11.5	6.7	100.0
W Brampton/ Georgetown	#	52	121	19	14	206
	%	25.2	58.7	9.2	6.8	100.0
SE Mississauga	#	69	93	21	26	209
	%	33.0	44.5	10.0	12.4	100.0
E Woodbridge	#	75	85	14	21	195
	%	38.5	43.6	7.2	10.8	100.0
Agincourt	#	71	66	15	7	159
	%	44.7	41.5	9.4	4.4	100.0
TOTAL All 5 Study Areas	#	336	502	98	85	1,021
	%	32.9	49.2	9.6	8.3	100.0

Notes: Most common transport mode was determined by asking which mode each respondent uses to get to work or school, and for those who were not working or in school, then by asking them the mode they use most often to get around.

The flipside of the fact that those with low income are disproportionately likely to use public transit and non-driving modes to get around, is that a greater proportion of those who use public transit and other modes as their most common modes have low income. Across the five study areas, 43.5 percent of those who report public transit as their most common mode report having

low income, compared with 18.7 percent of those who drive, and 29.6 percent who use other modes (Table 5.3). The survey provides a robust over-sampling of low-income residents in each study area who have experience with the public transit system.

Table 5.3: Low-Income Respondents, by Most Common Transport Mode

Study Area		Public Transit	Drive Car	Other Mode	Refused/ DK/NA	ALL MODES
Hamilton Mountain	#	29	19	10	1	59
	%	42.0	13.9	34.5	5.9	23.4
W Brampton/ Georgetown	#	20	27	2	2	51
	%	38.5	22.3	10.5	14.3	24.8
SE Mississauga	#	26	13	4	7	50
	%	37.7	14.0	19.0	26.9	23.9
E Woodbridge	#	38	18	9	1	66
	%	50.7	21.2	64.3	4.8	33.8
Agincourt	#	33	17	4	3	57
	%	46.5	25.8	26.7	42.9	35.8
TOTAL All 5 Study Areas	#	146	94	29	14	283
	%	43.5	18.7	29.6	16.5	27.7

Notes: Percentages here represent the proportion of the total population in each group that have low income. For instance, 42 percent of those who most commonly travel by public transit in the Hamilton central Mountain area (29 of the 69 people in this area who report travelling by public transit) have low income.

Women are more represented in the survey (58 percent vs 42 percent) than men, particularly in the Hamilton Mountain and Agincourt study areas, where women make up roughly 63 percent of respondents (Table 5.4) (compared to approximately 52 percent across the general population). This is partially due to the sampling method of recruiting at community centres, and partially due to the well-established trend in the literature for men to be more likely to refuse to participate in surveys. There are gendered patterns to the reporting of income as well. More women report having low income than men, and more women report their income. Men, meanwhile, were much more likely to refuse to answer the question on income (28.6 percent of men did not report income, while only 16.4 percent of women did not report income).

Table 5.4: Gender and Income Status

		Total		Low Income		Not Low Income		Income Not Reported	
		Female	Male	Female	Male	Female	Male	Female	Male
Hamilton Mountain	#	159	93	36	23	87	44	36	26
	%	*63.1**	*36.9**	22.6	24.7	54.7	47.3	22.6	28.0
W Brampton/ Georgetown	#	112	94	28	23	68	44	16	27
	%	*54.4**	*45.6**	25.0	24.5	60.7	46.8	14.3	28.7
SE Mississauga	#	115	94	29	21	68	54	18	19
	%	*55.0**	*45.0**	25.2	22.3	59.1	57.1	15.7	20.2
E Woodbridge	#	107	88	48	18	39	27	20	43
	%	*54.9**	*45.1**	44.9	20.5	36.4	30.7	18.7	48.9
Agincourt	#	101	58	39	18	54	33	8	7
	%	*63.5**	*36.5**	38.6	31.0	53.5	56.9	7.9	12.1
TOTAL All 5 Study Areas	#	594	427	180	103	316	202	98	122
	%	*58.2**	*41.8**	30.3	24.1	53.2	47.3	16.5	28.6

Notes: Percentages show the proportion of respondents from that gender who are in each income category (for instance, in Hamilton Mountain, 22.6 percent of females have low income). However, the percentage that is italicized and marked with an asterisk (*) shows the proportion of the total sample in each gender category, not income category (which would have been 100 percent).

Patterns of family status and structure vary across the five study areas, sometimes considerably. Respondents in Georgetown and west Brampton, and particularly in east Woodbridge, are more likely to be married and to have children at home. Meanwhile, a greater proportion of the survey population in south east Mississauga (20 percent), and particularly in Hamilton Mountain (27 percent), are aged 65 years old or older (compared with 14 percent of the total sample). Heads of single-parent families represent 6.2 percent of the sample, with slightly greater prevalence in the Agincourt study area. As might be expected, a large proportion – (44 percent) – of respondents from single-parent families reported low income, slightly higher than the 43 percent of non-married respondents who likewise reported having low income. Meanwhile, the low income rate among seniors (15.4 percent) is not far off that for the entire population (17.6 percent in 2006), and the differences in this rate across the five study areas are not statistically significant, suggesting that distribution of respondents aged 65+ in the survey across areas and social demographics is relatively representative of this population in general.

Table 5.5: Family Status, Age, and Income Status

Site		Married	Not Married	Seniors (Age 65+)	w/ Kids at Home	Single-Parent Family
Hamilton Mountain	#	126	110	68	71	17
	%*	53.4	46.6	27.0	28.2	6.7
Low income	%**	11.9	40.0	17.6	23.9	47.1
W Brampton/ Georgetown	#	129	69	11	111	13
	%*	65.2	34.8	5.3	53.9	6.3
Low income	%**	27.1	23.2	18.2	28.8	30.8
SE Mississauga	#	92	104	41	58	11
	%*	46.9	53.1	19.6	27.8	5.3
Low income	%**	15.2	29.8	4.9	24.1	27.3
E Woodbridge	#	142	40	4	127	9
	%*	78.0	22.0	2.2	65.1	4.6
Low income	%**	32.1	70.0	50.0	26.0	77.8
Agincourt	#	84	67	19	72	13
	%*	55.6	44.4	11.9	45.3	8.2
Low income	%**	38.1	34.3	21.1	44.4	46.2
TOTAL All 5 Study Areas	#	593	370	143	439	63
	%*	61.6	38.4	14.0	43.0	6.2
Low income	%**	25.0	42.7	15.4	29.2	44.4

Notes: All columns divided by a solid line constitute distinct variables. 'Not married' includes single, never married, divorced, separated, and/or widowed. Single-parent family involves a household in which only one adult parent is living with children. (*) 1st percentage shows the proportion of the survey population reporting that variable. (**) 2nd Percentage shows the proportion of survey respondents reporting that variable that also report low income.

Of the 1,021 respondents in the survey, roughly one third were born outside Canada (Table 5.6). Immigrants are distributed across the five study areas roughly in accordance to their underlying share of the population, although in proportions slightly lower than in the 2006 census (compare the data in Table 5.6 with the data in Table 4.5). As a proportion of the population in each study area, immigrants were more concentrated in Georgetown/west Brampton, and Agincourt (where they made up around 45 percent of the sample), and least concentrated in the Hamilton Mountain study area where they made up only 16 percent of the sample. Immigrants were more likely than those born in Canada to report their income on the survey. In four of the fives study areas, and in accordance with established trends in Canadian cities, immigrants are also statistically-significantly more likely to report low income than non-immigrants (the exception is the Hamilton Mountain study area, where the number of low-income immigrants is too small to

provide statistical significance). Overall, over 38 percent of immigrants in the sample report having low income.

Table 5.6: Immigrants in the Survey, by Income Status

Site		TOTAL Immigrants	Low Income	Not Low Income	Income Not Reported
Hamilton Mountain	#	40	7	25	8
	%*	15.9	11.9	19.1	12.9
By income category:	%**	100.0	17.5	62.5	20.0
W Brampton/ Georgetown	#	94	31	45	18
	%*	45.6	60.8	40.2	41.9
By income category:	%**	100.0	33.0	47.9	19.1
SE Mississauga	#	80	20	46	14
	%*	38.3	40.0	37.7	37.8
By income category:	%**	100.0	25.0	57.5	17.5
E Woodbridge	#	57	41	9	7
	%*	29.2	62.1	13.6	11.1
By income category:	%**	100.0	71.9	15.8	12.3
Agincourt	#	70	32	32	6
	%*	44.0	56.1	36.8	40.0
By income category:	%**	100.0	45.7	45.7	8.6
TOTAL All 5 Study Areas	#	341	131	157	53
	%*	33.4	46.3	30.3	24.1
By income category:	%**	100.0	38.4	46.0	15.5

Notes: (*) 1st percentage shows the proportion of the population in each income category that are immigrants (born outside Canada). (**) 2nd Percentage shows the proportion of all immigrants in the study area that are found in each income category. Table excludes those who did not state immigration status.

5.b Levels and Measures of Accessibility

Even across fixed distances between origins and destinations (for instance, between place of residence and place of work) the amount of time required for travel can vary, due to different needs regarding mode of transport, time of day, routes and connections. Decisions regarding which mode or route to take are more sensitive to length of time spent in travel than distance traversed. The 2014 survey contains two important time-based metrics for assessing accessibility. Respondents were asked to indicate how long it took them to get to work or school – a measure of accessibility *by* transport. This question was asked independent of mode, allowing for comparison of the length of travel among different modes, but only for those who commute regularly to work or school. A second question asked respondents how long it would take to walk to their local bus stop or train station – a measure of accessibility *to* transit. Both measures can be calculated for different sub-groups of the population, and provide a window on whether and how accessibility to work or school differs among social groups and across the study areas.

It is often assumed that people have a built-in aversion to travelling for more than half an hour at a time. Marchetti (1994), for instance, argued that this limited how far and wide cities could sprawl. Newman and Kenworthy (2011) have in turn argued that this is the main reason why cities are intensifying and becoming denser, now that they have "hit the Marchetti wall" and urban residents aim to reduce their commute to less than 30 minutes. It is striking how close, across each of the five study areas, the average commute time is to this assumed threshold (Table 5.7). The average estimated time spent commuting is 29.2 minutes, varying from a low of 26.5 minutes in south-east Mississauga, to a high of 32 minutes in East Woodbridge.

Table 5.7: Average Time Spent Commuting to Work or School, in Minutes (one way)

	ALL MODES			PUBLIC TRANSIT USERS			DRIVERS		
Site	TOTAL	Low Income	Not Low Income	TOTAL	Low Income	Not Low Income	TOTAL	Low Income	Not Low Income
All Respondents:									
Hamilton Mountain	28.1	33.2	26.3	31.9	41.4	26.7	24.3	20.8	25.0
W Brampton/ Georgetown	27.0	32.7	25.2	34.2	40.4	29.8	25.0	26.7	24.6
SE Mississauga	26.5	24.3	27.3	30.9	29.3	31.9	21.3	12.6	23.8
E Woodbridge	31.9	30.5	32.7	37.8	39.5	36.6	29.0	22.7	31.0
Agincourt	32.8	32.2	33.0	38.8	35.0	41.6	25.0	23.4	25.5
All 5 Study Areas	29.2	30.6	28.7	35.4	37.1	34.1	25.2	22.0	26.1
By Gender: Female									
Hamilton Mountain	26.6	31.9	25.1	32.9	46.5	27.1	20.8	15.7	22.0
W Brampton/ Georgetown	24.8	30.5	23.2	33.5	40.0	29.9	23.4	22.8	23.5
SE Mississauga	28.0	23.5	29.9	32.1	28.0	34.6	24.4	14.2	26.9
E Woodbridge	29.6	28.5	30.5	35.4	37.3	33.5	26.5	21.5	29.1
Agincourt	34.5	36.0	31.2	43.4	41.8	44.7	23.9	22.5	24.3
All 5 Study Areas	28.7	29.9	28.1	35.9	40.0	34.5	23.8	20.2	25.0
By Gender: Male									
Hamilton Mountain	31.6	34.8	30.0	30.0	35.2	25.7	29.2	28.5	29.3
W Brampton/ Georgetown	29.5	33.9	27.9	35.2	40.9	29.5	26.7	28.8	26.1
SE Mississauga	25.1	25.4	25.0	29.9	33.3	27.7	18.2	11.3	20.4
E Woodbridge	35.6	36.7	35.3	42.5	45.9	40.9	32.4	29.0	32.7
Agincourt	31.2	31.1	31.3	33.6	29.4	36.3	26.9	24.8	27.8
All 5 Study Areas	30.7	32.6	29.9	35.5	37.5	34.1	26.9	24.5	27.5
By Immigration Status: Immigrants									
Hamilton Mountain	28.3	**	**	**	**	**	**	**	**
W Brampton/ Georgetown	28.1	31.0	26.5	33.5	35.3	31.0	26.9	28.6	26.3
SE Mississauga	27.4	22.9	29.0	31.2	24.2	35.1	23.7	19.0*	25.1
E Woodbridge	27.4	30.2	20.4	32.3	38.1	16.0	24.1	23.3	25.8
Agincourt	36.9	37.2	36.7	41.2	40.2	42.2	27.3	27.9	27.8
All 5 Study Areas	29.4	30.8	28.2	34.9	36.3	33.1	25.9	25.2	26.2
By Family Status: Kids at Home									
Hamilton Mountain	25.3	33.6	23.0	25.5	38.0	21.0	22.0	23.5	21.7
W Brampton/ Georgetown	28.8	29.9	28.3	32.3	33.2	31.0	28.7	28.9	28.6
SE Mississauga	32.6	25.4	35.0	44.7	22.0	50.4	28.2	21.0*	30.9
E Woodbridge	31.9	27.9	33.4	40.1	38.8	40.9	28.7	19.1	30.8
Agincourt	32.7	29.5	35.9	39.4	34.0	46.7	27.6	24.2	31.0
All 5 Study Areas	30.2	28.6	30.8	36.9	35.2	38.2	27.6	23.0	29.0
By Family Status: Single-Parent Family									
Hamilton Mountain	22.3	**	**	**	**	**	**	**	**
W Brampton/ Georgetown	27.7	**	**	**	**	**	**	**	**
SE Mississauga	27.5	**	**	**	**	**	**	**	**
E Woodbridge	36.3	**	**	**	**	**	**	**	**
Agincourt	50.7	**	**	**	**	**	**	**	**
All 5 Study Areas	33.7	32.7	35.1	46.8	43.5	52.2	25.9	22.7	31.8

Notes: Values represent the average time in minutes to work or school, estimated from the mid-point of each category. (*) Values with a single asterisk represent instances with fewer than five cases, in which a the most likely value for this cell has been estimated using cross-validation techniques. (**) Cell numbers were too small to provide robust estimates for these cells. 'Not low income' in this table includes those who did not report their income. Only those who were working or enrolled in school at the time of the survey could answer this question. A total of 631 respondents, or 62 percent of survey respondents, provided information on this question. "All modes" includes those who travel by bike, walk, taxi, or passenger in another vehicle.

The survey results confirm established patterns in the literature in which those who take public transit spend more time commuting than do those who drive a car or truck. On average, respondents across the five study areas who commute via public transit report spending just over ten minutes more, or about 35 percent longer, commuting than do those who drive, and this result is statistically significant at the 0.05 percent level. Longer commute times for public transit trips are a consistent feature across all of the sub-groups examined, demonstrating the significant time disadvantage accruing to this mode across social groups. The difference (gap) in travel times between public transit use and driving varies widely, however, from a low of 7.6 minutes in Hamilton to a high of 13.8 minutes on East Woodbridge, which also happens to have the longest average travel times via public transit among the five study areas.

Travel patterns are gendered, with men are more likely to commute for longer times than women, although only by an average of 2 minutes, and the patterns are inconsistent among study areas. The lack of consistency is largely an effect of public transit times, which vary widely but otherwise average out. When it is only drivers who are analyzed, men show a clear tendency toward longer commutes (the exception is in south-east Mississauga). However, a separate gendered pattern emerges in the gap between the commute times of drivers and public transit users, with higher commute times for transit than driving of 12 minutes for women but only 8.6 minutes for men. The exceptions concern those places where a greater share of existing transit trips involves commuting long distances on commuter rail or busyway lines, which is more common in east Woodbridge and south-east Mississauga.

There is mixed evidence of the effects of low income on overall travel times. Overall, low-income commuters in total spend about 2 additional minutes commuting, but this is largely due to higher commute times among low-income commuters taking public transit in just two of the five study areas (Hamilton Mountain and Georgetown/west Brampton), and the results are not statistically significant. Among drivers, on the other hand, there is a more consistent (but still statistically insignificant) pattern whereby except in Georgetown/west Brampton, low-income drivers spend less time commuting than those that do not report low income. The latter effect is true for both genders, but more pronounced for women drivers, albeit with significant variation across study areas.

