The Spatial Trap

Exploring Equitable Access To Public Transit As A Social Determinant Of Health

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advancing urban health

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EXECUTIVE SUMMARY

The Spatial Trap: Exploring Equitable Access To Public Transit As A Social Determinant Of Health

With The Big Move, Ontario's regional transportation authority, Metrolinx, unveiled a bold vision to transform how people in Toronto and the Greater Toronto Area (GTA) move about their daily lives. Not only will the transformation improve the efficiency of our roadways and transit lines through the reduction of traffic congestion, it will represent a significant investment in improving the health of all residents by decreasing harmful pollution and greenhouse emissions and increasing healthier forms of commuting such as transit, cycling and walking.

And yet, in many respects, the vision is two dimensional. With a focus on what are called "choice riders" – moving upper and middle class persons from private vehicles for their commute to public transit options (there is a gap in priorities). Less evident in the planning and debate are the social needs of those with limited or no options: those who rely on public transit, or worse, cannot afford even that. Without affordable, available and accessible public transit, more marginalized residents such as single mothers, people with low income and recent immigrants are faced with restricted mobility, and this further limits their economic opportunity and access to other determinants of health such as healthy food and recreation. In essence, we need to complete the public transit picture with the introduction of a further dimension: health equity.

The purpose of this paper, then, is to shape the ongoing debate and how we think about public transit in Toronto – a future in which public transit represents a vital form of re-connecting individuals and communities caught in a spatial trap of social exclusion. The report reviews the international evidence on how public transit can enhance mobility and potentially improve the health and well-being of the most socially excluded, and considers the evidence on the existence of spatial traps in Toronto. In conclusion, the report identifies the elements of a health equity transit frame to pose the essential questions on equity and fairness that should be asked of each local, city or regional transit proposal.

The Three Policy Frames Of Public Transit

Traditionally, transportation and public transit planning has been bound within the confines of one policy frame, economics. From this frame, the functional objectives of planning are clear and specific: how can we move the most people and goods within the city and region in a time and cost efficient manner. While obviously essential to the productivity and competitiveness of the local economy from which many of us benefit, this policy frame too often ignored equally large questions about other aspects of health and well-being. Over the last three decades, population health research and advocacy have drawn attention to the need to address harmful externalities of transportation (e.g., air pollution, injuries/accidents) and the health promotion potential of increasing physical activity through active transportation (OMA, 2005; Toronto Public Health, 2007, 2011) Slowly over time, there has been a convergence of these two policy frames with mutually beneficial focus on expanding public transit options that reduce the use of private vehicles, thereby simultaneously decreasing traffic congestion and health harming externalities.

More recently, transportation and public transit research has drawn attention to another dimension of economic well-being and population health – social exclusion (Lucas, 2012). That is, the recognition that in a modern geographically dispersed society, acquiring health promoting social determinants such as decent work and healthy food is inextricably tied to mobility (Cass, Shove & Urry, 2005; Kenyon, 2003; Urry, 2002). However, for many, mobility is dependent on public transit. When such transit is not readily available, accessible, or flexibile, those dependent on transit face a form of social exclusion that can reduce employment opportunities and earnings (Blumenberg & Ong, 2001; Cervero, Onesimo & Landis, 2002; Plaut, 2006; Preston, McLafferty and Liu, 1998; Van Ham, Multer & Hooimeijer, 2001; Van Ham, 2001). Even grocery shopping or dropping off a child a day care can becomes an arduous trip, if not impossible, venture (Blomenberg and Ong, 2001; Grieco, 2003; Health Development Agency, 2005; Kenyon, 2003). In essence, the lack of accessible and timely public transit creates a spatial trap of limited life chances – a silent architect of health inequities. Alternatively, the availability of public transit can re-connect the socially excluded to economic opportunity, essential goods and services and other preconditions of good health.

Public Transit And The Spatial Trap: Reviewing The Evidence

The exclusionary force of inequitable transit and the spatial trap has been observed in countless studies over five decades in a wide variety of developed countries including the Canada, the U.S., the U.K., Australia and others. Accordingly, a robust body of evidence exists outlining the links between the lack of public transit and reduced economic opportunity and social mobility:

1. Employment: The physical mobility to move from one place to another for different purposes is linked to our ability to achieve economic and social mobility, with spatial flexibility intrinsically linked to employment and earnings (Preston, McLafferty and Liu, 1998; Van Ham, Multer & Hooimeijer, 2001; Van Ham, 2001). It is not surprising that low income populations frequently cited transportation as a key barrier to jobs or better paying work. Studies have empirically observed a relationship between the high cost of travel and rates of unemployment and low earnings (Blumenberg & Ong, 2001; Selod & Zenou, 2007; Van Ham, Multer & Hooimeijer, 2001). There is a strong association between proximity to a transit stop and employment and this that is further affected by the accessibility and flexibility of routes and hours of operation (Blumenberg & Ong, 2001; Holzer, 1991; Sanchez, 1999; Kawabata & Shen, 2007). The public transit effect on employment is particularly acute and severe in relation to service class jobs that are more often decentralized and dispersed over wide geographic spaces (Blumenberg and Ong, 2001; Blumenberg & Manville, 2004; Ihlanfeldt & Sjoquist, 1998; Gobillon, Selod & Zenou, 2007). Public transit can affect the geographic size of job search area with higher availability and accessibility being linked to a larger employment search zone (Holzer, 1991; Ihlanfeldt & Sjoquist, 1998; Gobillon, Selod & Zenou, 2007; Preston, McLafferty & Liu, 1998). All of the effects of public transit are magnified for low income women with children and single mothers who are more likely to be working a decentralized service job during off-peak hours and weekends, and often commute via trip chains for daycare and shopping (Blumenberg, 2004; Hanson and Pratt, 1988; Paez et al., 2009; Preston, McLafferty and Liu, 1998).
2. Goods and Services: The spatial trap is not limited to the effects on employment and earnings. Public transit/transportation studies point to exclusionary barriers related to access to health care, social services, community or political participation or simply buying groceries. Evidence consistently points to a lower frequency of trips and/or a shrunken zone of activity (e.g., shopping, recreation, socialization) for poorly served populations (Betts, 2007; Brown et al., 2013; Dobbs, 2005; Hine and Mitchell, 2001; Kenyon, 2003; Lyons, 2003; Paez et al, 2009; Scott & Horner, 2008).
3. Social Networks and Social Capital: The ability to be mobile is linked to social capital; those with greater spatial flexibility typically have larger, more diverse social networks over a wider geographic area (Axhausen, 2003; Frei et al., 2009. Such social connections can be a critical determinant, for example, in finding employment, particularly those jobs at a greater distance from one's residence

(Holzer, 1991; Ihlanfeldt & Sjoquist, 1998; Gobillon, Selod & Zenou, 2007). A variety of studies have identified a strong influence of car ownership on the size and strength of social networks, with a smaller number of studies pointing to the negative effect of transit disadvantage on the breadth and diversity of one's networks (Curry, et al., 2009; Frei et al., 2009; Hartell, 2007).

Toronto And The Spatial Trap

International research on public transit and spatial traps is wide and deep. Yet while such evidence informs us on how equitable transit can affect economic opportunity, social mobility and health equity; it does not tell us the status of public transit in Toronto in relation to socially excluded groups and neighbourhoods. However, local studies examining public transit and equity are becoming increasingly available, confirming prevalence of spatial traps in Toronto (Martin Prosperity Institute, 2010, 2011). One factor has been the near total exit of working class employment opportunities in Toronto. There are a few patches of manufacturing jobs in the North-West periphery – relatively small oases in a desert of working class opportunity (Martin Prosperity Institute, 2010). Accessing working class employment opportunities is increasingly dependent on reverse commuting – but there is limited public transit out of these regions to relatively job rich areas.

For those with a poor level of education, recent immigrants or women, the greatest likelihood is that they will be working in service jobs. Recent Toronto studies note that, consistent with international research, more than 50 percent of service class jobs are widely distributed across the city rather than concentrated in specific locations. The implication here as well is that the character and distribution of service class jobs are not well aligned with fixed rail transit solutions alone (Martin Prosperity Institute, 2010). Instead, more decentralized flexible transit options are a critical factor in matching employment need to employment opportunity.

On the other hand, creative class employment opportunities are overlaid by the highest availability of public transit, with 65 percent of creative class job rich areas within 500 metres of a subway station compared to only 21 percent of service class areas (Martin Prosperity Institute, 2010). Meanwhile, areas of low income populations and transit dependence are located in areas with the lowest intensity of public transit service frequently creating transit deserts. Overall, the areas with the highest transit dependence are the areas with the lowest transit availability, while the job opportunities (service class) most reliant on good public transit are the least likely to be in well served areas.

Further complicating the availability and affordability of public transit in Toronto is affordability (City of Toronto, 2005; Community Social Planning Council & Family Service Association of Toronto, 2004; Fair Fare Coalition, 2010; Khosla, 2003; Shapiro, 2012; Toronto Public Health, 2011). The cost of public transit has regularly been identified as a challenge for people on low income in Toronto. The 1997 elimination of all provincial subsidies for operational costs of municipal transit systems has increasingly transferred the cost of public transit to the user. In 2013, the cost of a monthly TTC pass as a percent of minimum wage income is now the second highest in Canada at 7.1 percent compared to other urban areas like Vancouver and Winnipeg where the rates are 5.6 percent and 5.0 percent respectively (Toronto Public Health, 2013). The most public transit dependent groups are least able to afford the full cost of transit.

Health Equity Policy Frame For Public Transit

Without the equitable connections of available, accessible and affordable public transit, those with often the greatest level of travel dependence will be locked into narrow work and activity zones and reduced occupational and social engagement in wider society – the spatial trap. The existence of spatial traps are evident in Toronto, with signs that such traps will increase in size and number without an adequate policy response. Accordingly, there is a critical need in transit planning to move beyond the focus on economic

competitiveness, the physical environment and active transportation to address the urgent social transit needs of those facing the greatest barriers.

The prominence of The Big Move has drawn the majority of attention to regional transit issues, arguably at the cost of a focus on localized transit priorities. While The Big Move proposes a number of initiatives that will improve localized transit needs, the mandate of regional transit planning imposes a restricted viewpoint and dialogue. Closing the transit gap between areas of high and low public transit availability urgently requires renewed municipal and local solutions, for example, regarding more accessible and flexible TTC operations and in City of Toronto budget development.

The following outlines four critical steps towards addressing equitable access to public transit as social determinant of health in public transit planning at local, regional and provincial levels. The purpose of each step is to re-set thinking on public transit, and encourage the development of tools and processes to achieve the goal.

1. Frame public transit as a health equity issue – A health equity frame will further research, planning and decision-making by fostering a shift:

- *from a focus on critical mass to one on social need* with a higher priority placed on the transit need of those identified as caught in a spatial trap marked by high unemployment, under-employment, low earnings or having low trip frequency or a small geographic zone of travel for personal activities;
- *from a focus on fixed rail lines to one on decentralized transit* availability matching transit options with the decentralized character of service jobs;
- *from a focus on the city core to one on the periphery* (i.e., inner suburbs) where the preponderance of spatial traps are located;
- *from a focus on regional capital investments to one on local operational transit policies* that facilitate greater service frequency including evening and weekend hours, as well to reduce the cost of public transit for socially excluded populations.

2. Asking the right questions: health equity impact assessment – Implement a local municipal regulation requiring that all public transit planning be the subject of a Health Equity Impact Assessment (HEIA) to identify transit options that could possibly widen health disparities between population groups. At minimum, the HEIA should ask and answer the following five questions:

4. Does the proposed transit option place a priority on low income transit dependent areas and poulations?
5. Does the transit option target known transit deserts in the suburban periphery and/or increase the intensity of service in an area of high transit dependence/low transit availability?
6. Does the transit option address the dispersed and decentralized character of service class employment opportunities?
7. Does the transit option increase hours of operation for evenings and weekends needed to support work schedules and opportunities, including for more precarious and service jobs?
8. Does the transit option reduce the cost of travel for socially excluded groups?

3. Answering the right questions: health equity transit metrics, data, and targets – Enacting a health equity policy frame is contingent on expanding the existing array of transit data (e.g., Transportation Tomorrow Surveys, Census/National Health Survey) with a particular emphasis on capturing data related to socio-economic factors such as low income, racialized status and recent immigrants. Concurrent with the evolution of socio-economic transit data is the necessity of developing transit equity targets that can be used to measure and evaluate performance in terms of availability and accessibility of localized TTC services and regional transit services. Equally important is a re-orientation from just operational cost assessments and targets (e.g. load factors) to identify targets related to transit benefits such as gains in employment or health status.

4. Who pays for equitable public transit? Increasingly, the cost of public transit is being transferred to the transit user. What remains critical to the discussion is who pays for (and who gains from) transit equity. For example, improving public transit accessibility might generate bus routes with a low load factor, yet generate social assistance savings through increased employment and/or earnings. An excellent starting point for considering such cross-cutting issues is the Ontario government's refreshing of the 2008 Poverty Reduction Strategy with a new five-year strategy.

Introduction

In 2013, the issue of transportation and public transit represents one of the most important political debates in Toronto and the Greater Toronto Area (GTA). With The Big Move, Ontario's regional transportation authority, Metrolinx, has put forth a vision to strengthen the reach of the GTA's public transit system (Metrolinx, 2008). Like most major public transit planning initiatives in North America, the priority is movement of the largest number of people and material goods in the most efficient and effective manner. Yet The Big Move also reflects an integrated vision for what might be described as a "big shift" – reducing the urban reliance on the car as the primary means of transportation through the evolution of public transit, and active transportation such as walking or cycling. (Metrolinx, 2008).

Such a bold vision for re-imagining our modern need for mobility reflects over three decades of research pointing to the ill effects of transportation by cars on our health. The quality of the air we breathe and the impact of vehicle emissions on climate change; harmful affects that have a near universal impact on the population health of all people (APHA, 2010; Toronto Public Health, 2007, 2011). More recently, researchers have explored the relationship between the daily work commute on individual health status measures such as stress, hypertension, diabetes and cardiovascular health – not surprisingly, the effect is negative (APHA, 2010, 2012; Frank & Engelke, 2002; Toronto Public Health, 2011, 2012). So no longer is transportation simply a technical planning matter determining how to move the greatest number of people and largest volume of goods from A to B and beyond; it has become an issue that recognizes decisions on transportation have an indelible impact on our health and well-being.

Like food or housing, transportation is vital component of our daily lives. We all have somewhere to go or where we would like to go. Whether that destination is work, the grocery store, the doctor's office or visiting a friend, transportation is the infrastructure of our modern lives, creating the conditions for mobility. Yet less often do we deeply consider how such mobility – the geographic reach, the ease of use, the cost of access – is part of the very social conditions that affect our health and well-being. That is, how differences in mobility and access to transportation might serve to create significant and systematic inequities and exclusions between different groups.