Commuting patterns among immigrants largely fit those of the rest of the sample. On the whole immigrants do not spend more time commuting than do those born in Canada, with the possible exception of those immigrants who are low-income drivers, who spend on average an extra 3.2 minutes commuting across those four study areas with enough low-income immigrants to measure travel times (Hamilton Mountain has too few for reliable estimates). However, there is enough variation among them that the results are not statistically significant.

The results for family type are also mixed. While there is no discernable pattern differentiating commuters with kids at home from others, single parents show longer average commute times (but varying widely and not statistically significant). However, there is a strong difference in the amount of time spent commuting by single parents who travel via public transit and those who drive, with public transit taking more than 20 minutes longer on average than driving. This result is statistically significant (at the 0.05 level), and this pattern holds for both low-income single-parents and single-parents who do not report low income. Single parents face special challenges linking work, home and children's schooling, among other things (discussed further below). The

evidence provided here suggests that public transit systems in the greater Toronto-Hamilton area are doing a poor job of aiding in this task among single parents. However, while statistically significant across the entire sample, the numbers of single parents are too low in most of the study areas to produce robust estimates allowing for comparison between them on this variable.

Accessibility *to* transit can be measured in relation to the time one must take to walk to the nearest bus stop or train station. From the perspective of maximizing the public benefit of public transit, those who need to take transit should be located closer to a stop or station than those who opt to drive. Furthermore, from an equity perspective, those with less choice because they have low income, or because they are newcomers to Canada with less capacity for taking up driving right away, should ideally be located closer to transit.

The results from the survey on these questions is mixed but show only minor differences in this kind of accessibility (Table 5.8). While on average, those whose most common mode is public transit report living slightly closer to the nearest stop than do those who drive, the difference is extremely modest (0.3 minutes), and is not consistent across groups or study areas. There are some gendered differences, but they are relatively minor. Women public transit users report being located closer to the nearest stop in three of the study areas, whereas men who take public transit report being located further away than drivers in all but one of study areas. However, the results for families with children at home, as well as for single-parent families do not differ significantly from the entire sample. There is a slight tendency for low-income single parents to be located further from a bus stop or train station, but only by about 0.3 minutes on average.

Immigrants report being located slightly closer to transit than those born in Canada, by about 0.8 minutes on average, and particularly among those who do not report low income, for whom the difference in walking time to the nearest stop/station is about 1.2 minutes. Immigrants residing in the Hamilton Mountain, south-east Mississauga, and Agincourt study areas who take public transit are particularly well placed. In the former (Hamilton-Mountain), they are almost three minutes closer than non-immigrants to the nearest stop or station, and in the latter two study areas, are about two minutes closer. Immigrants who drive are also typically located nearer to transit access than are non-immigrants, except in east Woodbridge where they are upwards of an additional four minute walk to transit. Overall, there is less evidence pointing to systemic inequities in the distribution of access *to* transit represented by nearness to the closest bus stop or train station. Of course, where the stops are located may have little to do with whether one can access one's destination using the routes or systems routed through that stop, nor does the time taken to walk to the nearest stop have much to do with how much time might be added to the entire trip from origin to destination. Often multiple transfers are required among routes within a given system, or between systems, and the speed and directness of routes plays a huge role in the time length of any trip. Indeed, there is no statistical correlation between the amount of time respondents report taking to work or school, and the amount of time it takes to walk to the nearest stop or station.[2] Even after controlling for both mode of transport and low income status, the pearson's r correlation only rises to $r = 0.040$, signaling there is no relationship between accessibility to a transit stop and accessibility to work/school among respondents to the survey.

[2] The bivariate pearson's correlation is $r = 0.038$, suggesting there is no relationship. Note that pearson's r varies from zero, indicating the complete absence of any relationship, to ±1.00, indicating a perfect (positive or negative) correlation.

Table 5.8: Estimated Average Time to Walk to Nearest Stop, in Minutes

	ALL MODES			PUBLIC TRANSIT USERS			DRIVERS		
Site	TOTAL	Low Income	Not Low Income	TOTAL	Low Income	Not Low Income	TOTAL	Low Income	Not Low Income
All Respondents:									
Hamilton Mountain	5.9	5.2	6.1	5.9	5.5	6.3	6.0	4.8	6.2
W Brampton/ Georgetown	8.6	6.9	9.1	7.1	6.2	7.7	8.9	7.5	9.4
SE Mississauga	6.5	7.0	6.3	6.5	7.4	5.9	6.4	7.4	6.2
E Woodbridge	8.9	9.0	8.7	9.2	9.2	9.2	8.6	9.6	8.3
Agincourt	6.7	6.7	6.7	6.5	6.7	6.3	6.8	6.8	6.8
All 5 Study Areas	7.2	7.0	7.3	7.0	7.1	6.9	7.3	7.2	7.3
By Gender: Female									
Hamilton Mountain	5.6	5.2	5.7	5.4	5.0	5.7	5.7	5.1	5.8
W Brampton/ Georgetown	8.6	6.4	9.5	6.8	5.3	7.7	9.4	7.0	10.2
SE Mississauga	6.6	6.8	6.5	6.4	7.9	5.6	6.3	4.7	6.6
E Woodbridge	8.8	9.0	8.7	9.2	9.6	8.8	8.6	9.5	8.2
Agincourt	6.8	6.5	6.9	6.4	6.6	6.2	7.1	6.8	7.2
All 5 Study Areas	7.1	6.9	7.2	6.8	7.0	6.6	7.3	7.0	7.4
By Gender: Male									
Hamilton Mountain	6.4	5.2	6.9	7.1	6.8	7.4	6.5	4.5	7.0
W Brampton/ Georgetown	8.5	7.6	8.8	7.5	7.5	7.6	8.3	8.0	8.4
SE Mississauga	6.3	7.2	6.1	6.7	6.3	7.1	6.4	9.7	5.8
E Woodbridge	8.8	9.1	8.7	9.2	8.5	9.8	8.4	10.0	8.3
Agincourt	6.6	7.2	6.4	6.9	7.3	6.8	6.3	6.8	6.2
All 5 Study Areas	7.3	7.2	7.3	7.6	7.4	7.7	7.2	7.5	7.2
By Immigration Status: Immigrants									
Hamilton Mountain	4.5	4.6	4.5	4.4	4.2*	4.6	4.4	4.3*	4.5
W Brampton/ Georgetown	7.8	6.5	8.5	8.2	6.3	9.8	7.1	6.4	7.3
SE Mississauga	5.9	5.2	6.1	5.3	5.7	5.0	5.8	5.6*	5.9
E Woodbridge	8.9	9.1	8.3	8.4	8.9	6.6	10.6	10.4	11.0
Agincourt	6.1	6.6	5.6	5.4	5.9	4.8	6.4	7.1	5.8
All 5 Study Areas	6.8	7.1	6.7	6.6	6.9	6.2	6.7	7.4	6.5
By Age: Seniors Aged 65+									
Hamilton Mountain	5.9	5.0	6.2	5.7	4.0	6.7	6.0	5.6	6.1
W Brampton/ Georgetown	11.6	11.8*	11.0	**	**	**	**	**	**
SE Mississauga	6.7	6.5*	6.9	**	**	**	**	**	**
E Woodbridge	**	**	**	**	**	**	**	**	**
Agincourt	5.5	5.0	5.6	5.0	5.3*	4.7	5.3	5.0*	5.7
All 5 Study Areas	6.8	6.5	6.9	6.4	5.8	6.7	6.5	7.8	6.3
By Family Status: Kids at Home									
Hamilton Mountain	5.4	5.8	5.3	5.6	6.4	5.1	5.7	5.3	5.8
W Brampton/ Georgetown	8.2	6.8	8.9	6.5	5.6	7.3	8.4	7.6	8.7
SE Mississauga	6.2	5.8	6.3	6.6	6.5	6.6	6.2	6.4	6.2
E Woodbridge	8.0	8.6	7.7	8.2	8.5	7.9	8.0	9.2	7.8
Agincourt	6.4	7.0	6.0	5.6	6.2	4.9	7.0	8.2	6.4
All 5 Study Areas	7.1	7.1	7.1	6.6	6.8	6.4	7.5	7.7	7.4
By Family Status: Single-Parent Family									
Hamilton Mountain	6.4	7.8	5.0	**	**	**	**	**	**
W Brampton/ Georgetown	9.0	**	**	**	**	**	**	**	**
SE Mississauga	6.4	**	**	**	**	**	**	**	**
E Woodbridge	7.3	**	**	**	**	**	**	**	**
Agincourt	6.0	7.0	5.1	**	**	**	**	**	**
All 5 Study Areas	7.0	7.3	6.7	6.6	7.3	5.6	7.3	7.3	7.3

Notes: Values represent the average time in minutes to work or school. (*) Values with a single asterisk represent instances with fewer than five cases, in which a the most likely value for this cell has been estimated using cross-validation techniques. (**) Cell numbers were too small to provide robust estimates for these cells. 'Not low income' in this table includes those who did not report their income. A total of 910 respondents answered this question, or 89 percent of respondents.

5.c. The Barriers to Travel in the GTHBOA

Respondents in the survey were asked a number of questions related to their experience and opinions of the transportation system in the GTHBOA. These took two forms – questions that had circumscribed prompts with likert-scale response options, and open-ended questions that allowed respondents to freely comment. The open-ended questions appeared first, so that the likert-scale questions would not bias how participants responded to them. However, the likert-scale questions provide some context to results of the open-ended questions, and thus are discussed here first. The likert-scale questions mostly asked respondents about the public transit system.

5.c.i. Likert-Scale Responses

Respondents were asked in question 9 on the survey to rate how strongly they agreed with a series of statements related to the transportation system, with the ratings ranging from a low of 1 (indicating strong disagreement) to 5 (indicating strong agreement), with 3 as a neutral value (neither agree nor disagree). Average responses above 3 therefore indicate overall collective agreement, while responses below 3 indicate overall disagreement with the statement in question. This exercise is useful for quantitatively assessing and comparing opinions on different issues, and thus for highlighting what might be the most pressing problems. The weighted average scores among respondents across all five study areas are broken down by income status, and by transport mode (Table 5.9). (The average scores as recorded separately in each study area can be found in Tables A1-A5 in Appendix A).

A number of patterns stand out. First of all are the generally positive responses on a number of questions. On average, respondents (including public transit users, and those with low income) report overall satisfaction with the safety and comfort of the public transit system, reported feeling comfortable with being with strangers on public transit, said that they can easily walk to their local stop from their home, that transit takes them where they want to go, and that for the most part, transit staff are polite and helpful. These are the issues on which the overall transport system in the GTHBOA is already doing relatively well. While those whose most common mode of transport is private vehicle had lower average scores than public transit users on most of these items, they nonetheless still provided averages above 3, indicating general agreement with these statements. This suggests that on average these items are not the ones that may have discouraged people from using public transit. The greatest discrepancy concerns whether transit takes them to where they want to go, however drivers still provided average scores above 3 and thus collective agreement with the statement. As well, respondents do not report that it is difficult to access route info, returning average scores below 3 on this item, which suggests that the information available is sufficient to allow them to navigate the system if they choose (Table 5.9).

At the same time, a series of other responses point to issues that, on average, were felt to be problems with the transport system. First of all, there is overall disagreement that the public transit system is affordable. Among public transit users, it is only those who have low income that disagreed with this statement, while public transit users who do not have low income provided an average score just above 3, suggesting they are relatively neutral on the issue.

(meanwhile the amount of disagreement among those who use other modes is not strong). Respondents reported that it is often difficult to get a seat on public transit (an issue that was felt more strongly by public transit users), that using transit takes too much time (an issue reported more by car drivers), and that there are too many transfers involved. In addition, there is general agreement, which is felt more strongly among low-income respondents, that "only those without another choice use public transit". These issues were also reflected in the answers to the open-ended questions (discussed in detail below), and point to one of the problems that policy makers face in attempting to expand public transit use in the GTHBOA: many respondents report that the public transit system in general is not competitive with private vehicles in terms of connectivity, trip times, and/or reliability, and thus to be able to live a proper life in the region one really needs a car, which is expensive but much more convenient given the prevailing built form.

Table 5.9: Average Score, Agreement/Disagreement with Statements on Public Transit, All 5 Study Areas

	ALL MODES			PUBLIC TRANSIT			OTHER MODES		
Weighted Average, all 5 Study Areas	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*
Transit is safe	3.91	3.93	3.90	3.99	3.99	3.98	3.87	3.84	3.88
Transit is affordable	2.90	2.86	2.90	2.94	2.78	3.05	2.88	2.94	2.86
I can count on how long it takes...	3.33	3.30	3.33	3.35	3.23	3.44	3.31	3.39	3.28
You have to wait a long time at the stop	3.39	3.35	3.41	3.36	3.40	3.34	3.41	3.32	3.44
I am comfortable with being w/ strangers…	3.34	3.35	3.34	3.36	3.43	3.30	3.32	3.26	3.34
Too crowded, often hard to get a seat	3.43	3.34	3.49	3.56	3.41	3.70	3.37	3.26	3.41
I can easily walk to a stop from my home…	3.80	3.82	3.79	3.98	3.81	4.10	3.72	3.83	3.69
Transit comes frequently at my stop...	3.20	3.31	3.15	3.30	3.32	3.29	3.14	3.27	3.10
Too slow, takes too much time	3.25	3.21	3.28	3.16	3.12	3.19	3.31	3.32	3.31
Reliable, I can count on it...	3.41	3.30	3.44	3.32	3.18	3.44	3.45	3.44	3.44
Transit takes me where I want to go	3.44	3.61	3.37	3.78	3.78	3.78	3.27	3.43	3.21
Too many transfers to get where I want to go	3.33	3.35	3.33	3.22	3.36	3.10	3.39	3.31	3.42
Vehicles are comfortable	3.60	3.64	3.58	3.64	3.67	3.62	3.56	3.59	3.55
It is hard to get route info	2.84	2.86	2.82	2.71	2.77	2.66	2.89	2.94	2.87
Transit staff are polite, helpful	3.50	3.52	3.50	3.49	3.54	3.47	3.51	3.51	3.51
Only people without choice use public transit	3.17	3.28	3.12	3.05	3.20	2.92	3.24	3.37	3.21

Notes: The average for all five study areas is weighted such that each site has equal weighting. (*) 'Not low income' in this table includes those who did not report income. This was necessary to provide robust estimates as those who did not report income were often less than forthcoming about their ratings. Scores are out of 5: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4= agree, 5 = strongly agree

These likert-scale questions allow for some comparative analysis across the five study areas (Table 5.10). The highest average score which might be considered to reflect positively on the transit system in each category is here coded green, while those that might be considered to reflect negatively are coded orange. Across the five study areas, it is in the two study areas located within the large Cities of Toronto and Hamilton (the Agincourt and the Hamilton Mountain study areas) that the existing transit system would appear to best meet the needs of low-income respondents in general. Low-income respondents reported the most negative average scores in the three more suburban/automobile dependent study areas, particularly in east Woodbridge (notably the wealthiest of the five study areas, with the most expensive regional transit costs on average). Among public transit users only, the highest average scores were attained in the Hamilton Mountain study area (the exception concerns the comfort of the vehicles, which is was scored most favourable among respondents in east Woodbridge where the

expensive York "Viva" BRT system operates, but also where transit operators appear to be more polite and it is easier to get a seat). Meanwhile, the most negative average scores were reported by public transit users in the Georgetown/ west Brampton study area, particularly on questions relating to trip lengths, waiting times, frequency, and reliability. Much of this relates to the generally poor state of public transit in Georgetown in comparison with the other study areas, and in comparison with Brampton.