Transportation research consistently points to how systems of public transit can adversely affect the mobility of poor, racialized groups, recent immigrants or single mothers – lacking the ability to own a car but often living in areas with minimal access to public transit (Cass, Shove & Urry, 2005; Kenyon, 2003; Kenyon, Lyons & Rafferty, 2001). Such limits on mobility, it is argued, reinforce social stratification by restricting access to employment opportunities, recreation and leisure, and goods and services (Cass, Shove & Urry, 2005). Similarly, there is a wealth of health research on the social determinants of health pointing to how low income, unemployment, precarious working conditions and food deserts can contribute to a significant poor health and a health gap between rich and poor (Block, 2013; Commission of the Social Determinants of Health, 2008; Evans, Barer and Marmot, 1994; Health Canada, 1994; Heymann et al, 2006; Mikkonenv & Raphael 2010; Public Health Agency of Canada; Senate Subcommittee on Population Health, 2009). Putting the system pieces together it becomes clear: public transit can forge a critical connection between access to the social determinants of health such as good jobs, housing, neighbourhoods and supportive social and health services.

This critical connection between public transit and health and health equity is seldom explicitly reflected in current planning and deliberations stimulated by The Big Move. The purpose of this paper, then, is to show how we can build health into the ongoing debate and re-set how we think about public transit in Toronto – a future in which public transit represents a vital form of re-connecting individuals and communities caught in a spatial trap of social exclusion, weak economic opportunity and a growing health gap. First is a critical review of the prevailing ways in which issues of transportation and public transit are currently framed for planning and policy development: the long-dominant economics approach in which the emphasis is on how transportation contributes to productivity, competitiveness and employment, and an increasing recognition that transportation also greatly affects population health. In this section it becomes clear that the emphasis is on what is called the "choice rider" – high and middle income individuals who currently use their cars but could be transitioned to public transit with the implementation of other options (Garrett and Taylor, 1999). Neither the existing economics or health frames adequately considers the ways transportation is related to structured social and economic inequality, and associated health inequities. Instead, there is a need for introducing a new way of looking at public transit – the health equity frame. In this perspective, the lens is not focused on the choice rider but rather, draws attention to the needs of the low income transit dependent and the invisible rider (the latter referring to those who are unable to access transit).

The third section reviews the quantitative and qualitative research accumulated from local investigations and national/international studies over the last several decades. With evidence in hand, the report reviews current public transit plans and how they could contribute to the existence of spatial traps, in which the limited access to transportation faced by some groups and geographic areas in Toronto results in more restricted access to jobs, services and social networks. In conclusion, the policy implications for public transit planning are highlighted. Most critical is the conclusion that the regional planning of The Big Move should not distract from TTC and City of Toronto priorities of local public transit needs – including bus routes, hours of operation, affordable fares – while posing the critical question: who pays for transit equity?

How Do We Currently Think About Transportation And Public Transit?

Policy frames are the implicit or explicit means by which a social issue is organized and understood: selecting the dominant viewpoint or paradigm, establishing the key institutional structures and processes, selecting the preferred discourses, identifying the key inputs of technical expertise and social group participation and, in many respects, defining the dominant metrics and solutions for consideration and prioritization (Rein, 1986, 1994; Schneider & Ingram, 1993). In plain language, policy frames shape the compelling public policy image of what is the problem and what opportunities for solutions are possible.

The Economic Policy Frame

Modern society is a mobile society (Kenyon, 2003; Urry, 2002). Such mobility was, of course, dependent on the development of faster, wide ranging modes of transportation with the train, motor vehicle, buses, streetcars, subways and transit all serving to 'shrink the world' by expanding the reach and speed of transportation options. For much of transportation history in the 20th century, the problem has been

dominated by a policy frame driven by the economics of productive competiveness that forge the goals, key stakeholders, technical rules and metrics of planning.

The economic policy frame of transportation and public transit is clear and simple: to move the most people and goods from A to B in the timeliest and most cost efficient fashion. From this policy frame emerges key stakeholders such as businesses and commercial groups, while the pivotal metrics are the amount of time stuck in traffic and the costs of congestion to business competitiveness and productivity of inefficiency. As the Toronto Region Board of Trade (2010) frames it, "time is money": $6 billion in 2012 and rising to $15 billion by 2031 in the absence of an effective regional transportation plan (Courtright, 2010; Verhoef, 2010). By extension, options and performance metrics are marked by process measures of efficiency such as utilization and load factors (Karlaftis & Tsamboulas, 2012; Murdock, 2012).

Bringing Health In: A Population Health Policy Frame

Conversely, the need to re-focus transportation and transit planning from simply the cost of doing business to the cost of poor health has been increasingly recognized. Population health is a way of viewing health status as more than the outcome of health care and medical interventions. Instead, population health considers the question "why are some people healthy and others not" in relation to three major grouping of social determinants: 1) the physical environment (e.g., pollution); 2) personal health habits (e.g., physical activity) and 3) social factors (e.g., income, education, housing). (Evans, Barer and Marmot, 1994; Health Canada, 1994, 2001; Mikkonenv & Raphael 2010; Senate Subcommittee on Population Health, 2009). Not surprisingly, population health forms a natural linkage with the environmental movement and, over time, has helped push discussions on how we design our cities and the transportation system in relation to the physical environment (World Health Organization; 2000). The international network of Healthy Cities developed by WHO exemplifies this approach. Critical to this aspect of the population health policy frame are metrics such as the negative health effects of transportation-generated externalities like the increased prevalence rates of chronic respiratory conditions, lung cancer, cardiovascular disease and, overall, a heightened risk of dying younger (Toronto Public Health, 2007). By extension, measures of the impact on the health care system attain preeminence such as recent estimates that the cost of air pollution on additional health care spending is $2.2. billion including 1,700 unnecessary hospitalizations and other forms of medical spending (OMA, 2005; Toronto Public Health, 2007).

A population health policy frame in transportation and transit planning pushes the lens and measures beyond the physical environment to also consider health promotion. From this perspective, the cost of transportation on health is captured by measures such as the association between commuting by car with high blood pressure, elevated levels of stress, poor mental health, and diseases like hypertension and cardiac health diagnoses. (Cavill et al.; 2008; Conor et al., 2010; Evans, Wener & Phillips, 2002; Frank & Engelke, 2002; Kageyama et al, 1998; Kluger, 1999; Walsben et al, 1999). More positively, the population health policy frame repositions the possibilities of public transit and other modes of commuting such as cycling as a positive social determinant of health. For example, research indicates that using public transit can lead to an increase in walking of 8.3 minutes a day (Edwards, 2008). Acknowledgement

and promotion of a population health policy frame in transportation and transit planning is now well reflected in policy documents around the world from the U.S. to the U.K. to Australia (APHA, 2011, 2012; Health Development Agency, 2005; NSW Government, 2013). Locally, Toronto Public Health has become a prominent voice articulating the relationship between population health and transportation using an increasingly deep body of quality research (Toronto Public Health, 2007, 2011, 2012).

Choice Riders And Other Priorities: Who Gets Missed?

Few would question that the local, provincial and national infrastructure and capacity to move the largest number of people and the largest supply of goods in the timeliest way is a critical factor to the competitiveness of an economy. Similarly, that transportation affects the physical environment and environmental sustainability that shape health behaviours and promotion is widely accepted. However, in a review of transportation and transit planning in the U.S., Garrett and Taylor (1999) critiqued the dominant characteristics and tendencies of planning and initiatives within the economic and population health policy frames. Garrett and Taylor (1999) suggest that the lens quickly falls on what are called "choice riders" – most often those with average or above average income and social position – and moving such individuals from private vehicles to public transit with a priority emphasis of planning on fixed rail solutions "connecting dense suburban residential concentrations to dense central areas." Even within city boundaries, the focus of action follows the same pattern of residential concentrations of choice riders commuting to employment concentrations within the city core. Moreover, the context is further shaped by political preferences in which higher levels of government and discretionary funding is biased in relation to capital projects rather than operations or maintenance – a bias, they argue, reflects the dominant voters' preference for taxes or tax increases going to capital investments (Garrett & Taylor, 1999). Overall, the key elements of the policy frames is on the movement of people to and from employment with an emphasis on critical mass and concentrations of employment in the city core using linear fixed rail options through capital investments.