Table 5.10: Comparison of Average Score among Study Areas

	Low Income – All Modes						Public Transit Users – All Incomes					
Average, all 5 Study Areas	Total	Ham. Mtn	Georg/ WBram	SE Miss	East Wood	Agin-Court	Total	Ham. Mtn	Georg/ WBram	SE Miss	East Wood	Agin-Court
Transit is safe	3.93	3.88	3.96	**3.82**	3.92	**4.06**	3.99	**4.18**	3.88	**3.86**	4.04	3.99
Transit is affordable	2.86	3.12	2.90	2.60	**2.49**	**3.20**	2.94	**3.55**	**2.69**	2.84	2.73	2.87
I can count on how long it takes...	3.30	3.21	3.43	3.33	**3.17**	**3.36**	3.35	**3.70**	**3.02**	3.39	3.42	3.21
You have to wait a long time	3.35	**3.28**	**3.49**	3.35	3.29	3.34	3.36	**3.18**	**3.63**	3.35	3.45	3.21
I am comfortable w/ strangers…	3.35	3.31	**3.49**	**3.24**	**3.24**	3.45	3.36	3.35	**3.19**	3.37	**3.55**	3.33
crowded, often hard to get a seat	3.34	3.53	3.02	**3.69**	**2.94**	3.51	3.56	3.54	3.51	**3.74**	**3.34**	3.69
I can easily walk to a stop	3.82	**4.32**	3.46	3.92	**3.39**	4.00	3.98	**4.52**	3.82	4.03	**3.47**	4.07
Transit comes frequently	3.31	**3.54**	3.26	3.27	**3.05**	3.41	3.30	**3.69**	**3.04**	3.29	3.05	3.44
Too slow, too much time	3.21	**3.18**	3.20	3.27	**3.35**	3.21	3.16	**3.00**	**3.44**	3.20	3.04	3.33
Reliable, I can count on it...	3.30	**3.50**	**3.06**	3.34	3.27	3.28	3.32	**3.68**	**3.12**	3.29	3.23	3.23
takes me where I want to go	3.61	3.63	3.54	3.70	**3.34**	**3.84**	3.78	**3.94**	3.75	3.81	**3.60**	3.79
Too many transfers	3.35	3.36	3.44	**3.17**	**3.48**	3.32	3.22	**3.03**	3.22	3.23	3.21	**3.39**
Vehicles are comfortable	3.64	**3.28**	**3.92**	3.56	3.81	3.61	3.64	**3.33**	3.55	3.52	**4.07**	3.72
It is hard to get route info	2.86	**3.00**	2.98	**2.51**	2.92	2.88	2.71	**2.53**	2.88	2.54	2.66	**2.94**
Transit staff are polite, helpful	3.52	3.47	**3.31**	3.53	**3.68**	3.49	3.49	3.58	**3.36**	3.43	**3.72**	3.37
Only people without choice…	3.28	3.09	**3.52**	**2.88**	3.51	3.42	3.05	2.91	3.22	**2.75**	**3.32**	3.06

Notes: **Green bold** = most benevolent average score; **Orange bold** = least benevolent average score
Scores are out of 5:
1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4= agree, 5 = strongly agree

While these likert-scale questions provide comparative quantitative information on the relative feelings of respondents to some of the main issues, it is the open-ended questions that provide the best window into the barriers to mobility and accessibility facing different social groups, including low-income people.

5.c.ii. Problems with the Transport System and Barriers to Access: Open-Ended Responses

A number of open-ended questions related to what respondents thought were the main problems with the transportation system, the barriers they and others face in getting around, and what needs to be fixed, changed or added to the transportation system to improve it (questions 5 through 8 in the attached survey). Respondents could raise as many issues/problems/barriers as they liked, and could (and often did) provide explanations and justification for their choices. The answers to these questions provide the most insight into the barriers facing users of the transport system, including those faced by people with low income.

It should be noted that the mix of issues raised by respondents is quite similar across the five study areas, albeit with differences in emphasis related to the unique position of each study area within the region with respect to local needs and how the local transport service fits into the overall transportation system. A majority of the respondents understood the questions related to

the overall transportation system to relate primary to the public transportation system, and only about 12 percent of respondents only talked about the highway-roadway system. This is true even though the likert-scale questions came later, and would seem to have arisen partly as a result of the perceived decline in public transit infrastructure, and partly as a result of the politicization of public transit in the media and among local politicians over the last few years. The issues raised by respondents were classified (by the author of this report) into 17 distinct coherent categories. Table 5.11 shows the proportions of respondents listing each issue, and breaks the results down by income status, and by most common transport mode (the separate results for each study area can be found in Tables A6 through A10 in Appendix A).

Table 5.11: Factors acting as Barriers to Travel, All 5 Study Areas

Weighted Average	ALL MODES (%)				PUBLIC TRANSIT USERS (%)				OTHER MODES (%)			
All 5 Study Areas	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd
Trip Duration/ Timing, incl.:	63.2	62.0	64.2	61.1	66.0	66.2	66.8	64.4	62.2	57.5	63.4	60.5
Takes too long	40.3	40.3	40.8	35.1	39.0	38.2	41.7	32.3	41.7	43.9	41.4	36.8
Frequency of service	37.0	36.2	39.0	33.4	41.9	39.4	44.2	39.2	34.6	34.5	36.3	31.7
Time spent transferring	14.2	18.1	13.9	9.1	16.7	18.5	16.9	11.7	12.6	17.4	12.6	7.8
Scheduling: weekends/nights	11.0	11.1	11.9	6.7	11.0	12.6	10.8	3.5	10.9	8.9	12.5	7.6
Time limits on transfers* **	3.8	6.2	3.3	1.7	5.8	10.0	3.8	0.0	1.9	2.5	1.9	1.1
Accessibility via/to Transit, incl.:	42.7	36.9	45.6	41.5	37.6	39.8	36.0	34.2	44.8	31.9	49.1	42.5
Lack of connectivity	26.5	21.9	28.7	25.8	23.0	24.6	21.7	22.0	28.2	18.0	31.0	26.8
Lack of routes	13.3	12.1	13.6	12.6	9.7	10.6	9.7	6.8	15.2	13.4	15.2	15.0
Distance to local stops	7.6	6.5	7.6	9.2	8.2	9.5	5.2	8.6	7.4	2.8	8.6	9.6
Direction of routes **	4.2	3.1	6.0	0.9	2.2	2.3	2.6	0.0	5.2	3.8	7.2	1.2
Cost * **	28.4	66.7	15.6	11.0	43.2	73.4	19.8	23.3	20.7	59.8	13.3	6.1
Cost of Transfers **	9.2	11.1	8.4	7.9	14.4	15.2	14.4	13.5	6.1	6.5	5.8	5.2
Reliability * **	18.5	25.0	16.9	16.3	22.2	23.5	24.1	17.0	16.8	26.2	14.7	15.6
Cost of Vehicle, Gas, Insurance	11.8	12.0	12.2	12.3	7.3	4.5	9.9	10.1	13.7	19.0	13.1	12.8
Safety, Crowding, Comfort	10.2	12.4	9.1	11.7	13.6	15.9	10.2	18.6	8.7	8.8	8.9	9.1
Difficult re Families, Strollers	3.6	4.5	3.8	1.9	5.4	7.7	4.8	0.0	2.9	1.6	3.6	2.4
Parking: lack of, cost	3.1	3.0	3.0	2.6	2.3	0.0	3.7	5.0	3.3	6.3	2.6	1.9
External Infrast. (shelters, etc)	1.7	2.0	0.9	2.2	2.1	2.5	0.0	3.5	1.4	1.3	1.2	1.6
Rudeness/Unhelpfullness *	0.9	2.8	0.4	0.0	1.9	2.5	2.0	0.0	0.5	2.9	0.0	0.0

Notes: These results show the percentage (%) of respondents in each category who listed each of these issues as representing a barrier to travel in the GTHBOA in any of questions 5, 6, 7 and 8 in the respondent survey. Respondents could list as many issues as they liked. (*) Statistically-significant difference in the proportions of low income versus non-low income respondents listing this issue (typically, low-income respondents raised this issue significantly more than those without low income). (**) Statistically-significant difference in the proportions of public transit users versus users of other modes listing this issue (typically, public transit users raised this issue significantly more than others, except in the case of the direction of routes, in which drivers raised this issue more often). These results are weighted such that each of the five areas is given equal weight (so that results are not more reflective of study areas with more respondents).

A. Duration/Scheduling. The most common general complaint, mentioned by almost two thirds of respondents (63 percent), related in some way to trip duration or scheduling as an important problem or barrier to transit use. The amount of detail provided by respondents varied, with some simply reporting that using transit 'takes too long', while others discussed issues such as the frequency of service (37 percent), the time spent transferring between routes, or between different transit systems (14 percent), problems with lack of scheduling or routes off hours (typically on weekends, or early morning/late evening) (11 percent), and time limits on transfers (4 percent). Public transit users were slightly more likely (66 percent) to list trip duration, frequency, and

scheduling issues as barriers, and were more likely to be specific in describing in detail the precise problems related to the transit system, while those whose most common mode is private vehicle were (slightly) more likely to say they didn't use public transit simply for the reason that 'it took too long'. Low-income respondents were more likely to discuss the amount of time it took to transfer between routes or transit systems as an barrier, and were statistically-significantly more likely to specifically mention time limits on transfers as a key problem. For many lower-income respondents the time limit on transfers is a cost issue, and a number of such respondents said this often prevented them from accessing retail amenities after work, or that it otherwise forced them to compromise their travel plans.

Frequency of service was mentioned by a number of respondents. For example, one respondent said that "GO buses need to run more frequently. An example would be the 25A…this currently runs every hour from each designated stop so if you miss it you'll be waiting another full hour for the next one". A male participant at the focus group session commented on hearing an executive speak about GO train improvements: "the CEO was saying…we are proud to say the GO train will have twelve wagons instead of ten…but…we need more frequent trains, not twelve instead of ten, it doesn't solve the problem. We need trains running the whole day." The longer the interruptions, and even headways, between vehicles, the more stress and frustration this causes riders. Those who attended the focus groups put the limit at twenty minutes, anything longer deters people from taking transit: "it causes stress on yourself. If you know with peace of mind that a bus is coming every fifteen or twenty minutes, I think the stress level would be coming down" (focus group participant, male).

A big issue for transit riders concerns the delays and problems introduced by having to transfer between routes: "getting around on public transit takes a lot more time if you have to transfer to other subways or buses". A respondent from Brampton noted that the buses often are highly delayed, especially during winter: "imagine having to wait 45 minutes in the cold"! Respondents also highlighted the fact that many transit systems do not coordinate their "transfer times…when the connecting bus leaves 2-3 minutes before you arrive". This presents problems for "meeting certain time constraints…If I have to work at 12, I have to leave my house over an hour earlier". A woman participant at the focus group session spelled this out clearly: "from here, you would need to take two buses. So one bus runs at least every fifteen minutes and the other one's running every twenty. But if you miss this particular bus on Airport Road, you've missed the other one, your waiting another extra twenty minutes. So you have to give yourself an extra forty-five minutes [to get to work]…It's frustrating". The additional time delays caused by having to transfer between routes, as well as the slow movement of buses during times of peak congestion, present a problem picking up children: "then it becomes a thing of daycares. Most of them close by six. So, you're commuting…and every five minutes they're charged [the kids, by the daycare, after hours]. Most of them are like 'OK six o'clock we wrap up' or 6:15. They'll hold off I think until 6:30… So, how do you pick up your child? They're being charged, so it becomes stressful for the parents" (focus group participant, female). Such issues increased frustration with the transit system. As one driver noted, "if I had to use transit all the time, it would be a pain. With car its not too bad".

A2. Scheduling. A specific problem for many low-income respondents involved the scheduling of transit services. This was mentioned by 11 percent of respondents, but almost 13 percent of low-income transit users. Low-income workers are more likely to work night shifts, weekends

and odd hours in general. If no transit is available, this compels them to use other modes to get to and from work. This was mentioned by respondents in a number of different contexts: "On Sundays and holidays the bus starts too late. We have to start working at 6am"; "the train only runs weekdays and only runs first thing in the morning. There is no access to a different train line when Georgetown train has problems". For those with low income, the lack of transit service often forces people to find others who can drive them: "They don't run transit on the weekends. So, there's no transit running on particular streets. So, somebody that needs to get to work still needs to get to work…so you have to find someone who can give you are ride" (focus group participant, female). As well, many low-income workers cannot afford to take time off from work on weekdays, and so must depend on weekends for shopping and other necessities: "It tells you right if you go on the website the buses don't run on weekends. I am thinking why is that? What happens to people who don't own cars? How do they get to the mall? Maybe their dentist is at the mall and they have go on a Saturday or you know on a Sunday" (focus group participant, female).

In addition to lack of service on weekends, many respondents complained of limited service in off hours, which even occurs in the middle of the day, taking those not familiar with the system by surprise. While demand may usually be lower in the middle of the day, the lack of service can have consequences, particularly for journeys that involve children: "my friend…couldn't get to her little girl, one day she [the girl] was sick, she goes 'I can't [pick her up] cause there's no GO that rides until 3'" (focus group participant, female). The lack of daytime service is compounded by the fact that bus schedules and times are no longer posted on most bus stops, so many potential riders cannot tell (without going online) when the service starts or stops. Some also said that the phone numbers provided were of no help:

> "It doesn't have to be only on weekends. I am an immigrant…I remember very well that one day some teacher of my daughter at school call me 'Ok she has fever' and to come pick up, and it was at 12:30 noon, right, I was waiting one hour and fifteen-twenty minutes at the bus stop, no bus. Finally, one lady she came and said 'there's no bus'. And I said 'how is possible, this is the bus stop?' And she said 'no this bus it just run from 6:30 to 9:30 and then from 4 to 7', and I was a completely idiot in the wrong place. And there is not even a sign on the bus stop, no information" (focus group participant, male)
>
> "but there is you know that phone number…" (other focus group participant, which prompted a third, female focus group participant to jump in:)
>
> "I used it and I couldn't get through. The line was busy…and my daughter…she's asking me 'Mom do you think the bus left like we might have missed it?' cause we're supposed to be here at eight, but I got there at 7:50 and I'm thinking we couldn't have missed it because we got here at 7:50 in the morning and the bus says it will be here at 8, so I said "Oh let me just call" on my cell phone and was just busy busy, and I'm like 'I don't know, we'll just have to stand here to wait it out and see what happens' cause I can't even get through to call someone to ask them 'did I miss the bus?"…[if] "you don't have a smart phone or have access to data and stuff, or a computer, so how are you going to know when your' next bus is going to come? …They used to have schedules, on the line, right on the bus stop. There's [now] nothing" (focus group participant, female).

It is for this reason that a common refrain among respondents is that “Buses time should be every 10 minutes all the time, even during weekend”. Similarly, a number of respondents criticized the limited GO train service on most lines (including, for many who live in Hamilton, that there are “not enough GO trains go from Hamilton to Union Station”): “The problems I face are that the Go trains only work during rush hours and the buses take twice the time of trains”. Many argued for “24hr subway and bus service; being "stranded" downtown because I missed the last train is ridiculous”. Likewise, “too many bus routes do not run past 7pm and people work all hours of day” and hence transit simply “doesn't run late enough to get home from work”. The following story was relayed at the focus group session about a friend of one of the female participants: “she can’t have an evening job working nights because the buses are so atrocious…she couldn't take the job, she had to refuse the job…so now, she’s continuously trying to look for work”. When transit schedules are not coordinated with the closing times of malls and retail workers, this also presents a problem for young people who are too young drive: “People work until nine o’clock at night. You know, sales or whatever they do, and the bus starts slowing down even more. They have to get home. It’s night time. You know 15 and 17 year olds. They’re still waiting for those buses.” (focus group participant, male). This problem of scheduling in off hours is of greater importance in areas with lower densities and generally lower transit usage, because demand for transit in such areas may dip below economic thresholds. In such cases, smaller transit vehicles or alternate transit systems might allow for transit service to be extended after hours.

B. Connectivity. A highly-related issue to trip timing is that of connectivity. While for many respondents the key issue reported was how long the entire journey took for them, many respondents also reflected on how connectivity, or lack of connectivity, provided an underlying reason for trips that are overly long in duration. About 43 percent of respondents discussed issues of connectivity or availability of transit in some way. The lack of connectivity, including lack of direct routes to places of work, or lack of any routes that might take them to where they needed to get to, was mentioned more often by drivers who did not have low income (49 percent), and many of these respondents said this was the main issue they had to avail themselves of private vehicles. Nonetheless, issues of (lack of) availability and connectivity of transit were mentioned slightly more often by low-income public transit users (roughly 40 percent), than those who do not have low income (36). The most common complaint was that routes that respondents could access did not connect to routes they would want to take, or that they connected at a central point that was too far away from where they would want to go. This is particularly a problem for those who need to cross municipal boundaries, and thus who need to transfer to other systems. For instance, one respondent complained that “there’s no direct bus service from here in Brampton to the Toronto and Hamilton areas”, while another noted that “there is no way of getting around the GTA unless you go through downtown Toronto taking a long time”. Another aspect of the problem relates to the multiple tickets that have to be purchased in order to transfer between systems. For example, “from Mississauga to Brampton we have to go to Toronto or Hamilton and buy another ticket”. For the GO system, routes that cross-connect suburban areas that do not require riders to pass through centrally-located hubs (downtown Toronto, Square One, etc) would improve connectivity across the region.

One of the big problems raised by these responses relates to the *hub and spoke system* that is often used by public transit agencies in the GTHBOA, but which provides only limited connections with other routes, both within a single municipal system and between those of other systems. This often means that transit riders have to sit on one line for a long time, often

suffering a long circuitous route, until it arrives at a main hub, and then transfer to another bus which could also then ply another circuitous route, meaning that the transit rider might put have to sit through far more kilometres than a relatively direct route would require. A number of respondents were critical of this approach, saying there are "not enough hubs with connectivity to various other transit", and "there are only limited buses I can take that go straight to my area, or I would have to bus it to the terminal and take a bus from there". Coupled with the infrequent headways, this means that "to reach a desired area we need to change 2-3 buses and of course long wait"; "where it takes only 15 minutes by car, it takes more than 2 hours to reach that stop and that too after having changed 2-3 buses". If routes are not run to a strict schedule, one route might arrive and leave early, requiring the user to suffer an additional wait. One respondent highlighted the problem as "connection with meeting other buses…drivers are not helpful in not wanting to call ahead".

The latter is even more of a problem when transferring to different municipal systems, as there is then even less chance that drivers might "call ahead" to ask a connecting route to wait at a stop. There are often few transfer points between different systems, when hub and spoke models are applied in each municipal jurisdiction separately. One of the women at the focus group noted how this often works:

> "I know one of the girls…she works downtown Brampton. So, she would have to take her bus to that clustered area there, to get on the [connecting] bus, and she said many times she's missed the bus. The bus left, and she was stuck there for twenty, twenty-five minutes waiting."

It might be noted that the hub and spoke system of routing, in which looping circuitous routes meet infrequently at main hubs (often shopping malls, but sometimes GO stations in the GTHBOA), has been largely discredited in the scholarly literature, in comparison with networked systems. Mees (2009) demonstrated the benefits of having a network system in which routes ply main arteries in relatively linear fashion in a grid-like structure, such that each route meets up with cross routes at major intersections. In such systems, it usually only ever takes two routes to get to one's preferred destination, and the amount of distance travelled per trip is minimized. Furthermore, such systems allow for more frequent headways, allowing for shorter transfer times and overall shorter trip times. Finally, networked systems such as this allow for more frequent and better connections to neighbouring municipal systems. However, because each municipality may be most concerned about maximizing the efficiency of their resources (mainly, keeping the number of buses to a minimum) and prioritizing local trips within their municipal boundaries (for instance, routing people to local malls where their spending will be captured for municipal revenues), they may not have much incentive to reform their system to better link with neighbouring systems. The responses of the survey suggest that one way Metrolinx could better serve the larger public of the GTHBOA is to use its authority to modify local municipal routing systems away from hub and spoke systems and toward network systems that link up with neighbouring systems. One of the strongest recommendations of this report is that municipal systems be restructured along the lines of grid-based networks.

C. Reliability is an issue that is highly related to the above discussion. When the frequency of transfers, and transfer points, is reduced (as in the hub and spoke system), there is even more dependency on the system running properly on schedule. Issues of reliability were raised by 18.5

percent of all respondents, but 25 percent of low-income respondents (and 24 percent of all public transit users), suggesting that improving the reliability of transit in the GTHBOA is an important *social equity issue* (these differences for public transit users and for low income travellers are both statistically significant). Indeed, many respondents reported that reliability issues had an impact on their ability to access and maintain employment. A common personal refrain of respondents is that "I am often late for work because of transportation problems". Respondents noted that "buses [are] always late and unorganized", and there are "constant issues with the GO train and switches on the track or some other maintenance". This is exacerbated by a lack of communication about problems as they arise: "There is no communication while waiting for a bus. Buses break down…and cause delays". A number of respondents expressed frustration at how large rain and snow storms are handled. Many reported that during some rain storms "the bus just doesn't come", or that "two days ago when weather was raining I had to stand in the station without shelter for 30 minutes".

Not only are delays an issue, but an important aspect of reliability relates to keeping to a proper schedule. In some cases, routes may 'run short', bunching up and leaving gaps in the schedule: "Sometimes you do see two, three buses going at the same time. If there's two buses together, they're missing all their times" (Focus group participant, male). Many respondents reported that the routes they would transfer to would leave early from their perches, making the timing of their trip unreliable and reducing their confidence in their ability to get to work on time:

> "you never know if you will get to work on time. Buses sometimes don't come, or they leave *early* from their stops"

A large problem occurs when "transferring to another bus, it would have already departed and I would miss the bus". As one of the focus group participants noted, "five minutes can make you or break you….it's really bad". Another noted "if the bus happens to get there early by any chance, that's it, that's the only time". A quote from one low-income respondent makes clear how keeping to a regular schedule and not leaving early from a stop is an equity issue with greater significance then merely trip times, and why some low-income people feel compelled to drive instead of take transit:

> "I had to get a car. I could never be sure if I would get to work on time. Both Brampton Transit and Mississauga Transit are unreliable. I was late to work too many times. I thought I was going to be fired".

Ensuring that drivers keep to their proper schedules such that routes meet their transfers at the correct times can thus help improve the employment prospects of low-income people while simultaneously reducing unnecessary automobile use in the GTHBOA. One of the male focus group participants laid out the solution:

> "Its an easy solution. If the bus is early, wait. He should wait there until the [departure] time…then he should proceed. Not drive by and say 'oh, nobody there' and go…If they say '8:15' they should wait until 8:15"

While delays might not always be avoided, the practice of leaving early from scheduled stops can be *easily eliminated*. Another strong recommendation of this report is that to improve transit

usage and benefits to low-income travellers, transit drivers should be required to wait at their stop until the scheduled departure times and to not leave early.

D. Cost of Transit. The third-most cited barrier mentioned by respondents (at 28 percent), but the top of the list among low-income public transit users (mentioned by over 73 percent of the latter group) is the cost of transit. This is in fact a multi-layered issue, with connections to each of the problems already discussed. First of all, those who depend on public transit on a daily basis and thus who have an interest in purchasing a monthly pass, complain about the cost of these passes (rather than individual fares): "monthly bus passes are very expensive and take a big chunk out of salary", especially for low income respondents who often noted things like "the cost of living is very stressfull, everything is too expensive, shopping, rent, bills". Respondents raised the inequity involved in giving discounts to wealthy seniors on monthly passes but not to the unemployed or low-income people of working age, suggesting that since the "price is high, so they should give a special price for low income".

Secondly, those who need to transfer between systems raised the cost of the transfer as an important issue. Many respondents raised the fact that "transport system is not unified, [I] need to pay extra just to cross one municipality to another even if total distance is short"; "problem is paying 2 fares to travel downtown"; "systems are not linked…it costs money every time you change lines". A big problem for many is that "you have to pay *extra* when you get to another city within the GTA". The cost of such multiple transfers was specifically mentioned by 9 percent of all respondents, but 14 percent of public transit riders, and over 15 percent of low-income transit riders. There was general agreement among participants at the focus group that one should be able to transfer among different transit systems on a single transfer, without having to pay extra, or acquire multiple cards. One focus group participant noted that where they immigrated from has a more equitable and seamless system than the GTHBOA:

> "I came from Sao Paulo in Brazil. In Sao Paulo you have this transfer that you receive. With this transfer you can take any other company for three hours, you don't need an extra card like a Presto. With this same transfer you can ride any other private or public company for three hours. You don't need to pay or load…" (focus group participant, male)

Third, a number of respondents complained that if their trip took longer than expected, perhaps due to reliability issues (delays, or if their connecting route left its perch early), then the time limits on their transfers would expire and they would be forced to shell out for another fare. Often respondents had not budgeted for this extra cost nor brought along funds for it, obviously presenting a problem for them when in fact the delays were of no fault of their own. Fourth, many specifically criticize the GO system as being too expensive: "if you are earning $11 an hour with only 4 hours of work, $7.50 everyday is a big cost in your income". It might be noted that this cost ($7.50) is much lower than is typical for the GO system, and those living farther away from work will pay much more than this. Recommendations of this report to deal with these issues include: 1) discounted monthly passes for low-income people which mirror those for seniors, 2) free transfers between municipal transit systems, 3) much longer time limits on paid transfers, and 4) reduced fares on the GO system for low-income riders.

D.2. Transfer Payment System. A problem raised by respondents to the survey, and in the focus group, is the transfer payment system. As noted above, there are the problems of coordinating payment using different payment systems, and in which the rules around paying for transfers are not clear (in some municipalities, those who transfer from the Presto system get a discount on local service costs, while in others there is no discount). Respondents argue that the "transit systems are too segregated" and suggest "there should be a regulated fare system from municipality to municipality" that allows for a single coordinated payment system. While the Presto card does this to some extent, participants at the focus group noted some of the problems with the system as it currently stands, and suggest that in many cases these problems reduce the desirability and usability of the Presto system. Here is the (edited) exchange:

> "The problem is, if you are short on it (on the Presto card), you have to keep going back to certain locations to load your card. You can't have the convenience of going to a variety store, you have to get physically to that location to reload that card….It was initially said that Brampton would have Presto that could be reloaded at Shoppers, at a variety store, and they took all of that out. I don't like that idea, I find that inconvenient…they should have something within the schools where students can reload their card if they want them to take the transit…Rec centres, they should be able, they're part of the City of Brampton, you should be able to reload your cards at rec centres" (focus group participant, female)
>
> "can you load by the internet?" (interviewer)
>
> "There is a way of reloading it [via the internet] but it takes over 24 hours. So, you can't even get – let's say you forgot do it until the night before, saying 'my goodness I have to get myself to the GO' so you decide to reload it, it is going to take you 24 hours - so you are not getting on with your Presto. And if you lose it, it is 6 dollars to activate a card, and it is 6 dollars to initially activate your card….And there's a lot of people who do not have computers" (focus group participant, female)
>
> "…if you lose the card, like I listened to this lady… she forgot to register her card, so, and she had a 100 dollars on it. She lost it, it's gone… and then [at the ticket counter], she said 'I did sign it up online' but the other lady [GO employee] kept saying 'no you did not, because your name is not here' but she was 'but I did'…I felt bad." (focus group participant, female)
>
> "So, if you keep adding these additional costs, basically, there is no exactly an advantage of having it" (focus group participant, male)

There would seem to be broad agreement that what is required is a single coordinated payment system for the entire region that would take into account the entirety of the trip, including any transfers across different systems, and that could be 'reloaded' at multiple physical locations, including everyday retail locations, high schools, and community centres.

E. In addition, a number of respondents raised issues that were less common, but nonetheless that highlighted existing problems with the transport system that act as barriers to accessibility and mobility. More common among drivers of private vehicles were complaints related to the cost of

purchasing a car, gasoline, and insurance (13.7 percent of those who drive or use non-transit modes raised this issue, compared to 7.3 of public transit users). As one person expressed it as such: "If you can afford it, you get a car, if not, you are stuck at the mercy of an unreliable system". Often such complaints accompanied a general feeling that much of the GTHBOA is inaccessible without a car, and thus that lack of a car or inability to afford a car represented an important barrier to mobility. This was particularly felt among low-income drivers (19 percent).

F. Feelings of ***discomfort, lack of safety, and over-crowding*** on public transit were also expressed, by about ten percent of respondents (but 13.6 percent of public transit riders, and 16 percent of low-income public transit riders). Most of the time, such concerns were due to over-crowding and the inability to get a seat, which sometimes led to conflicts over who might deserve to sit. Many respondents related such issues to a lack of frequency of service or to lack of capacity within the system or on vehicles: "sometimes the buses don't arrive on time and there can be too many people on the bus", while "capacity has not kept up with population increases. Buses are overloaded". A participant at the focus group session noted that the problem is made worse in suburban areas where lack of service frequency can put pressure on riders to get onto a bus even when there are no seats available, such that there are:

> "too many people waiting, trying to get on the same bus because they know that the next bus is going to be, the distance and time is too much and they need to get back either to home or to jobs, and it is vital for them to get on that bus. There needs to be more busing, more frequency…I remember taking the bus in the city (Toronto), because I lived in the city. I knew that at my door every five to every seven minutes, guaranteed there was going to be a bus. So, I if couldn't get on this one because it was full, it was OK to wait another five minutes because another bus would trail. Here if you don't get on a bus you got to push yourself on to that bus." (Brampton resident, female).

G. Strollers and Children. A relatively small, but nonetheless important segment (5.4 percent) of public transit users (and an even higher proportion of low-income transit users – 7.7 percent), raised the problem of using public transit to transport children, particularly when multiple children are involved or when strollers are being used. There are two distinct issues that were raised. 1) First of all, the design of buses and trains, and lack of elevators at many subway stations, makes it difficult to wheel strollers onto transit vehicles, and when one is able to do so, there is often insufficient space to park the stroller (particular during high-traffic times when vehicles can get overcrowded). Some respondents reported not being allowed on buses with large strollers, such as this respondent from Brampton: "This one is special for me, being a single mom with 2 kids (I have a double stroller). Sometimes for one reason or another the bus driver won't let you come on the bus". 2) The second issue involves the cost involved in paying fare for multiple children makes it uneconomical to use transit for transporting families, particularly during the week when family passes are often unavailable and monthly transit passes do not cover accompanying children. In order to serve better families with children who seek to use transit, redesigning the entrances to transit vehicles (larger doors, straight and flat entrance steps, 'stooping' buses, etc), and making space for strollers, even during rush hour, would help. Furthermore, allowing all children to accompany parents for free, both those paying regular fares and those using monthly passes, or alternatively selling discounted family passes on weekdays, would help deal with such barriers. Single parents with accompanying children could be given

discounted family passes, since with one less parent their families use less space on transit than would couple families with children.

H. Parking. A small number of respondents (3 percent) complained about the lack of adequate parking at transit stations (or elsewhere in the city). As might be expected, such complaints were much more common in the three study areas in located in lower-density suburban areas, and among those whose most common mode of transport is private vehicle.

I. Shelters. A similarly small number of respondents (1.7 percent overall, but 2.1 percent of transit users, and 2.5 percent of low-income transit users) mentioned the state or lack of external infrastructure meant to protect transit users from the elements at bus stops and stations as a barrier to travel on public transit, particularly if they "face the hardship of being forced to use the current transit system in severe weather". Respondents complained that "the bus stops are small and not suitable for winter", largely because they are "not cover[ed] well". Such complaints were more weighted toward those in the east Woodbridge study area, but similar issues abound across the GTHBOA. Along these lines, one of the participants at the focus group noted a design flaw in some of the shelters in Brampton, which do not convey much protection from the elements:

> "The shelters too…they're not fully sheltered, like half a wall. So, what happened to the other half of the wall? Everybody's frozen. When you're on the other side of the wall, you miss that little corner…" (focus group participant, female).

Ensuring the most bus stop have fully covered waiting areas would reduce the discomfort experienced by transit users as they wait for the bus.

J. Driver Behaviour. Finally, some respondents talked about ***disrespectful, rude or unhelpful*** transit staff, ticket agents and/or drivers as a problem that either made using transit unpleasant or turned them off from using transit altogether. While some such statements were not linked to other issues, some respondents linked driver attitudes to problems of ***reliability and connectivity***: "Some drivers have no respect, your knocking on the bus door and they drive off". One respondent from south-east Mississauga made this linkage explicit:

> "Buses sometimes don't come, or they leave early from their stops. There was this one bus driver who would leave the stop early and I could see it from the GO train window. He would leave the stop early and yet still be stuck at the [traffic] light leaving the station. I would arrive on the train and run up to the light, and go stand beside the door of the bus, but the driver refused to open the door, even though it was not yet even the scheduled time to leave his stop! That should not be allowed" (low-income survey respondent)

Another problem is when buses do not even stop at scheduled stops. Sometimes this occurs when a bus is full, but sometimes buses with plenty of room on board will neglect to stop. A woman participating in the focus group session reported that "I called and I complained once on a bus driver. My son was standing there and he just kept driving, he just drove right by him….he missed school". While there is a random element to customer interactions, the kind of behaviour described by these respondents, and a few others, is problematic. Because of the already-noted link between reliability (not leaving a stop early) and social equity (ability to access and maintain employment), public transit authorities should put in place policies to discourage behavior on

behalf of drivers that is disrespectful and hurtful to low-income riders, including rules for preventing buses from leaving their stops early. Thankfully, the low proportion of respondents making reference to rude or disrespectful drivers, coupled with the largely positive average likert scores on this issue in question 9 described above, demonstrates that such problems are not common across the GTHBOA, and thus largely the result of a few bad apples among a generally polite and helpful transit staff (Mississauga Transit, however, could be an exception to this, as a number of respondents specifically noted impolite or unhelpful drivers on Mississauga Transit).

5.c.iii. Barriers to Mobility and Accessibility among other Vulnerable Groups

How might the factors reported by respondents to the survey as representing barriers to travel relate to other vulnerable groups, besides those with low income already discussed above? Logit modeling, controlling for income, transport mode, and other socio-demographic variables in the survey, as well as differences in the distribution of social variables across the five study areas, was employed to ascertain which factors have independent statistically-significant effects for other key segments of the population identified in the literature as being vulnerable: women, families with children, single parents, seniors, and immigrants.