The logic of targeting choice riders by emphasizing critical mass and movement to areas of high employment concentration is clear and obvious. Such a targeted strategy makes sense from the perspective of the highest economic return on transit investments by moving the most people to a few select areas, as well as the most significant reductions in congestion. Similarly, a focused strategy has the potential to generate the largest positive impact on reducing air pollution and greenhouse emissions. What makes these strategic options problematic is what is often excluded – the needs of those who are transit dependent.

In contrast to the choice rider – typically affluent individuals with a range of options on where they work and how to get there – the transit dependent are more often from low income backgrounds with few options for getting to work or accessing goods and services. Moreover, transit dependent riders are far more likely to live in peripheral geographic areas and their employment opportunities less likely to be within the city core (Garrett &Taylor, 1999; Kenyon, Lyons and Rafferty, 2001). Equally so, the transit dependent often require public transit for not simply getting to and from work, but also in other daily life activities such as shopping, medical care, obtaining healthy food and the acquisition of other goods and services. As such Garrett and Taylor (1999) among other researchers argue transit plans focused on the choice rider and critical mass run the risk of social exclusion of the most marginalized and transit

dependent populations, and by default, create or reinforce economic and social inequalities (Blumenberg & Ong, 2001; Cass, Shove & Urry, 2005; Kenyon, Lyons & Rafferty, 2001; Lucas, 2012; Mercado et al, 2012).

The implication is not that that economic and population health factors are not important to a vibrant and healthy society, but rather, these policy frames are not fully adequate in concept and strategy to address the issue of social exclusion and health equity. Instead, there is a critical need to introduce a third policy frame that addresses transportation and transit in terms of the economic and health needs of socially excluded individuals, groups and communities.

Towards A Health Equity Policy Frame

A social determinants of health (SDH) approach to health and well-being is founded on the vast empirical evidence that health is not simply the product of medical intervention and health care. Indeed, research over decades and across multiple jurisdictions indicate that health care contributes perhaps as little as 25percent in terms of life expectancy and health status (Senate Subcommittee on Population Health, 2009). More important are social factors or determinants such as income, education, employment and working conditions, social support, gender, culture and healthy child development (Evans and Stoddart, 1990; Health Canada, 1994, 2001). Inequitable access to these determinants drives systemic health inequities (Graham, 2004, 2009). For example, the higher one's level of income the higher the likelihood of better health than someone with a lower income. By extension, employment is more likely to result in better health in comparison with unemployment, as is stable employment in a place of decent working conditions than precarious employment in poor working conditions.

Over the last four decades there has been increasing recognition that it is possible to improve the average health status of the population, but leave, or even widen health inequalities between different socio-economic groups (Commission of the Social Determinants of Health, 2008; Evans, Barer and Marmot, 1994; Health Canada, 1994; Heymann et al, 2006; Senate Subcommittee on Population Health, 2009). In other words, even while absolute health status has increased for all groups, the relative outcomes are differentially distributed by socio-economic status such that there is a growing health gap between the richest and poorest.

The critical question, then, is how these inequitable differences in health are produced. Health equity first draws attention to social stratification. Significant inequalities in income, social class, gender and race/ethnicity, in turn, affect inequitable opportunities for acquiring health positive social determinants such as education, employment, housing, social support and so on. These social determinants need to be seen as a dynamic, inter-dependent and multi-layered system in which inequitable social position can have a cascading effect. Structured social and economic inequality not only underlies the inequitable overall gradient of health, but can contribute to some communities and populations having less access to the resources, infrastructure and social capital that contribute to better health. More optimistically, while the macro social conditions that produce economic stratification can be difficult to fundamentally change, particularly in the short term, altering access to just one or two social determinants can significantly

ameliorate health disadvantage. In effect, health equity approaches look for public policy that can level the playing field such that structured social inequality does not, by default, translate into health inequities.

Reducing Barriers And Opening Connections

What is the connection between transportation/transit, the social determinants and health equity? Quite simply, a growing evidence-based awareness that in a mobile, modern society the acquisition of health promoting social determinants such as decent work, post-secondary education or goods and services is heavily dependent on fair access to transportation, especially public transit (Health Development Agency, 2005; Kenyon, 2003; Litman, 2003, 2006; Policylink, 2009; Raje, 2004). Insufficient income can limit access to adequate private transportation or timely and available public transit – in effect – creating a negative feedback loop which limits the capacity to improve one's economic conditions. Accessible, flexible and affordable public transit, then, can represent a vital connection to economic and educational opportunities.

With most transport surveys suggesting it is usually the most socially disadvantaged who also experience transport disadvantage or transport poverty, the spatial reorganization of society has generated what is called by some socio-spatial exclusion (Cass, Shove, Urry, 2005; Lucas, 2012). Larger than poverty and material deprivation, social exclusion speaks to a comprehensive, multi-dimensional concept, capturing exclusionary barriers on opportunities available to most people such as access to work, learning, health care, food and other essential goods, community involvement and recreation/culture (Grieco, 2003; Health Development Agency, 2005; Kenyon, 2003). Inadequate and inequitable access to transportation can reinforce social stratification "due in whole or in part to insufficient mobility in a society and environment built around the assumption of high mobility" (Kenyon, Lyons & Rafferty, 2001; Cass, Shove & Urry, 2005; Miller, 2006). Alternatively, reducing the effects of "socio-spatial exclusion" through public transit can help in securing better paying employment with decent working conditions, acquiring goods such as healthy foods, or expanding the size and diversity of social networks and support.

Figure 3

Dimensions of Social-Spatial Exclusion

- Geographic Exclusion: geographic proximity of transit services
- Time-based Exclusion: the reasonable time available for travel/transit
- Economic Exclusion: the cost of transport in relation to income
- Facility Exclusion: distance of key facilities such as shops, schools
- Physical Exclusion: physical barriers that inhibit accessibility of transport services

(Church et al., 2000)

The development and routine application of a health equity policy framework in the planning of public transit is essential to reducing the barriers of socio-spatial exclusion (See Figure 3), and opening the connections to a complex array of health positive social determinants. Understanding the public transit connection with social exclusion and health equity is most often viewed and measured in two ways: 1) the category approach; and 2) the spatial approach (Cass, Shove & Urry, 2005; Church, Frost & Sullivan, 2000). Each has important implications for how social exclusion is shaped and the impact on health equity. The former focuses on how transit dependence

and access varies according to unique socio-demographic characteristics and needs. While geographic proximity to a transit stop and intensity of service is obviously critical to single mothers, so too are factors related to policies and physical design of vehicles and stations (e.g, being able to get around with baby strollers) and, most critically, the flexibility to undertake what are known as trip chains, that is drop-offs and pick-ups at child care and handling other household chores like grocery shopping. Even within areas of high transit density and mobility, there can be substantial number of persons with low mobility (Church, Frost & Sullivan, 2000).

The spatial approach focuses on specific neighbourhoods – concentrated areas of socio-economic need that are peripheral to employment, goods and services and other social determinants with the isolation further reinforced by what is tagged a transit desert. Needless to say, the category approach and spatial approach are frequently overlapping in that many of those facing social exclusion have been essentially "sorted" into low rent areas that house a large number of people without a car and inadequate public transit availability and accessibility. For Toronto, the now familiar "priority areas" of high rise concentrations identified by the United Way typify the spatial geographic approach. Yet, in considering public transit and health equity, it necessary to recognize that need is not always concentrated and can be dispersed or decentralized with larger populations of socially excluded populations falling outside a category or geographic area (Church, Frost & Sullivan, 2000; Lucas, 2012; Martin Prosperity Institute, 2010).

Acknowledging health, equity and social inclusions within transportation and public transit policy and planning has been slow and incremental. Interestingly, the pathway of advocacy and legitimacy has followed two different social trajectories, no doubt reflecting different social and political cultures. In the U.S., the trajectory has more often been influenced by civic group action. Most famously, in 1994, the National Association for the Advancement of Colored People (NAACP) filed suit against Los Angeles' Metropolitan Transit Authority using civil rights legislation in response to a major public transit initiative to build subways and other fixed rail routes. The NAACP position was that these public transit solutions were focused on middle and upper class populations residing in the outer suburbs neglecting the needs of inner city populations. In the end, a consent agreement was reached in which the Metropolitan Transit Authority agreed to expand bus services in low income, transit dependent areas of the city (Blumenberg & Ong, 2001).

Conversely, public transit in England, Scotland and Australia was explicitly seen as part of a wider commitment of government to tackle health inequalities and social exclusion (Lucas, 2012). Perhaps this was most strongly recognized in the British Social Equity Unit's 2003 report *Making the Connections: Final Report on Transport and Social Exclusion*. In many respects, SEU's *Making the Connections* put public transit and health equity on the map of policy planning. The product of a detailed literature review, public consultations, and local studies mapping and documenting mobility differences by socio-economic areas, the report clearly identified a relationship between low socio-economic status, a lack of public transit and diminished access to social determinants of health including: work; learning; health care; food shops; and, social, cultural and sporting activities (SEU, 2003).

Policy research in Scotland and Australia (State of Victoria) replicated these findings – establishing a strong connection between socio-economic status and social exclusion – and further indicated that lack of public transit entrenched exclusion and pushed down social status (Gaffron, Hine & Mitchell, 2001; Hine & Mitchell, 2003; Currie & Stanley, 2008; Currie et al., 2009; Lucas, 2012). Such policy work spurred

on various national, regional and local efforts to reduce the exclusionary force of inadequate public transit ranging from price subsidies, improving hours of operation and route configuration better linking neighbourhoods to jobs and other resources (Lucas, 2012). More recently, Toronto Public Health released Next Stop Health: Transit Access and Health Inequalities in Toronto (2013), in an attempt to push forward health equity as a transit issue. Building on the pioneering work of groups such as the Fair Fare Coalition (2010) and exploratory studies by a number of community-based organizations, Toronto Public Health calls for building the recognition of the health equity into transport/transit planning.

A health equity policy frame considers key drivers, elements and effects of public transit in relation to health, health equity and social needs, and builds this into the previously discussed economic and population health frames. In the next section, we review the best quality empirical evidence that identifies how lower socio-economic position and inadequate public transit creates what we call the spatial trap – a world of limited mobility hindering access to critical social determinants such as employment, goods and services, and social networks.

Public Transit And The Spatial Trap

The physical mobility to move from one place to another for different purposes is linked to our ability to achieve economic and social mobility (Lichter, 1983; Plaut, 2006; Preston, McLafferty and Liu, 1998; Van Ham, Multer & Hooimeijer, 2001; Van Ham, 2001). Logically, transportation in a dispersed modern society establishes the tangible physical connections to employment, social networks, public and private goods and services that have been repeatedly and consistently demonstrated to be social determinants of health (SEU, 2003; Health Development Agency, 2005; Toronto Public Health, 2013). Geographic mobility intrinsically shapes social mobility and, with it, the opportunities for health and well-being. While transportation and public transit is certainly not the only important factor – human capital variables such as education or family background are strong determining forces – there is a relationship between the ability to be geographically mobile and health.

Employment

Transportation is often cited as one of the key employment barriers low income persons face (Access Alliance, 2011; Blumenberg & Ong, 2001; Khosla, 2003; Gobillon, Selod & Zenou, 2007). In many cities, commuting even short distances to employment is made difficult by limited access to fast and reliable forms of public transit (Blumenberg & Ong, 2001; Cervero, Onesimo & Landis, 2002). People with a low or precarious income are less likely to own a car and, even if a car is owned, less likely to have enough cars in relation to number of licensed drivers (Baum, 2009; Blumenberg & Ong, 2001; Dobbs, 2005; Garasky, Fletcher and Jensen, 2006; Gobillon, Selod & Zenou, 2007). The focus on the connection between transportation and employment was spurred by John Kain in 1968 with what he called the spatial mismatch. The mismatch proposed that the high and rising unemployment among young American black males living in inner city neighbourhoods was the result of manufacturing and other entry level and low income opportunities shifting to the suburbs (Kain, 1968; Kain, 1992). While findings on the spatial mismatch have been inconsistent (Holzer, 1991; Ihlanfeldt & Sjoquist, 1998), Kain's work helped push the exploration of social exclusion, transportation and transit into the public consciousness.

Over the decades, ever more sophisticated research has expanded to other racial/ethnic groups, low income populations and women (Blumenberg, 2008; Blumenberg, 2004; Blumenberg & Shiki, 2003, Blumenburg and Ong, 2001; Giuliano, 2003; Holzer, 1991; Mercado, 2012). Instead, of a spatial mismatch, a more nuanced perspective is emerging that is not limited to inner cities and, in fact, is increasingly prominent in the inner and outer suburbs (Hu, 2013; Ihlanfeldt & Sjoquist, 1998; Martin Prosperity Institute, 2010). The spatial trap is limited access to flexible mobility reflecting public transit availability, accessibility and affordability that affects employment and other opportunities. Moreover, it is important to not simply view the spatial trap as only a feature of a specific neighbourhood. Rather, the trap is the result of socio-economic characteristics that result in transit dependence that restrict mobility and thereby contribute to social exclusion in terms of employment.

Spatial flexibility is intrinsically linked to employment and earnings (Holzer, 1991; Ihlanfeldt & Sjoquist, 1998; Kain, 1992; Lichter, 1983; Plaut, 2006; Preston, McLafferty and Liu, 1998; Van Ham, Multer & Hooimeijer, 2001; Van Ham, 2001). Such flexibility allows individuals to take advantage or alternative job opportunities – the economic power to create choice, bargaining opportunities and upward career movement (Lichter, 1983). In looking at the impact of spatial inflexibility, Van Ham and colleagues (2001) propose that in the search for opportunity, a job searcher has three options*:* 1) stay put in present job or current state of unemployment; 2) accept a local job for which one is overqualified or presents limited opportunity for career development; or, 3) migrate to job rich areas (Van Ham, Multer & Hooimeijer, 2001). As the Van Ham and colleagues note, the third option of migration is dependent on many factors including housing availability prices; not everyone can live next to a job rich area and/or afford to do so. Moreover, in an era of increasing temporary contracts, part-time work and other forms of precarious employment migration is not necessarily the most rational strategy (Miller, 2006).

While Van Ham and colleagues pose a theoretical understanding of rational decision making and options for employment seeking, a variety of studies have empirically validated the model to the availability of transportation and public transit in relation to the availability of jobs (Bania, Coulton & Leete, 1999; Ong and Miller, 2005; Shen, 2001). In turn, a variety of studies suggest spatial inflexibility often forces people to restrict their job searches to more localized, but lower paying, job opportunities. (Blumenberg, 2004; Blumenberg & Manville, 2004; Holzer, 1991; Ihlanfeldt & Sjoquist, 1998; Preston, McLafferty & Liu,1998; Sanchez, 1999). Moreover, transit reliability can affect employer willingness to hire due to scheduling challenges or absenteeism due to transit (Gobillon, Selod & Zenou, 2007).