For the most part, the factors mentioned by each of these groups matches closely those of other groups, such that in most cases they are statistically similar. However, there are some clear differences worth noting. First of all, ***women*** respondents are 6.4 times more likely than men to say that the difficulties and costs of travelling with children, including the difficulties of travelling with strollers on buses, represent an important barrier to travel. This reflects the fact that women often take on additional responsibilities with regards to getting children to daycare or school, even if they are working. There were no other factors in which women revealed statistically-significant differences.

Meanwhile, respondents (of both genders) with ***children under 18 at home*** were statistically significantly more likely (2.8 times as likely) to say that the *time* involved in transferring between different transit routes and systems acted as a barrier to travel (after controlling for other variables and their distribution across the five study areas). This is likely related to two facets: 1) families with children at home on average live farther from work than those without children at home, so they will be more sensitive to delays that might be avoided (like those related to transferring between systems), and 2) families with children at home often face scheduling constraints related to the dropping or pickup up of children from school or after-school activities. Also, those with children still at home were 3.4 times as likely as others to discuss the difficulties of travelling with children and strollers on buses as a barrier preventing them from using transit. It should be noted that the effects of gender, and of having children at home, operate independently of each other here, and both are being controlled for simultaneously.

Among respondents who head ***single-parent families***, only one barrier is statistically-significantly mentioned more than others – the *cost* of transferring between systems. This is understandable given the greater dependence on public transit of single parent families, especially for longer commutes (Table 4.1), coupled with their generally lower incomes (Table 4.3) and longer times spent commuting (Table 5.7). For other factors, single parents reported no statistically-significant differences, suggesting that other barriers affect single-parent families to

roughly the same extent as other respondents. This also means that the difficulties of bringing children and strollers onto transit is felt relatively equally among all families with children, including but not restricted to single-parent families.

Seniors – those aged 65 and older – were not statistically-significantly more likely to mention any particular barrier than were respondents who are younger than 65, after controlling for other variables (including the fact that they are more represented in the Hamilton, SE Mississauga, and Agincourt study areas). However, seniors were statistically-significantly *less likely* to complain about the cost of travel, the condition of the buses, and feelings of lack of safety on transit, as well as the length of time it took to get around in general (although they were no less likely to complain about reliability, the time or cost of transfers, problems of connectivity, lack of full scheduling on weekends or evenings, rude drivers, or lack of routes). Seniors were roughly as likely as non-seniors to mention the difficulties of getting a seat in crowded situations, although seniors were about four times as likely to specifically mention the difficulties of climbing up the steps onto buses or in transit stations (although the numbers are too low for analysis of statistical significance). As with the case of stroller access, buses that are able to stoop, and having elevators in train and subway stations, help to alleviate this particular barrier.

Immigrants living in the GTHBOA who answered the survey, meanwhile, were statistically-significantly more likely to report that the cost of transferring between different transit systems represented a barrier to travel for them. This may be one reason why after more than ten years immigrants in Ontario were more likely to drive than are native-born commuters (Mercado et al., 2012). There were no other factors for which immigrants had statistically-significant differences from non-immigrants, once other variables were controlled for.

5.c.iv. Comparing Factors affecting Travel across Space

Comparing the list of barriers to travel across the five study areas sheds some light on the degree to which certain issues are specific to each place, and which places might be doing a better job at meeting the needs of public transit users or low-income riders (Table 5.10). As in Table 5.8, lower proportions on a given issue (which reflect positively on the issue being relatively less important in the study area in question) are coded green, while high proportions (indicating that a disproportionate number of respondents in the study area raised the issue as a potential problem or barrier) are coded orange. Issues for which the distribution across the five study areas is statistically significant are identified with a star.

Low-income respondents in the Hamilton Mountain study area would appear to be more sanguine about the barriers to transit use in the City of Hamilton than respondents elsewhere. An exception to this involves the problems of bringing children and strollers onto the buses, perhaps because Hamilton's bus fleet is older than other fleets and so has fewer 'stooping' buses. Agincourt respondents are second-most sanguine. This suggests that the transit systems in these two Cities – Toronto and Hamilton – are doing better at meeting low-income needs than in the other study areas. Meanwhile, low-income respondents, as well as all public transit riders, in Georgetown/ west Brampton are more likely to take the transit system to task for poor scheduling and time limits on transfers, and to bemoan the cost of cars, gasoline and auto insurance as a barrier to living properly. Low-income respondents in south-east Mississauga are more critical of the safety, comfort and crowding issues, and more likely to highlight the unhelpful and rude bus

drivers. Low-income respondents in east Woodbridge, meanwhile, are significantly more sensitive to the high cost of transfers between transit systems, and the lack of bus shelters to protect them from the harsh Canadian weather.

Table 5.10: Comparing the Barriers to Travel Across the 5 Study Areas

	Low Income - All Modes						Public Transit Users – All Incomes					
Study Areas	Total	Ham. Mtn	Georg/ W Bram	SE Miss	East Wood	Agin-Court	Total	Ham. Mtn	Georg/ W Bram	SE Miss	East Wood	Agin-Court
Trip Duration/ Timing, incl.:	62.0	**52.2**	70.5	**73.0**	61.8	**52.5**	66.0	56.9	72.3	**77.8**	66.7	**56.1**
Takes too long	40.3	**26.1**	**54.5**	48.6	40.0	32.5	39.0*	**13.7**	**57.4**	49.2	48.3	26.3
Frequency of service	36.2	28.3	**47.7**	**27.0**	45.5	32.5	41.9	41.2	46.8	38.1	**48.3**	**35.1**
Time spent transferring	18.1	15.2	20.5	**24.3**	18.2	**12.5**	16.7	15.7	14.9	**20.6**	18.3	**14.0**
Scheduling: weekends/nights	11.1*	**6.5**	**15.9**	13.5	7.3	12.5	11.0	11.8	12.8	**7.9**	8.3	**14.0**
Time limits on transfers	6.2*	6.5	**11.4**	5.4	5.4	**2.5**	5.8*	5.9	**8.5**	7.9	5.0	**1.8**
Accessibility via/to Transit, incl.:	36.9	**28.3**	36.4	**45.9**	36.4	37.5	37.6	**39.2**	36.2	38.1	**39.2**	**35.1**
Lack of connectivity	21.9	19.6	**18.2**	**29.7**	21.8	20.0	23.0	21.6	**17.0**	**30.2**	23.3	22.8
Lack of routes	12.1	**8.7**	11.4	10.8	**14.5**	15.0	9.7*	9.8	6.4	**3.2**	**16.7**	12.3
Distance to local stops	6.5*	**0.0**	4.5	**10.8**	7.3	10.0	8.2*	**3.9**	10.6	6.3	**13.3**	7.0
Direction of routes	3.1	**2.2**	**4.5**	2.7	3.6	2.5	2.2	**3.9**	2.1	**1.6**	1.7	1.8
Cost	66.7	77.8	55.6	65.8	**83.3**	**51.1**	43.2	**33.3**	41.7	39.1	**56.7**	45.0
Cost of Transfers	11.1*	**4.3**	11.4	8.1	**21.8**	10.0	14.4*	**2.0**	14.9	14.3	**25.0**	15.8
Reliability	25.0	23.9	**36.4**	29.7	20.0	**17.1**	22.2	21.6	**29.8**	23.8	18.3	**17.5**
Cost of Vehicle, Gas, Insurance	12.0*	**6.5**	**20.5**	10.8	7.3	12.5	7.3*	**0.0**	**14.9**	4.8	5.0	12.3
Safety, Crowding, Comfort	12.4*	10.9	**6.8**	**21.6**	12.7	10.0	13.6	**17.6**	**10.6**	15.9	11.7	12.3
Difficult re Families, Strollers	4.5*	**10.9**	9.1	0.0	0.0	2.5	5.4*	**13.7**	8.5	3.2	**0.0**	1.8
Parking: lack of, cost	3.0*	2.2	4.5	2.7	**5.5**	**0.0**	2.3*	0.0	0.0	**6.3**	3.3	1.8
External Infrast. (shelters, etc)	2.0*	0.0	0.0	2.7	**7.3**	0.0	2.1*	0.0	2.1	0.0	**8.3**	0.0
Rudeness/Unhelpfullness	2.8*	4.3	2.3	**5.4**	1.8	**0.0**	1.9	**3.9**	2.1	1.6	1.7	0.0

Notes: Study area names have been abbreviated. **Green bold** = lowest proportion of survey respondents reporting this problem among the five study areas; **Orange bold** = largest proportion of survey respondents reporting this problem among the five study areas. (*) Statistically-significant variation in results across the five study areas.

Among public transit riders as a whole, the most amenable respondents are found in Agincourt (the higher proportion of those mentioning scheduling issues is not statistically significant), followed by respondents in the Hamilton Mountain study area (again, excepting the issue of taking children and strollers on buses, which is statistically significant), suggesting that the public transit systems in these two Cities are meeting the needs of public transit riders in these study areas better than those found in the outer suburbs. In addition to the issues already identified above (transfer time limits, and the cost of cars/gas/insurance), Georgetown/ west Brampton respondents who used public transit were statistically-significantly more likely to say transit took too long. Public transit riders in south-east Mississauga were more likely to complain about a lack of parking at transit stations. And, in addition to listing the high cost of transfers and lack of adequate bus shelters, east Woodbridge public transit riders were more likely to say the distance to their local stops was too far, and there is a lack of sufficient transit routes. (Separate Tables outlining the distribution of responses in each study area can be found in Tables A6 through A10 in Appendix A).

This research has found a diversity of different factors and barriers to travel raised by respondents to the survey. While this last section has detailed some of the variation among the five study areas in responses to these questions, in turn highlighting the influence of local context in producing or ameliorating different barriers to travel, the previous sections documented the

importance of a series of factors impeding mobility and transit accessibility across the GTHBOA, for low-income respondents, for public transit riders, and for other vulnerable groups. The results presented above point to a series of recommendations that would be helpful for ameliorating the barriers limiting mobility and accessibility via transit in the GTHBOA, given the issues raised by the survey respondents. The next section details these recommendations.

6. Recommendations for Addressing the Barriers to Travel Among Low-Income and Vulnerable Groups

The survey analysis reported on herein points to a number of improvements that could be made to reduce the barriers to public transit travel in the GTHBOA among those with low income and other vulnerable social groups, given how they have responded to the survey. Below, the ten most important recommendations for reducing the barriers to transit travel among these groups are presented. These recommendations derive directly from the findings and analysis discussed in section 5 above.

Recommendation 1: Discounted monthly/ daily passes, children accompany parents for free

Justification: Wealthy seniors are often provided with discounts on monthly passes, but low-income people of working age typically receive no discount, which works to inhibit mobility among the latter group, or to encourage them to use more expensive modes (private vehicles, etc). As well, family passes are often not available on weekdays, if at all. Many respondents noted that it is uneconomical to travel on public transit with children, due to the additional cost, and some noted that this was a significant barrier to public transit use for them. Single parents currently receive no discount on family passes, even though the lack of a second parent means fewer travellers on average.

Recommendation: For all low-income travellers, monthly and daily passes should be offered at the same discount rate paid by seniors. Family day passes should be offered on weekdays as well as weekends, and single parents should be given a special discount on these. For single rides, children up to a certain age should be allowed to accompany parents for free, at all times.

Recommendation 2: Routes should never leave their perch/stop early, and always stop when someone is requesting to board

Justification: Many respondents noted that they could not trust the transit system to get them to work on time if they needed to transfer to other routes or systems, often because the connecting route would leave its perch or stop early, in turn making them wait for long periods of time for the next bus or train to arrive. Some respondents reported having to resort to driving to work because of this problem, and to having it impact their employment prospects. Respondents stated that it is worse to depart early than to depart late, since at least in the latter case they would make their connection. Low-income travellers typically depend more than others on public transit, but often feel neglected or disrespected by how this need is not recognized. One aspect of this concerns routes that do not wait the proper time for connecting routes to arrive before departing.

Recommendation: All routes should adhere as best as possible to their allotted schedules, should not be allowed to ‘run short’, and should never, for any reason, leave their perch or stop early. Whenever a scheduled transfer is meant to occur, the connecting route should wait for the providing route to arrive. Drivers should ‘call ahead’ to ensure connections are made, and communicate when adjustments to the schedule might need to be made. If a passenger is running late and is within view, drivers should always wait to pick them up. If a passenger is waiting at a stop, the driver should always stop, even if they are full and must tell the passenger they cannot

accommodate them. If a passenger knocks on the door or window of a bus that is not moving they have arrived at and wish to board, the driver should always open the door to let them board, even if this occurs slightly after the scheduled departure time.

Recommendation 3: GO and VIVA rates should be reduced, or discounted for low-income travellers

Justification: Many low-income respondents said that the high cost of GO and Viva systems prevented them from using them, or that they were so expensive as to reduce their ability to consume basic items related to daily needs. The fares for these systems are very high for those riders earning the minimum wage. A number of respondents noted that it was cheaper to drive than to use these systems, except for trips that terminate right in downtown Toronto, and that this discouraged them from using such systems unless absolutely necessary.

Recommendation: Reduce fares on GO and Viva systems, or provide discounted fares for low-income riders. The latter should be relatively easy to implement, once recommendation 5 (below) is implemented.

Recommendation 4: Free or minimal cost transfers between different systems, with extended time limits on transfers

Justification: A large number of respondents, including not only low-income respondents but also (statistically-significantly) single parents and immigrants, said that the cost of transferring between different transit systems (between different municipal systems, or between a local municipal system and the GO system) acted as a significant barrier to them using public transit for longer journeys. Furthermore, a number of respondents said that because of missed transfers (at times because routes had left their perches early, see recommendation 2 above), the time limit on their transfers had expired, forcing them to pay twice for the journey, adding to frustration and embarrassment, and among low-income travellers, lack of affordability.

Recommendation: Once a rider boards one system, they should be able to transfer to adjoining systems for either no additional cost, or for a very minimal additional cost, and to use the same fare-transfer system for this purpose. Time limits on transfers, both for journeys made on the same system and for transfers to adjoining systems, should be extended to take into account the lack of reliability of arriving on schedule for connecting routes (which would be reduced if recommendation 2 is implemented properly).

Recommendation 5: Implement a single integrated fare-payment system across *all* local and regional transit systems, and allow cards to be 'reloaded' at multiple everyday locations

Justification: In addition to the cost of multiple fare systems (see recommendation 3), respondents voiced confusion and frustration at having to find money for second fares, and with the inability to use payment cards from one system in another system. Also, the rules for applying discounts when connecting to adjoining systems vary between systems, adding to confusion and frustration, and acting as a barrier to travel for low-income travellers in particular, as in some cases there is very little or no discount. Finally, frustration was voiced that Presto cards could not

be ‘reloaded’ at schools, community centres, or variety stores, particularly given that not everyone can access the internet, or easily get to a GO station.

Recommendation: Implement a single integrated fare-payment system that will work across all local and regional transit systems. Allow the same payment system to be used for payment on all local and regional systems. Apply the same rules regarding discounts when transferring to adjoining systems. The Presto card system already accomplishes this in some locations – this logic should be extended to all transit jurisdictions and the rules for applying discounts when transferring between systems should equalized across all systems. Allow the Presto card to be ‘reloaded’ at schools, community centres, city halls and other public buildings, and common variety stores.

Recommendation 6: Restructure local Municipal public transit routes along the lines of grid-based networks

Justification: The hub-and-spoke model of transit service routing most often employed in the GTHBOA (in which routes typically meander via circuitous routes between between key hubs where most transfers to other routes must take place), adds significant amounts of waiting time and transfer time to journeys, makes transfers to other systems more difficult, and is discredited in the scholarly literature. Respondents report that when they have to take two or more routes, this significantly adds to their duration of their trip, and this acts as as a significant deterrent to using transit. The literature suggests that the state of the art transit system involves a series of routes plying key arterials in a grid-like fashion, with transfer points thus occurring frequently with all other routes at the intersections of the arterials. This network structure is shown in the literature to reduce travel times, to typically reduce the number of transfers riders must make to a single transfer, and to facilitate much better integration with adjoining transit systems.

Recommendation: Restructure transit routing in local municipal transit systems so that a majority of routes ply the main arterials in a grid-like network form, meeting up with cross routes and adjoining municipal transit systems at major intersections. Some looping circuitous routes could be kept for instances in which large local neighbourhoods with winding indirect streets mean that many residences are located far away from the main arterials, and some hubs could be kept for those destinations (train stations, local malls) with significant demand as long as they are in the direct path of the major routes. But any looping routes should also be used to deliver local residents onto the main arterial routes, and should allow for significant multiple transfer points to other routes.

Recommendation 7: Extend transit service on weekends and after hours

Justification: Many respondents, including many low-income respondents (who, if working, are more likely to have to work in night shifts or weekends than those who do not have low income), report that the lack of adequate service in off hours acts as a barrier to them using public transit. Some respondents said they would like to use public transit, but could not because it is simply not available at the time they need it.