There are a variety of elements that construct the 'spatial trap' – each having been demonstrated through empirical research to have a relationship with job opportunities, employment rates and/or earnings. This section fills out how transportation acts as a vital intermediary factor shaping access to these fundamental determinants of health.

1) **Affordability**: A wide number of studies identify the high cost of travel being a factor that limits the distance travelled in employment. (Holzer, 1991; Ihlanfeldt & Sjoquist, 1998; Gobillon, Selod & Zenou, 2007). Generally, the working poor spend a much higher portion of their income on their commute than other workers (Roberto, 2008; Ontario Public Health Association, 2012; Toronto Public Health, 2013). As well, if the cost of travel is too high, many do not select employment at all (Holzer, 1991; Ihlanfeldt & Sjoquist, 1998; Preston, McLafferty and Liu, 1998).

2) **Availability:** Public transit has long been recognized as a vital link to employment (Blumenberg and Ong, 2001; Holzer, 1991; Kain, 1968, 1992; Ihlanfeldt & Sjoquist, 1998). Studies have repeatedly demonstrated a strong association between proximity to a transit stop and employment level (Holzer, 1991; Sanchez, 1999; Kawabata & Shen, 2007). Yet what is also consistent in research is that those areas with the highest levels of transit dependence are frequently those areas with the lowest levels of intensity of transit availability (Blumenburg & Ong, 2001; Garrett & Taylor, 1999; Martin Prosperity Institute, 2010, 2011).

3) **Accessibility:** A short distance is not the equivalent of short time, even moving from neighbourhood to adjacent neigbourhood can require complex pattern of transfer, waiting and exchange that increase the time cost of travel and employment opportunity (Blumenberg and Ong, 2001; Ihlanfeldt & Sjoquist, 1998; Blumenberg & Manville, 2004). Even within the presence of suburban homes clustered around transit stops, suburban employment is not so centralized (Blumenberg and Ong, 2001; Ihlanfeldt & Sjoquist, 1998; Blumenberg & Manville, 2004). Public transit may not adequately accommodate complicated travel patterns such that even if one's home is close to a transit stop the final point of destination be far or even not possible to reach (Blumenberg & Ong, 2001;Gobillon, Selod & Zenou, 2007). Key bus lines might also be subject to high levels of demand so that passengers are frequently left waiting for the next bus or more (Blumenberg & Ong, 2001). The association is further confounded by frequency of service, and hours of operation (Blumenberg & Ong, 2001; Gobillon, Selod & Zenou, 2007; Sanchez, 1999). The latter point is increasingly emphasized in relation to the shift towards a service economy in which retail operations involve evening and weekend hours of work (Blumenberg & Ong, 2001; Gobillon, Selod & Zenou, 2007; Sanchez, 1999); a shift further critical in relation to women and single mothers who are more likely to work in this type of occupation (Blumenberg & Ong, 2001).

No less critical to the zone of accessible employment is the important matter of finding the job. Conversely, poor mobility and public transit has consistently been found to affect the zone of employment search (Holzer, 1991; Ihlanfeldt & Sjoquist, 1998; Gobillon, Selod & Zenou, 2007; Preston, McLafferty & Liu, 1998). In that many job opportunities are not posted in newspaper or on-line sites, a physical presence in a job area all the more valuable. The problem of distant, public transit and cost is further exacerbated when a person is not familiar with the area (Blumenberg, 2004). On the other hand, Pilegaard and Fosgereau (2008) found that lower transport costs can result in a job search over a larger area.

The Gender Effect

In that the spatial trap is a process which is forged in relation to transit dependence and socio-economic and demographic characteristics, it is not surprising that the pervasiveness and effects of the 'trap' vary in relation these characteristics. A Swedish study investigating the impact of daily commuting on mortality found that while the length of one's commute has an influence on the length of one's life expectancy the effect was not evenly distributed (Sandow, 2011). For men, the association between commute and life expectancy was insignificant but, for women, the effect was significant, particularly those of low income and low education (Sandow, 2011). So there is a socio-economic gradient for transportation and health, with lower social position and demographic factors affecting health outcomes.

Research suggests that the spatial flexibility of men is less restricted in comparison to mothers (single or partnered), but not women in general (Blumenberg, 2004; Blumenberg & Shiki, 2003; Gustafson, 2006; Hjorthol, 2000; Van Ham, Mulder & Hooimeijer, 2001). Such studies observe that mothers more frequently

restrict their commute areas, but this effect is more muted when there is a spouse (Gustafson, 2006; Hjorthol, 2000). However, there is evidence that there is a socio-economic gradient in relation to the size of most women's commute and employment zone as well as between racialized and non-racialized women (Blumenberg, 2004; Hanson and Pratt, 1988; Paez et al., 2009; Preston, McLafferty and Liu, 1998).

Low income women are more likely to work in service class occupations and such employment tends to be more de-centralized (Blumenberg and Ong, 2001; Presser & Cox, 1997). Women holding service class jobs are more likely to be transit dependent (Wyly, 1998), and even if there is a car in the family the male partner's employment needs take priority (Dobbs, 2005; Blumenberg & Manville, 2004). Low income women make more trips than low income men along with a greater likelihood of making stops along the way – the familiar pattern of trip chains to manage children and household responsibilities (Blumenberg, 2004; Blumenberg and Ong, 2001). Furthermore, low income women appear to reduce their zone of employment opportunity in order to maintain flexibility for responding to family crisis (Blumenberg & Manville, 2004); as well as ensure proximity to families and friends for support (Blumenberg, 2004).

In addition to the non-concentrated aspect of service jobs and transit dependence, the work is often part-time and requiring off-peak travel during the evening and weekends (Blumenburg, 2004; Blumenberg and Ong, 2001; Paez et al., 2009). Off-peak travel, particularly evenings, further magnifies safety concerns in relation to dark and isolated stations and stops (Blumenberg & Ong, 2001). Overall, the design and operations of public transit are not well aligned with the needs of low income women: fixed rail routes and strongly linear bus routes compared to complicated travel patterns of trip chaining and decentralized job opportunity, and a low frquency of service during off-peak hours. The net result is highly localized female job markets with lower wage earning potential (Blumenberg, 2004; Hanson and Pratt, 1988 Preston, McLafferty and Liu, 1998).

Access To Goods And Services

The spatial trap is not limited to the effects on employment and earnings. Studies point to exclusionary barriers related to health care, social services, community or political participation or simply buying groceries (Betts, 2007; Brown et al., 2013; Dobbs, 2005; Hine and Mitchell, 2001; SEU, 2003; Scott & Horner, 2008; Toronto Public Health, 2013). Once again, the changing forms of urban design from small, relatively self-sufficient mixed neighbourhoods to dispersed single purpose areas was facilitated by the mobility of the car (Lyons, 2003). For example, many grocery stores are located close to new developments in the inner suburbs or alongside large retail developments in the outer suburbs (Martin Prosperity Institute, 2010). People can feel disenfranchised having to experience time consuming trips for daily activities (Hess & Farrow, 2010). Even when walking is feasible, areas are designed with fences, wide fast moving roads and other mobility barriers (Hess & Farrow, 2010). A variety of studies have identified the presence of food deserts – geographic areas lacking the availability of grocery stores offering fresh fruit and vegetables and other healthy food items within one kilometre (Bertrand, Therien, & Cloutier, 2008; Larsen & Gilliland, 2008; Martin Prosperity Institute, 2010; Latham & Moffat, 2007), and have further been linked to higher rates of obesity and obesity-linked health problems such as diabetes (Glazier et al, 2007).

Moreover, the distribution of other goods and services, including those provided by public sector organizations and institutions, has been linked to challenges of public transit and equitable mobility.

Indeed, one author has pointed out the irony that even many of the public policies to tackle exclusion often implicitly require a high level of mobility from the groups they are designed to assist such as getting to an employment centre, searching for a job or getting to a job (Kenyon, 2003). Transit barriers to community based health and social care services have been identified in a number of international and local studies and consultation (Community Social Planning Council of Toronto & Family Service Association of Toronto, 2004; Currie & Stanley, 2007; Currie et al., 2009; Exworthy & Peckham, 2006; Gaffron, Hine & Mitchell, 2001; Hine & Mitchell, 2003; Khosla, 2003; McKeary and Newbold, 2010; Toronto Public Health, 2011). Limited access to public transit and constrained mobility has also been cited as a barrier to recreational and cultural programs (Community Social Planning Council of Toronto & Family Service Association of Toronto, 2004; Redmond and Associates, 2007; Toronto Public Health, 2011). Transit as an exclusionary barrier to needed life resources typically reflects a combination of affordability, time constraints and lack of availability and flexibility of routes.

A number of studies point to a lower frequency of trips and a shrunken zone of activity space. In one study, Loveless (1999) found that low income households take 20 percent fewer trips and travel 40 percent fewer miles than middle- and upper income households. In Canada, Paez and colleagues (2009) pioneered a study on the transportation patterns of seniors, single mothers and (for Quebec only) low income groups in Hamilton, Montreal and Toronto. Replicating other North American studies, they concluded that all three groups tended to make fewer trips and have a much smaller space in which they conduct their activities. While for single parents in Toronto, there did not appear to be a significant difference in the frequency of trip making, there was significant a difference in the size of their activity space (and time spent on shopping). The activity space limitations were particularly noticeable in the northern and eastern parts of the city. In other words, the empirical evidence points to the presence of a "spatial trap" extending beyond employment by affecting a wide range of daily life activities most people take for granted. For all groups, availability of a car has a considerable effect on increasing the activity space.

Lastly, while improving the possibilities for walkability and cycling has been rightly cited as a basis for improving the health of the population, Bostock (2001) points to how walkability might affect low income or vulnerable populations differently than more affluent groups. Most studies on cycling and walking benefits are influenced by self-selection, the persons involved in the studies are those who make an active decision to cycle and walk and choose their neighbourhood location accordingly. However, for those who do not actively make such a decision, walking or navigating poor public transit is a default decision of poor mobility and dependence rather than a healthy choice. The health effect might be negative rather than positive, for example, single mothers have identified negative psycho-social effects and fatigue of poor mobility, often resulting in deliberate decisions to restrict the number and space of their activities (Bostock, 2001).

Social Networks/Social Capital

An individual's social networks are particularly important area for social exclusion (Frei et al, 2009). The stronger and wider the social network, the greater the level of social capital and thereby access to life opportunities and resources. Inequitable public transit can have an effect on the size and strength

of social networks as well as a reduced strength and diversity in social capital (Curry, et al., 2009; Frei et al., 2009; Hartell, 2007).

In a modern mobile society, strong mobility widens social capital (Axhausen, 2003; Lucas, 2012). In effect, the spatial trap reflects a process in which the capacity to find and/or get to work and constraints on everyday activities sets in place a series of potentially negative feedback loops that truncate the establishment of bridging capital or loose ties (Grannovetter, 1995). For example, studies have repeatedly found that a small, geographically bound social networks are less effective in finding employment the greater the distance one's contacts are from a job rich area (Holzer, 1991; Ihlanfeldt & Sjoquist, 1998; Gobillon, Selod & Zenou, 2007). Such geographic limitations are not meant to diminish the importance and value of locally constructed "bonding" capital within the neighbourhood. Neighbourhood social capital can form an invaluable support system for single mothers, one in which they create by rejecting opportunities to commute further for employment or better employment (Blumenberg & Manville, 2004). The critical factor is whether the decision to limit one's space of employment, activities and social networks is that of preference rather than a spatial trap of inflexible mobility due to transit dependence.

Implications Of The Spatial Trap

The mobility to move from place to place, often at a long distance, is a crucial determinant of economic opportunity and social mobility. Spatial flexibility has been identified as critical factor in relationship to obtaining employment and enhancing wage potential. Not surprisingly, those from low socio-economic circumstances are most frequently transit dependent, thus making public transit a critical connection to income/employment, material goods, social inclusion and, ultimately, better health. In the absence of such transit mobility there is solid research evidence that a spatial trap can be created, touching every aspect of life from work, through access to goods and services, to the formation of enabling social networks and consequently the opportunities for good health.

Drawing from a large body of transportation research, the health equity policy frame points to the need for a rebalancing of the goals of public transit. The economic policy frame emphasizes critical mass and employment concentration which, most often, translates into the efficient movement of the largest number of choice riders to the city core and concentrated areas of well paying, knowledge based employment opportunities. Alternatively, the population health policy frame in transit has emphasized the physical environment and personal health habits (e.g. physical activity). In contrast, the spatial trap and health equity frame translates into a focus on social need, the periphery (i.e., inner suburbs located in the furthest reach of city boundaries) and social factors like employment. Further, employment opportunities for those residing in these areas are often decentralized rather than concentrated, and require movement beyond the typical peak hours of Monday to Friday, 9 to 5 to include weekends and evening hours.

No less important, the implication of addressing equitable access to public transit calls into question the narrowness of transportation metrics such as operating costs and load factors, suggesting the need to expand the range of metrics with non-transit outcomes such as higher employment and earnings and improved access to goods and services. Return on investment is not simply the flow of people and goods or improvements in air quality, but the reduction of social exclusion, material deprivation, limited life

opportunities and poor health that, in turn, can potentially generate indirect savings in social assistance and health care.

This literature review on public transit and the social determinants of health identifies findings from U.S. and international research which help identify the key concepts and critical elements of a health equity frame. However, it is also evident that transportation and transit planning are context dependent and one cannot assume conditions and trends observed in other jurisdictions are applicable to Toronto. In the next section, we review current transportation/transit planning as reflected in The Big Move and existing demographic, employment and transit data for Toronto to assess the applied relevance of the literature to the local context of Toronto.

Wrapping Health Equity Evidence In Context: Toronto Transportation And Demographics

Language is important. The label or title applied to a report or plan is an attempt to clearly communicate a fundamental message about the vision and content. So when former mayor David Miller released *Transit City* in 2007, the symbolic message of the vision was a city rich in different forms of public transit and connections that reached across all corners of the city and beyond (TTC, 2009). Similarly, the more recent *One City* (2012) plan represents a deliberate reference to, *The Three Cities within Toronto. Three Cities* drew a new image of Toronto, one that is increasingly divided and entrenched in socio-economic differences with a growing gap – both economically and geographically – between the richest and poorest of residents (Hulchanski, 2010). The public message, then, of *One City* was that economic segregation and differences in mobility could be diminished by the re-connective force of public transit. With Transit City and One City, the intent was to influence the evolution of regional and direct attention on transportation needs and priorities within the city including the connection of high need areas with employment, learning and goods and services.

With The Big Move (2008) the provincial agency, Metrolinx, introduced its ambitious long range regional plan. The bold future expressed in The Big Move reflects a much welcomed re-engagement of the provincial government in public transit. In the mid-1990s, the province exited regional transit planning, symbolically sealing their role with the filling in of a partially dug tunnel for an Eglington West subway line. The initial approach to regional planning by the government, MoveOntario 2020, was significant for its emphasis on regional connections such as GO transit and a subway to Vaughan. However, with the creation of Metrolinx, the intent is to evolve integrated regional transit planning. Yet, even from this increased geographic scope and purpose, the title language, The Big Move, implies a focus on the movement of large numbers of people from within and well beyond the borders of the City of Toronto to the city core, as well as nourishing a connected network of municipal economic centres.