Recommendation: There should be sufficiently regular and reliable transit service during weekends and during off hours when shift workers might need to travel. Smaller transit vehicles,

or alternate transit vehicles (use of buses instead of trains during after hours, as the GO system already does for some train routes) would help meet this demand. Ideally, all major routes should run on regular schedules 7 days per week.

Recommendation 8: Provide fast cross-connecting lines between suburban areas

Justification: Many places of work are located outside of the census business districts. Existing routing often means one has to travel toward the centre in order to transfer onto other routes. Those wishing to travel between suburban areas must often travel toward the centre and then transfer onto routes heading back out to the edges in a slightly different direction. This significantly adds to the time it takes to travel between suburban areas, to such an extent that many said it is simply not worth doing, particularly when the trip undertaken via private vehicle takes a fraction of this time.

Recommendation: new high-speed train or BRT lines should be built between and across suburban areas, connecting different local municipal transit systems and regional (GO) transit systems at key nodes.

Recommendation 9: Provide fully weather-protected shelters on all regular routes

Justification: Respondents living in areas without covered shelters reported significant discomfort having to wait for buses unprotected from the elements, and some said this acted as a deterrent to their use of the transit system. Shelters that only partially protect passengers from the elements also caused discomfort. This problem contributes to the feeling, held more strongly by low-income people, that "only those without choice use public transit", thus adding to the stigma attached to public transit systems and their riders, and speeding up the decision on behalf of some travellers to purchase a private vehicle.

Recommendation: Provide fully weather-protected shelters on all regular routes, in cases where they do not yet exist

Recommendation 10: Provide space for strollers, and work towards continually improving stroller and wheelchair accessibility

Justification: While major progress has been made in providing access to those with wheelchairs and strollers, respondents report that this still remains an issue on some routes, and that the lack of space for strollers on buses and trains acts as a barrier to using transit. Seniors, parents with strollers, and those using wheelchairs reported having difficulty when elevators are not present. Some respondents report not being allowed to bring strollers on buses.

Recommendation: Design space for strollers into all buses and trains, and always allow strollers on all transit vehicles. Provide elevators where possible for access to train stations or bus hubs that are not at grade. Provide 'stooping' buses on routes where they do not yet exist, so that strollers, seniors, and wheelchairs can enter easily.

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APPENDIX A

Table A1: Average Score, Agreement/Disagreement with Statements on Public Transit, Hamilton Mountain Study Area

	ALL MODES			PUBLIC TRANSIT			OTHER MODES		
Hamilton Mountain Centre	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*
Transit is safe	3.86	3.88	3.86	4.18	4.07	4.26	3.75	3.68	3.76
Transit is affordable	3.24	3.12	3.27	3.55	3.17	3.83	3.11	3.07	3.12
I can count on how long it takes...	3.43	3.21	3.49	3.70	3.43	3.90	3.32	3.00	3.38
You have to wait a long time at the stop	3.16	3.28	3.12	3.18	3.32	3.08	3.15	3.24	3.14
I am comfortable with being w/ strangers…	3.27	3.31	3.26	3.35	3.55	3.20	3.24	3.07	3.28
Too crowded, often hard to get a seat	3.34	3.53	3.29	3.54	3.78	3.38	3.26	3.29	3.26
I can easily walk to a stop from my home…	4.27	4.32	4.25	4.52	4.46	4.56	4.17	4.18	4.17
Transit comes frequently at my stop...	3.67	3.54	3.71	3.69	3.59	3.77	3.66	3.50	3.69
Too slow, takes too much time	3.07	3.18	2.97	3.00	3.25	2.82	3.04	3.14	3.01
Reliable, I can count on it...	3.64	3.50	3.68	3.68	3.62	3.73	3.62	3.37	3.67
Transit takes me where I want to go	3.65	3.63	3.66	3.94	3.86	4.00	3.54	3.37	3.57
Too many transfers to get where I want to go	3.05	3.36	2.95	3.03	3.26	2.87	3.06	3.46	2.98
Vehicles are comfortable	3.37	3.28	3.39	3.33	3.38	3.29	3.38	3.18	3.42
Hard to get route info	2.90	3.00	2.86	2.53	2.82	2.33	3.03	3.18	3.01
Transit staff are polite, helpful	3.57	3.47	3.60	3.58	3.66	3.53	3.56	3.29	3.62
Only people without choice use public transit	2.98	3.09	2.94	2.91	3.00	2.85	3.00	3.18	2.97

Notes: Scores are out of 5: 1 = strongly disagree, 3 = neither agree nor disagree, 5 = strongly agree

Table A2: Average Score, Agreement/Disagreement with Statements on Public Transit, West Brampton/ Georgetown Study Area

	ALL MODES			PUBLIC TRANSIT			OTHER MODES		
W Brampton/ Georgetown	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*
Transit is safe	3.90	3.96	3.87	3.88	3.90	3.88	3.90	4.00	3.87
Transit is affordable	2.81	2.90	2.78	2.69	2.60	2.75	2.85	3.10	2.79
I can count on how long it takes...	3.26	3.33	3.21	3.02	3.37	2.81	3.34	3.46	3.31
You have to wait a long time at the stop	3.50	3.49	3.50	3.63	3.74	3.56	3.45	3.32	3.48
I am comfortable with being w/ strangers…	3.31	3.49	3.25	3.19	3.55	2.97	3.35	3.45	3.33
Too crowded, often hard to get a seat	3.34	3.02	3.45	3.51	3.05	3.81	3.28	3.00	3.35
I can easily walk to a stop from my home…	3.44	3.46	3.44	3.82	3.42	4.06	3.32	3.48	3.28
Transit comes frequently at my stop...	2.93	3.26	2.82	3.04	3.15	2.97	2.90	3.33	2.79
Too slow, takes too much time	3.33	3.20	3.41	3.44	3.20	3.49	3.23	3.00	3.29
Reliable, I can count on it...	3.25	3.06	3.32	3.12	2.85	3.30	3.30	3.21	3.32
Transit takes me where I want to go	3.21	3.54	3.11	3.75	3.80	3.71	3.03	3.36	2.95
Too many transfers to get where I want to go	3.43	3.44	3.43	3.22	3.26	3.19	3.51	3.55	3.50
Vehicles are comfortable	3.65	3.92	3.56	3.55	3.90	3.32	3.69	3.93	3.63
Hard to get route info	2.91	2.98	2.89	2.88	2.80	2.94	2.93	3.10	2.88
Transit staff are polite, helpful	3.38	3.31	3.41	3.36	3.42	3.32	3.39	3.24	3.43
Only people without choice use public transit	3.23	3.52	3.13	3.22	3.50	3.03	3.24	3.53	3.16

Notes: Scores are out of 5: 1 = strongly disagree, 3 = neither agree nor disagree, 5 = strongly agree

Table A3: Average Score, Agreement/Disagreement with Statements on Public Transit, SE Mississauga Study Area

	ALL MODES			PUBLIC TRANSIT			OTHER MODES		
SE Mississauga	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*
Transit is safe	3.91	3.82	3.94	3.86	3.73	3.93	3.93	3.91	3.94
Transit is affordable	2.84	2.60	2.92	2.84	2.52	3.02	2.84	2.68	2.88
I can count on how long it takes...	3.47	3.33	3.51	3.39	2.96	3.65	3.51	3.80	3.45
You have to wait a long time at the stop	3.41	3.35	3.43	3.35	3.31	3.37	3.44	3.41	3.45
I am comfortable with being w/ strangers…	3.42	3.24	3.47	3.37	3.12	3.52	3.44	3.39	3.45
Too crowded, often hard to get a seat	3.57	3.69	3.53	3.74	3.77	3.72	3.47	3.59	3.45
I can easily walk to a stop from my home…	3.99	3.92	4.02	4.03	3.81	4.16	3.98	4.05	3.96
Transit comes frequently at my stop...	3.35	3.27	3.38	3.29	3.23	3.33	3.39	3.32	3.40
Too slow, takes too much time	3.27	3.27	3.27	3.20	3.12	3.26	3.31	3.45	3.27
Reliable, I can count on it...	3.59	3.34	3.68	3.29	3.13	3.44	3.74	3.59	3.77
Transit takes me where I want to go	3.60	3.70	3.56	3.81	3.81	3.81	3.48	3.57	3.45
Too many transfers to get where I want to go	3.29	3.17	3.33	3.23	3.42	3.12	3.32	2.86	3.42
Vehicles are comfortable	3.56	3.56	3.55	3.52	3.50	3.53	3.57	3.64	3.56
Hard to get route info	2.73	2.51	2.80	2.54	2.46	2.58	2.84	2.57	2.89
Transit staff are polite, helpful	3.52	3.53	3.51	3.43	3.58	3.34	3.63	3.91	3.57
Only people without choice use public transit	2.97	2.88	3.01	2.75	2.62	2.84	3.10	3.17	3.08

Notes: Scores are out of 5: 1 = strongly disagree, 3 = neither agree nor disagree, 5 = strongly agree

Table A4: Average Score, Agreement/Disagreement with Statements on Public Transit, East Woodbridge Study Area

	ALL MODES			PUBLIC TRANSIT			OTHER MODES		
E Woodbridge	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*
Transit is safe	3.96	3.92	3.98	4.04	4.11	3.97	3.91	3.68	3.98
Transit is affordable	2.69	2.49	2.79	2.73	2.43	3.03	2.66	2.58	2.69
I can count on how long it takes...	3.21	3.17	3.23	3.42	3.19	3.65	3.07	3.14	3.05
You have to wait a long time at the stop	3.50	3.29	3.61	3.45	3.51	3.39	3.54	3.00	3.71
I am comfortable with being w/ strangers…	3.42	3.24	3.52	3.55	3.58	3.51	3.34	2.79	3.52
Too crowded, often hard to get a seat	3.30	2.94	3.49	3.34	2.92	3.78	3.27	2.96	3.37
I can easily walk to a stop from my home…	3.26	3.39	3.19	3.47	3.45	3.49	3.13	3.32	3.07
Transit comes frequently at my stop...	2.79	3.05	2.65	3.05	3.08	3.03	2.62	3.00	2.49
Too slow, takes too much time	3.41	3.35	3.44	3.04	3.13	2.95	3.64	3.64	3.64
Reliable, I can count on it...	3.27	3.27	3.27	3.23	3.03	3.43	3.29	3.57	3.20
Transit takes me where I want to go	3.14	3.34	3.04	3.60	3.47	3.73	2.84	3.15	2.75
Too many transfers to get where I want to go	3.61	3.48	3.68	3.21	3.45	2.97	3.87	3.52	3.98
Vehicles are comfortable	3.92	3.81	3.98	4.07	3.92	4.22	3.83	3.68	3.88
Hard to get route info	2.76	2.92	2.67	2.66	2.89	2.43	2.82	2.96	2.77
Transit staff are polite, helpful	3.62	3.68	3.57	3.72	3.61	3.83	3.48	3.54	3.47
Only people without choice use public transit	3.47	3.51	3.45	3.32	3.54	3.11	3.57	3.46	3.60

Notes: Scores are out of 5: 1 = strongly disagree, 3 = neither agree nor disagree, 5 = strongly agree

Table A5: Average Score, Agreement/Disagreement with Statements on Public Transit, Agincourt Study Area

	ALL MODES			PUBLIC TRANSIT			OTHER MODES		
Agincourt	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*	TOTAL	Low Income	Not Low Income*
Transit is safe	3.92	4.06	3.85	3.99	4.16	3.84	3.87	3.91	3.86
Transit is affordable	2.91	3.20	2.75	2.87	3.16	2.61	2.94	3.25	2.83
I can count on how long it takes...	3.26	3.36	3.20	3.21	3.22	3.21	3.29	3.54	3.19
You have to wait a long time at the stop	3.36	3.34	3.37	3.21	3.13	3.29	3.48	3.63	3.42
I am comfortable with being w/ strangers…	3.28	3.45	3.19	3.33	3.34	3.32	3.24	3.58	3.11
Too crowded, often hard to get a seat	3.62	3.51	3.69	3.69	3.55	3.82	3.57	3.46	3.61
I can easily walk to a stop from my home…	4.03	4.00	4.05	4.07	3.91	4.21	4.00	4.13	3.95
Transit comes frequently at my stop...	3.28	3.41	3.20	3.44	3.56	3.34	3.14	3.21	3.11
Too slow, takes too much time	3.33	3.21	3.40	3.33	3.09	3.54	3.34	3.38	3.32
Reliable, I can count on it...	3.27	3.28	3.27	3.23	3.15	3.29	3.31	3.46	3.26
Transit takes me where I want to go	3.60	3.84	3.47	3.79	3.94	3.66	3.45	3.71	3.35
Too many transfers to get where I want to go	3.29	3.32	3.28	3.39	3.42	3.35	3.21	3.17	3.23
Vehicles are comfortable	3.50	3.61	3.44	3.72	3.67	3.76	3.32	3.54	3.24
Hard to get route info	2.89	2.88	2.89	2.94	2.88	3.00	2.84	2.88	2.82
Transit staff are polite, helpful	3.43	3.49	3.39	3.37	3.42	3.32	3.48	3.58	3.44
Only people without choice use public transit	3.19	3.42	3.06	3.06	3.36	2.79	3.30	3.50	3.22

Notes: Scores are out of 5: 1 = strongly disagree, 3 = neither agree nor disagree, 5 = strongly agree

……

Table A6: Factors acting as Barriers to Travel, Hamilton Mountain Study Area

Hamilton Mountain Centre	ALL MODES (%)				PUBLIC TRANSIT USERS (%)				OTHER MODES (%)			
	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd
Trip Duration/ Timing, incl.:	48.7	52.2	49.1	43.2	56.9	61.9	45.8	83.3	45.7	44.0	50.0	35.5
Frequency of service	28.8	28.3	30.6	24.3	41.2	47.6	33.3	50.0	24.3	12.0	29.8	19.4
Takes too long	21.5	26.1	19.4	21.6	13.7	14.3	8.3	33.3	24.3	36.0	22.6	19.4
Time spent transferring	11.5	15.2	13.9	0.0	15.7	14.3	20.8	0.0	10.0	16.0	11.9	0.0
Scheduling: weekends/nights	10.5	6.5	13.0	8.1	11.8	9.5	16.7	0.0	10.0	4.0	11.9	9.7
Time limits on transfers * **	2.6	6.5	1.9	0.0	5.9	9.5	4.2	0.0	1.4	4.0	1.2	0.0
Accessibility via/to Transit, incl.:	33.5	28.3	38.0	27.0	39.2	47.6	37.5	16.7	31.4	12.0	38.1	29.0
Lack of connectivity **	16.2	19.6	19.4	2.7	21.6	33.3	16.7	0.0	14.3	8.0	20.2	3.2
Lack of routes	9.9	8.7	8.3	16.2	9.8	14.3	4.2	16.7	10.0	4.0	9.5	16.1
Direction of routes	5.2	2.2	7.4	2.7	3.9	4.8	4.2	0.0	5.7	0.0	8.3	3.2
Distance to local stops	3.1	0.0	4.6	2.7	3.9	0.0	8.3	0.0	2.9	0.0	3.6	3.2
Cost * **	24.2	77.8	8.3	7.5	33.3	71.4	4.3	14.3	21.0	83.3	9.3	6.1
Cost of Transfers	2.1	4.3	0.9	2.7	2.0	4.8	0.0	0.0	2.1	4.0	1.2	3.2
Reliability *	16.8	23.9	13.0	18.9	21.6	19.0	25.0	16.7	15.0	28.0	9.5	19.4
Safety, Crowding, Comfort **	7.9	10.9	7.4	5.4	17.6	19.0	16.7	16.7	4.3	4.0	4.8	3.2
Difficult re Families, Strollers	7.3	10.9	6.5	5.4	13.7	19.0	12.5	0.0	5.0	4.0	4.8	6.5
Cost of Vehicle, Gas, Insurance	4.7	6.5	4.6	2.7	0.0	0.0	0.0	0.0	6.4	12.0	6.0	3.2
Rudeness/ Unhelpfullness	1.6	4.3	0.9	0.0	3.9	4.8	4.2	0.0	0.7	4.0	0.0	0.0
Parking: lack of, cost	1.6	2.2	1.9	0.0	0.0	0.0	0.0	0.0	2.1	4.0	2.4	0.0
External Infrast. (shelters, etc)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes: These results show the percentage (%) of respondents in each category who listed each of these issues as representing a barrier to travel in questions 5, 6, 7 and 8 in the respondent survey. Respondents could list as many issues as they liked. (*) Statistically-significant difference in the proportions of those with low income versus non-low income respondents listing this issue (typically, low-income respondents raised this issue significantly more than those without low income). (**) Statistically-significant difference in the proportions of public transit users versus users of other modes listing this issue (typically, public transit users raised this issue significantly more than others).

Table A7: Factors acting as Barriers to Travel, Georgetown/West Brampton Study Area

Georgetown/ West Brampton	ALL MODES (%)				PUBLIC TRANSIT USERS (%)				OTHER MODES (%)			
	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd
Trip Duration/ Timing, incl.:	65.7	70.5	67.4	55.6	72.3	73.7	76.5	63.6	63.2	68.0	65.3	52.0
Takes too long	48.8	54.5	51.1	36.1	57.4	63.2	64.7	36.4	45.6	48.0	48.0	36.0
Frequency of service	43.6	47.7	44.6	36.1	46.8	52.6	35.3	54.5	42.4	44.0	46.7	28.0
Time spent transferring	16.9	20.5	18.5	8.3	14.9	21.1	17.6	0.0	17.6	20.0	18.7	12.0
Scheduling: weekends/nights	13.4	15.9	13.0	11.1	12.8	15.8	11.8	9.1	13.6	16.0	13.3	12.0
Time limits on transfers **	4.7	11.4	3.3	0.0	8.5	21.1	0.0	0.0	3.2	4.0	4.0	0.0
Accessibility via/to Transit, incl.:	46.5	36.4	53.3	41.7	36.2	26.3	41.2	45.5	50.4	44.0	56.0	40.0
Lack of connectivity	29.7	18.2	37.0	25.0	17.0	10.5	23.5	18.2	34.4	24.0	40.0	28.0
Lack of routes	14.0	11.4	15.2	13.9	6.4	0.0	11.8	9.1	16.8	20.0	16.0	16.0
Distance to local stops	9.9	4.5	10.9	13.9	10.6	10.5	5.9	18.2	9.6	0.0	12.0	12.0
Direction of routes	5.2	4.5	7.6	0.0	2.1	0.0	5.9	0.0	6.4	8.0	8.0	0.0
Cost * **	24.6	55.6	15.2	12.8	41.7	78.9	11.8	25.0	18.5	38.5	15.9	7.4
Cost of Transfers	9.9	11.4	10.9	5.6	14.9	21.1	11.8	9.1	8.0	4.0	10.7	4.0
Reliability **	23.8	36.4	21.7	13.9	29.8	31.6	35.3	18.2	21.6	40.0	18.7	12.0
Cost of Vehicle, Gas, Insurance	23.3	20.5	25.0	22.2	14.9	0.0	29.4	9.1	27.2	36.0	24.0	28.0
Safety, Crowding, Comfort	8.1	6.8	8.7	8.3	10.6	10.5	5.9	18.2	7.2	4.0	9.3	4.0
Difficult re Families, Strollers	4.7	9.1	4.3	0.0	8.5	15.8	5.9	0.0	3.2	4.0	4.0	0.0
Parking: lack of, cost	2.9	4.5	2.2	2.8	0.0	0.0	0.0	0.0	4.0	8.0	2.7	4.0
External Infrast. (shelters, etc)	1.7	0.0	2.2	2.8	2.1	0.0	0.0	9.1	1.6	0.0	2.7	0.0
Rudeness/ Unhelpfullness	1.2	2.3	1.1	0.0	2.1	0.0	5.9	0.0	0.8	4.0	0.0	0.0

Notes: see Table A6

Table A8: Factors acting as Barriers to Travel, South-East Mississauga Study Area

SE Mississauga	ALL MODES (%)				PUBLIC TRANSIT USERS (%)				OTHER MODES (%)			
Site	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd
Trip Duration/ Timing, incl.:	78.0	73.0	79.4	79.2	77.8	72.7	85.7	50.0	78.1	73.3	76.4	88.9
Takes too long	60.1	48.6	61.7	70.8	49.2	36.4	57.1	50.0	66.7	66.7	63.9	77.8
Frequency of service	34.5	27.0	38.3	29.2	38.1	18.2	54.3	16.7	32.4	40.0	30.6	33.3
Time spent transferring **	16.1	24.3	15.0	8.3	20.6	22.7	22.9	0.0	13.3	26.7	11.1	11.1
Scheduling: weekends/nights	9.5	13.5	9.3	4.2	7.9	9.1	8.6	0.0	10.5	20.0	9.7	5.6
Time limits on transfers **	5.4	5.4	5.6	4.2	7.9	9.1	8.6	0.0	3.8	0.0	4.2	5.6
Accessibility via/to Transit, incl.:	43.5	45.9	43.9	37.5	38.1	40.9	37.1	33.3	46.7	53.3	47.2	38.9
Lack of connectivity	32.1	29.7	32.7	33.3	30.2	27.3	31.4	33.3	33.3	33.3	33.3	33.3
Lack of routes	10.1	10.8	12.1	0.0	3.2	4.5	2.9	0.0	14.3	20.0	16.7	0.0
Distance to local stops	7.1	10.8	6.5	4.2	6.3	9.1	5.7	0.0	7.6	13.3	6.9	5.6
Direction of routes	4.2	2.7	5.6	0.0	1.6	0.0	2.9	0.0	5.7	6.7	6.9	0.0
Cost * **	23.1	65.8	12.2	10.3	39.1	72.7	20.0	28.6	14.4	56.3	8.8	4.5
Cost of Transfers **	7.7	8.1	8.4	4.2	14.3	13.6	17.1	0.0	3.8	0.0	4.2	5.6
Reliability *	19.6	29.7	16.8	16.7	23.8	36.4	20.0	0.0	17.1	20.0	15.3	22.2
Safety, Crowding, Comfort *	11.9	21.6	8.4	12.5	15.9	22.7	11.4	16.7	9.5	20.0	6.9	11.1
Cost of Vehicle, Gas, Insurance	6.5	10.8	5.6	4.2	4.8	4.5	5.7	0.0	7.6	20.0	5.6	5.6
Parking: lack of, cost	5.4	2.7	6.5	4.2	6.3	0.0	8.6	16.7	4.8	6.7	5.6	0.0
Difficult re Families, Strollers	3.0	0.0	3.7	4.2	3.2	0.0	5.7	0.0	2.9	0.0	2.8	5.6
Rudeness/ Unhelpfullness	1.2	5.4	0.0	0.0	1.6	4.5	0.0	0.0	1.0	6.7	0.0	0.0
External Infrast. (shelters, etc)	1.2	2.7	0.9	0.0	0.0	0.0	0.0	0.0	1.9	6.7	1.4	0.0

Notes: See Table A6

Table A9: Factors acting as Barriers to Travel, East Woodbridge Study Area

East Woodbridge	ALL MODES (%)				PUBLIC TRANSIT USERS (%)				OTHER MODES (%)			
	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd
Trip Duration/ Timing, incl.:	66.1	61.8	65.1	72.0	66.7	68.8	68.8	58.3	65.7	52.2	63.8	76.3
Frequency of service	47.6	45.5	52.4	44.0	48.3	43.8	62.5	41.7	47.2	47.8	48.9	44.7
Takes too long **	35.7	40.0	31.7	36.0	48.3	50.0	50.0	41.7	28.7	26.1	25.5	34.2
Time spent transferring *	16.1	18.2	12.7	18.0	18.3	18.8	12.5	25.0	14.8	17.4	12.8	15.8
Scheduling: weekends/nights	9.5	7.3	11.1	10.0	8.3	9.4	6.3	8.3	10.2	4.3	12.8	10.5
Time limits on transfers **	5.4	5.4	5.6	4.2	5.0	6.3	6.3	0.0	0.9	4.3	0.0	0.0
Accessibility via/to Transit, incl.:	53.0	36.4	55.6	68.0	39.2	41.7	35.8	42.1	56.5	21.7	61.7	71.1
Lack of connectivity	32.7	21.8	31.7	46.0	23.3	25.0	18.8	25.0	38.0	17.4	36.2	52.6
Lack of routes	17.9	14.5	17.5	22.0	16.7	18.8	18.8	8.3	18.5	8.7	17.0	26.3
Distance to local stops	10.7	7.3	11.1	14.0	13.3	12.5	6.3	25.0	9.3	0.0	12.8	10.5
Direction of routes	4.8	3.6	7.9	2.0	1.7	3.1	0.0	0.0	6.5	4.3	10.6	2.6
Cost * **	36.6	83.3	16.9	13.2	56.7	90.3	25.0	15.4	25.9	73.9	14.3	12.5
Cost of Transfers **	16.7	21.8	12.7	16.0	25.0	25.0	25.0	25.0	12.0	17.4	8.5	13.2
Reliability	15.5	20.0	15.9	10.0	18.3	18.8	18.8	16.7	13.9	21.7	14.9	7.9
Safety, Crowding, Comfort	10.1	12.7	7.9	10.0	11.7	15.6	6.3	8.3	9.3	8.7	8.5	10.5
Cost of Vehicle, Gas, Insurance	10.1	7.3	12.7	10.0	5.0	6.3	0.0	8.3	13.0	8.7	17.0	10.5
External Infrast. (shelters, etc)	5.4	7.3	1.6	8.0	8.3	12.5	0.0	8.3	3.7	0.0	2.1	7.9
Parking: lack of, cost	4.8	5.5	3.2	6.0	3.3	0.0	6.3	8.3	5.6	13.0	2.1	5.3
Difficult re Families, Strollers	1.2	0.0	3.2	0.0	0.0	0.0	0.0	0.0	1.9	0.0	4.3	0.0
Rudeness/Unhelpfullness	0.6	1.8	0.0	0.0	1.7	3.1	0.0	0.0	0.0	0.0	0.0	0.0

Notes: see Table A6

Table A10: Factors acting as Barriers to Travel, Agincourt Study Area

Agincourt	ALL MODES (%)				PUBLIC TRANSIT USERS (%)				OTHER MODES (%)			
	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd	Total	Low Income	Not Low Income	Income Unreprtd
Trip Duration/ Timing, incl.:	57.3	52.5	60.0	55.6	56.1	53.8	57.1	66.7	58.2	50.0	61.7	50.0
Takes too long	35.5	32.5	40.0	11.1	26.3	26.9	28.6	0.0	43.3	42.9	46.8	16.7
Frequency of service	30.6	32.5	29.3	33.3	35.1	34.6	35.7	33.3	26.9	28.6	25.5	33.3
Scheduling: weekends/nights	12.1	12.5	13.3	0.0	14.0	19.2	10.7	0.0	10.4	0.0	14.9	0.0
Time spent transferring **	10.5	12.5	9.3	11.1	14.0	15.4	10.7	33.3	7.5	7.1	8.5	0.0
Time limits on transfers	0.8	2.5	0.0	0.0	1.8	3.8	0.0	0.0	0.0	0.0	0.0	0.0
Accessibility via/to Transit, incl.:	37.1	37.5	37.3	33.3	35.1	42.3	28.6	33.3	38.8	28.6	42.6	33.3
Lack of connectivity	21.8	20.0	22.7	22.2	22.8	26.9	17.9	33.3	20.9	7.1	25.5	16.7
Lack of routes	14.5	15.0	14.7	11.1	12.3	15.4	10.7	0.0	16.4	14.3	17.0	16.7
Distance to local stops	7.3	10.0	5.6	11.1	7.0	15.4	0.0	0.0	7.5	7.1	6.4	16.7
Direction of routes	1.6	2.5	1.3	0.0	1.8	3.8	0.0	0.0	1.5	0.0	2.1	0.0
Cost * **	33.3	51.1	25.6	11.1	45.0	53.6	37.9	33.3	23.6	47.1	18.4	0.0
Cost of Transfers **	9.7	10.0	9.3	11.1	15.8	11.5	17.9	33.3	4.5	7.1	4.3	0.0
Reliability	17.6	17.1	17.3	22.2	19.0	14.8	21.4	33.3	16.4	21.4	14.9	16.7
Cost of Vehicle, Gas, Insurance	13.7	12.5	13.3	22.2	12.3	11.5	14.3	33.3	13.4	14.3	12.8	16.7
Safety, Crowding, Comfort	12.9	10.0	13.3	22.2	12.3	11.5	10.7	33.3	13.4	7.1	14.9	16.7
Difficult re Families, Strollers	1.6	2.5	1.3	0.0	1.8	3.8	0.0	0.0	1.5	0.0	2.1	0.0
Parking: lack of, cost	0.8	0.0	1.3	0.0	1.8	0.0	3.6	0.0	0.0	0.0	0.0	0.0
External Infrast. (shelters, etc)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rudeness/Unhelpfullness	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes: see Table A6

APPENDIX B

Low Income Cutoffs, by Family/Household Size, 2014 Benchmark

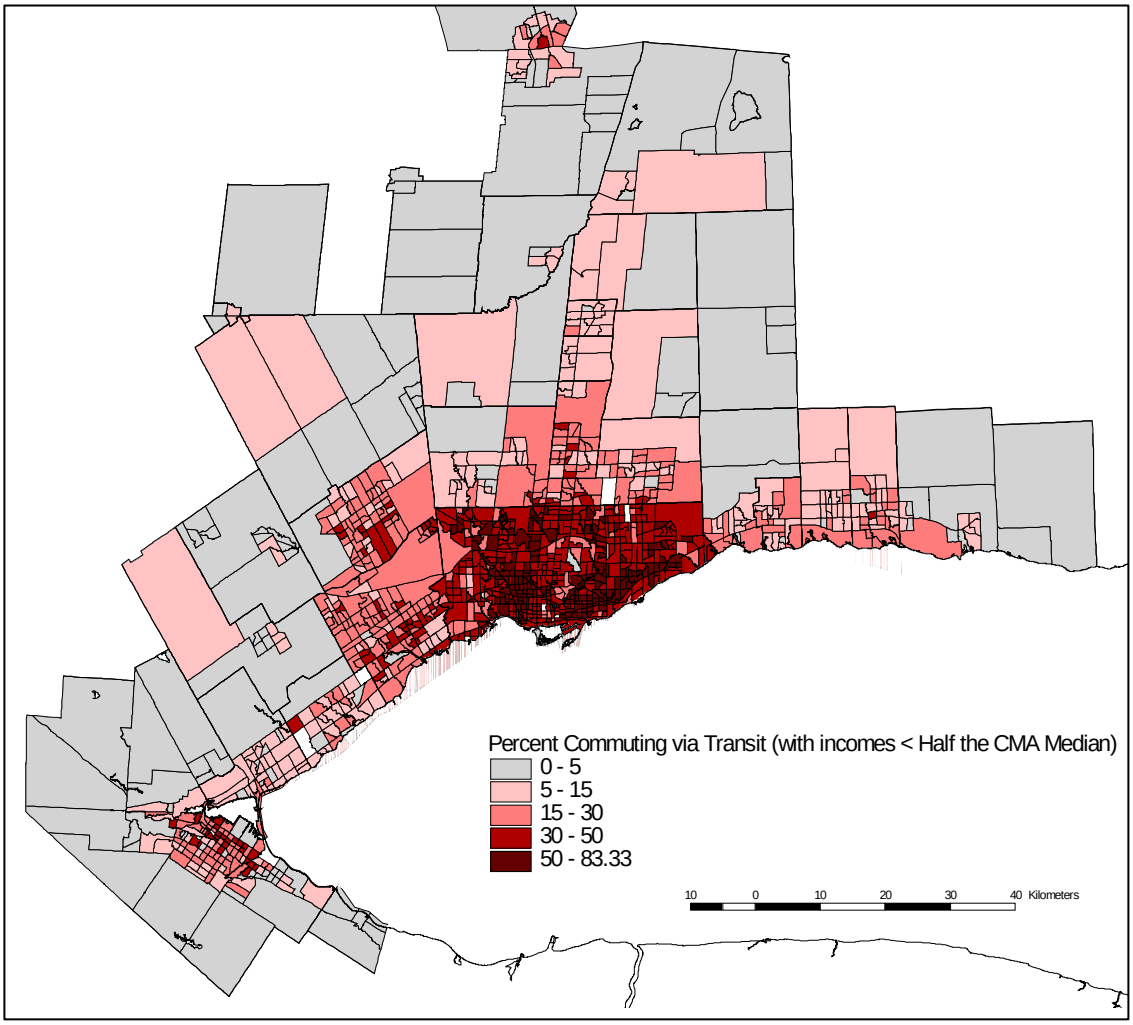
HH	1	2	3	4	5	6	7
LICO	$23,647	$29,440	$36,193	$43,942	$49,839	$56,209	$62,581
	>$5000	>$5000	>$5000	> $5000	> $5000	> $5000	> $5000
	$5000-$9999	$5000-$9999	$5000-$9999	$5000-$999	$5000-$9999	$5000-$9999	$5000-$9999
	$10,000-$19,999	$10,000-$19,999	$10,000-$19,999	$10,000-$19,999	$10,000-$19,999	$10,000-$19,999	$10,000-$19,999
	$20,000-$29,999	$20,000-$29,999	$20,000-$29,999	$20,000-$29,999	$20,000-$29,999	$20,000-$29,999	$20,000-$29,999
	$30,000-$39,999	$30,000-$39,999	$30,000-$39,999	$30,000-$39,999	$30,000-$39,999	$30,000-$39,999	$30,000-$39,999
	$40,000-$49,999	$40,000-$49,999	$40,000-$49,999	$40,000-$49,999	$40,000-$49,999	$40,000-$49,999	$40,000-$49,999
	$50,000-$59,999	$50,000-$59,999	$50,000-$59,999	$50,000-$59,999	$50,000-$59,999	$50,000-$59,999	$50,000-$59,999
	$60,000-$69,999	$60,000-$69,999	$60,000-$69,999	$60,000-$69,999	$60,000-$69,999	$60,000-$69,999	$60,000-$69,999

> HH = Household Size
> LICO = Low-Income Cut-off (2014) per household size
> Red Cells = Low-Income status for the survey

Source: Statistics Canada, 2014

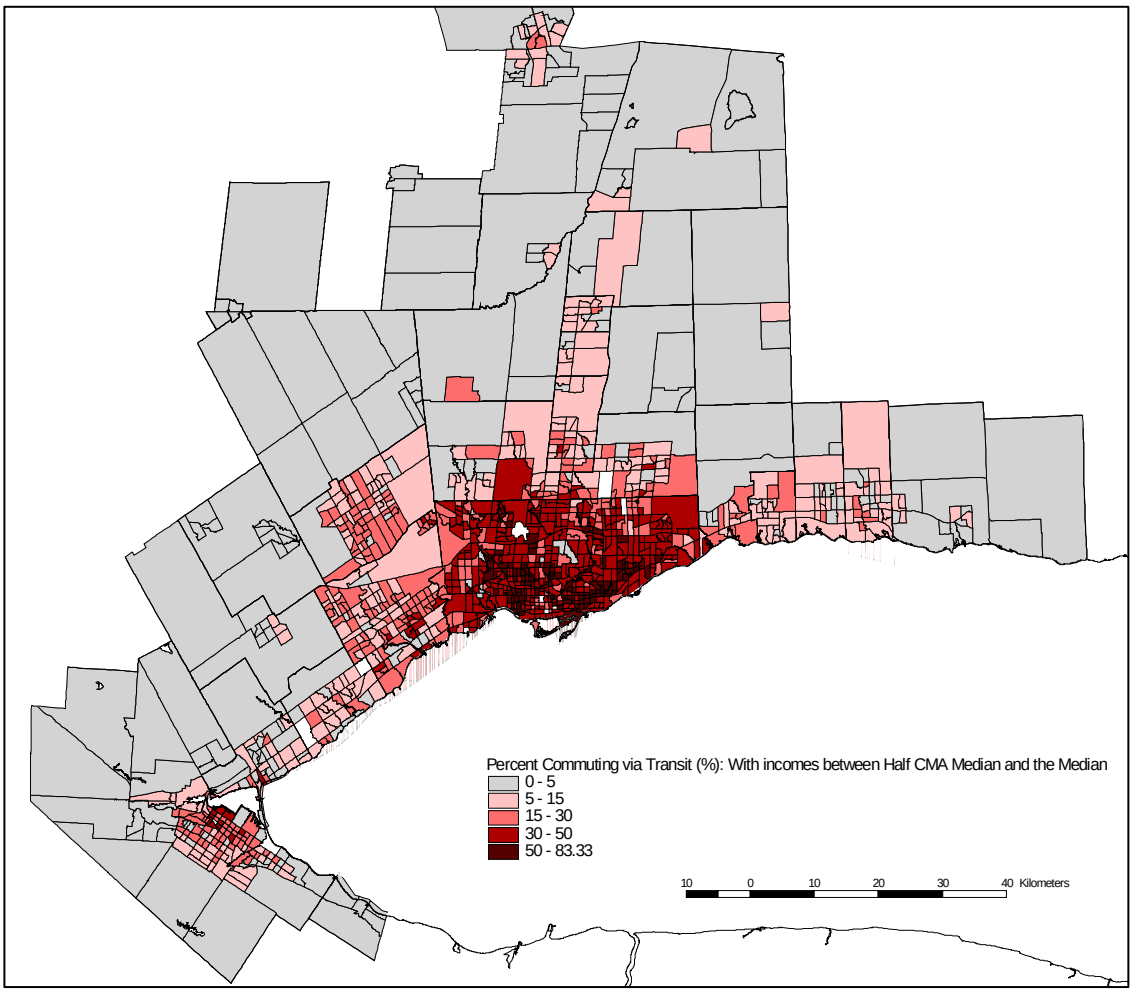
APPENDIX C

Figure C1: Transit Modal Share for Commuters with Incomes less than half the Median CMA Income, 2006



Source: Created and calculated by the author, from custom data ordered from the 2006 Census of Canada

Figure C2: Transit Modal Share for Commuters with Incomes between half the CMA Median and the CMA Median Income, 2006



Source: Created and calculated by the author, from custom data ordered from the 2006 Census of Canada

Figure C3: Transit Modal Share for Commuters with Incomes between the CMA Median Income and Twice the CMA Median Income, 2006

Source: Created and calculated by the author, from custom data ordered from the 2006 Census of Canada

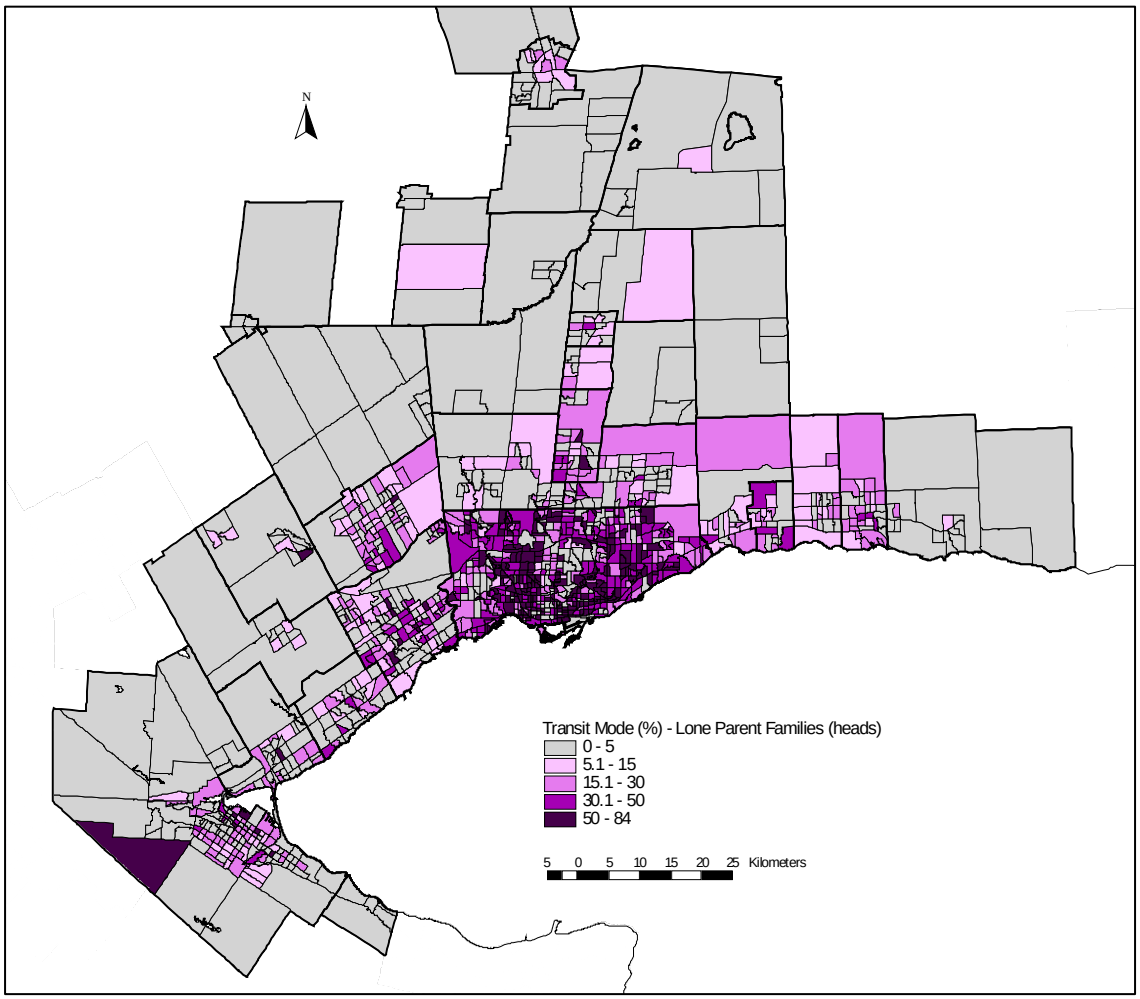
Figure C4: Transit Modal Share for Commuters with Incomes greater than Twice the CMA Median Income, 2006

Source: Created and calculated by the author, from custom data ordered from the 2006 Census of Canada

Figure C5: Difference in Transit Modal Split between Commuters with less than the CMA Median Income, and All Commuters, 2006

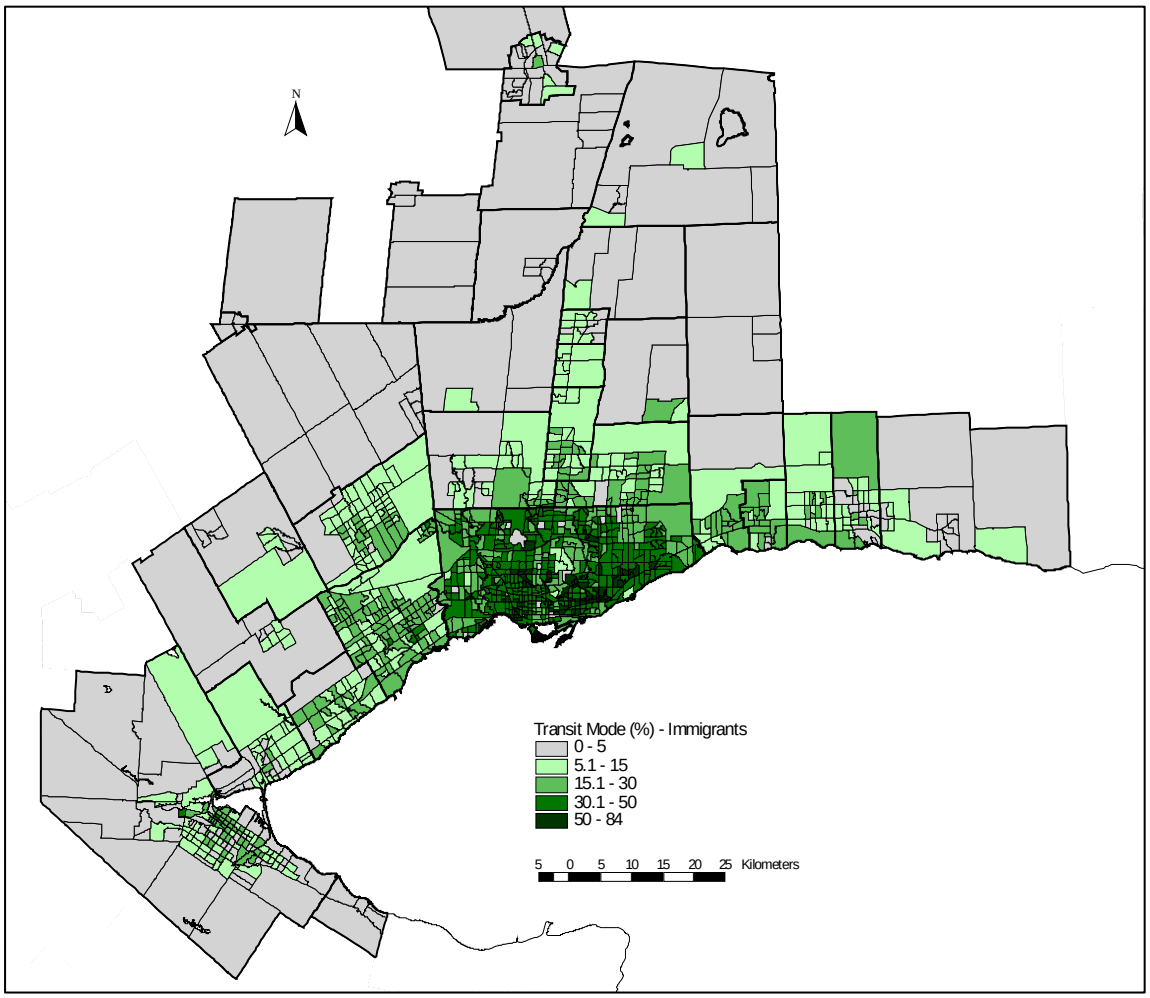
Source: Created and calculated by the author, from custom data ordered from the 2006 Census of Canada

Figure C6: Transit Modal Share among Lone Parents, 2006



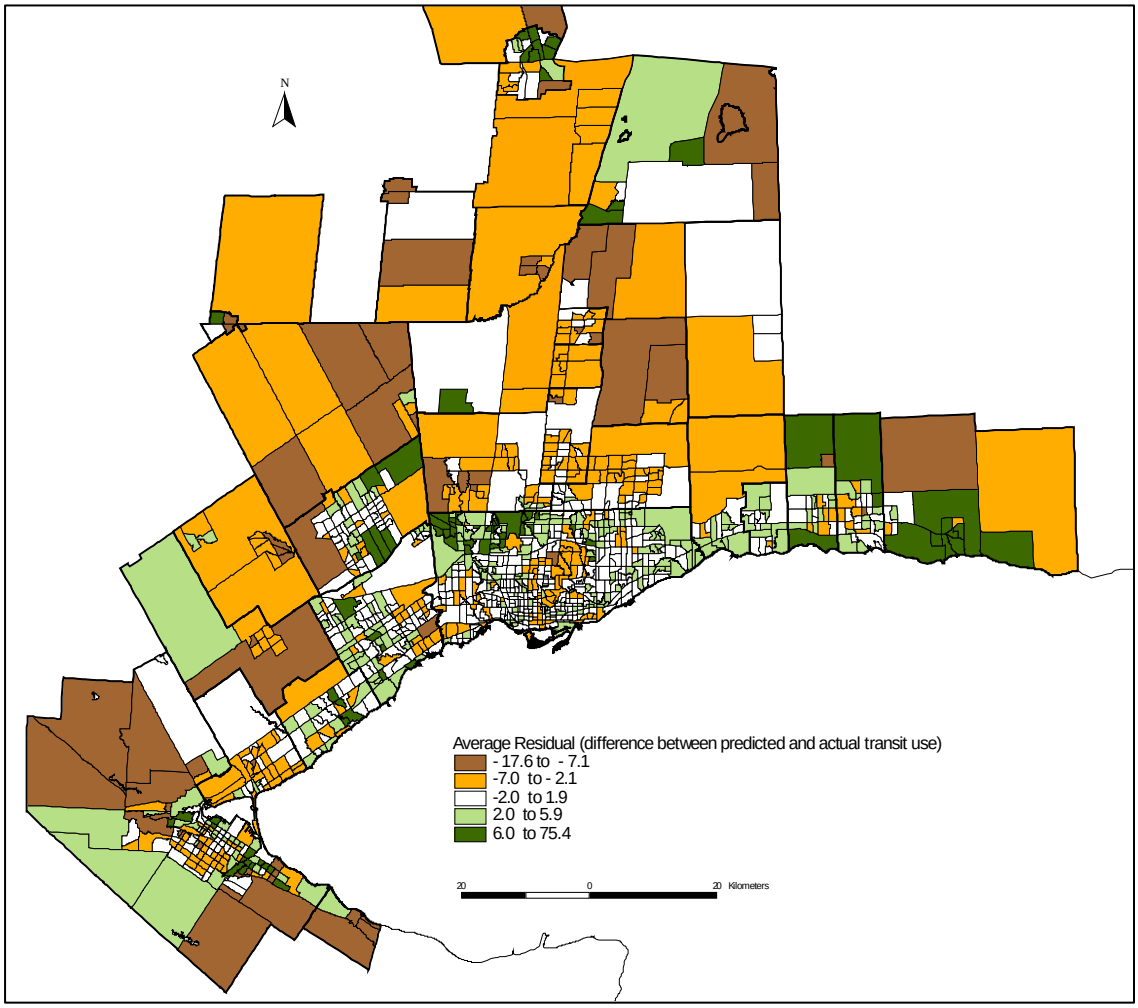
Source: Created and calculated by the author, from custom data ordered from the 2006 Census of Canada

Figure C7: Transit Modal Share among Immigrants, 2006



Source: Created and calculated by the author, from custom data ordered from the 2006 Census of Canada

Figure C8: Average Difference between Expected (Predicted) and Actual (Observed) Transit Use across All the OLS Models



Source: Created and calculated by the author, from custom data ordered from the 2006 Census of Canada