The vision of The Big Move is to foster a system of transportation and public transit that promotes: 1) a strong and prosperous and competitive economy; 2) a sustainable and protected environment; and, 3) a high quality of life (Metrolinx, 2008). Quite visible within the contours of vision and strategy are economic and population health considerations – congestion, emissions and active transportation – arguably with a greater emphasis on the economic policy frame of congestion. Similarly, the goals and strategies are consistent with a focus on moving choice riders from their private vehicles to public transit

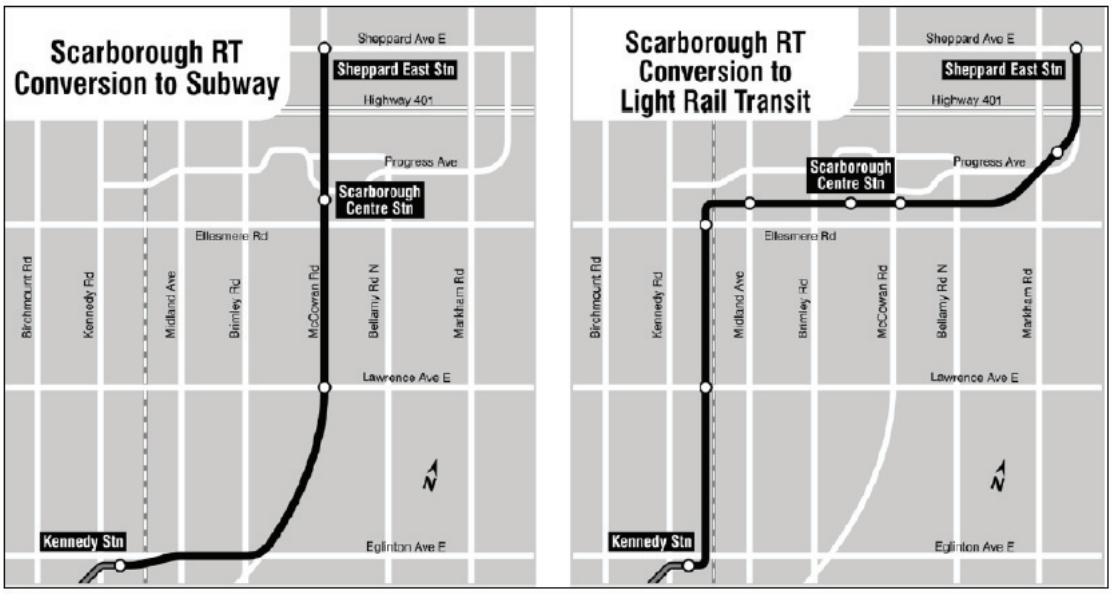
with an emphasis on capital investments and commuter fixed rail service directed to the concentrated job rich city core (Garrett & Taylor, 1999). Less visibly prominent in the vision and strategies of The Big Move are health equity considerations. However, Metrolinx identified the connection between social need and public transit, noting there are a large number of people who cannot afford a car or must make the difficult financial decision to own one in order to find and maintain employment and, therefore, the need for "frequent, fast and affordable transit."

Implementing The Big Move In Toronto

In September 2012, the Toronto Transit Commission (TTC) and Metrolinx reached an agreement on four light rail transit lines (LRT) reflecting a number of priorities identified in *Transit City.* The critical objective of three of the four lines is establishing rapid transit options for east-west connections in the northern area of the city – creating linkages not only across the city but also allowing several low income transit dependent areas a link to the city core.

1. The **Sheppard East LRT** will run for just over 13 kilometres starting at Don Mills Subway Station in North York and ending at Meadowvale Road in Scarborough. Not proposed at this time, as recommended in Transit City, was an extension westward from Don Mills to Finch Station, thereby allowing a fully seamless cross-town line in the most northern reach of the city.
2. The **Etobicoke Finch West LRT** will for 23.4 kilometres from Finch Subway Station in North York to the Highway 27/Humber College area of north Etobicoke. A further extension from north Etobicoke to the job rich area of Pearson Airport was not recommended at this time in the TTC-Metrolinx master agreement on priorities.
3. **The Eglinton Crosstown LRT** will start at Black Creek Drive and end at McCowan Road in Scarborough for a total of 25.2 kilometres. Of particular importance is connecting the low income area of Black Creek with lines eventually feeding into the city core.
4. The **Scarborough LRT or Subway** remains an issue of contention. The original The Big Move proposal was to extend rapid transit to reach low income areas including three priority neighbourhoods and a learning institute, Centennial College. Of critical importance is the plan's call for a total of eight stations that would increase walkable access for approximately 47,000 persons many of whom are transit dependent (City of Toronto, 2013). Similarly, it would increase the number of potential bus line connections across a wider breadth of Scarborough. Not only would the LRT establish a connection with the Sheppard East LRT and link to the city core, the target population would be substantially increased for a larger number of people, with an emphasis on transit dependent residents rather than choice riders. Alternatively, the development of a subway would travel less distance with fewer stops (3) and move through neighbourhoods of low density housing more highly comprised of choice riders. Only one "priority" neighbourhood would have immediate access to a station and Centennial College would be far removed from the line. With the recent introduction by the provincial government of a subway option following the RT route with only two stations to Scarborough Centre mall, the impact will be a similar reduction in access for priority neighbourhoods and populations.

Figure 1 Comparison of Scarborough Subway and LRT Options



Overall, planning for transit planning in Toronto and GTA reflects many of the characteristics of the economic policy frame. Much of the planning emphasis is on critical mass and movement of workers to areas of employment concentration in the core via capital investments in fixed rail lines. Yet, The Big Move optimistically includes aspects of the health equity frame. While keeping within the mandated boundaries of capital investment and fixed rail solutions, the development of lines to periphery areas such as Black Creek, Etobicoke Finch and the Scarborough LRT option touching on three priority neighbourhoods are consistent with a health equity frame. Less evident is localized planning on non-fixed rail options such as buses, hours of operation and affordability that are indicated as critical discussions given the changing demographics of mobility and work in Toronto.

Changing Demographics Of Mobility And Work In Toronto/Shifting Spatial Traps

In many respects, Toronto was relatively unique among North American urban areas in that post-war suburban development was marked not solely by the building of single detached houses, but instead, experienced the growth of pockets of dense high rise developments to accommodate the population bulge of the baby boom (E.R.A. Architects & the Cities Centre at the University of Toronto, 2010). Yet the initial settlement of these areas reflected a general trend of economic affluence and upward social mobility; those originally living in these areas were more likely to be moving through a life stage and, most important, had ready access to a private vehicle to enable local and regional mobility (E.R.A. Architects & Cities Centre, 2010; Hess & Farrow, 2010). Most are now aware of the substantial shifts in Toronto since 1970 with a transformation of many suburban high rises as areas of intense poverty and deprivation (Hulchanski, 2010; United Way, 2011). Others have written robustly on the topics of macroeconomic change, racism and discrimination, the discounting of immigrant human capital and other factors that help explain the

declining opportunities for economic opportunity and social mobility (Access Alliance, 2011; Block and Galabuzi, 2011; Galabuzi, 2006; United Way, 2011). Accordingly, the focus of this report is on how the conditions of mobility have been transformed in relation to the availability and type of employment in Toronto and the geographic, demographic and socio-economic transformation of the city.

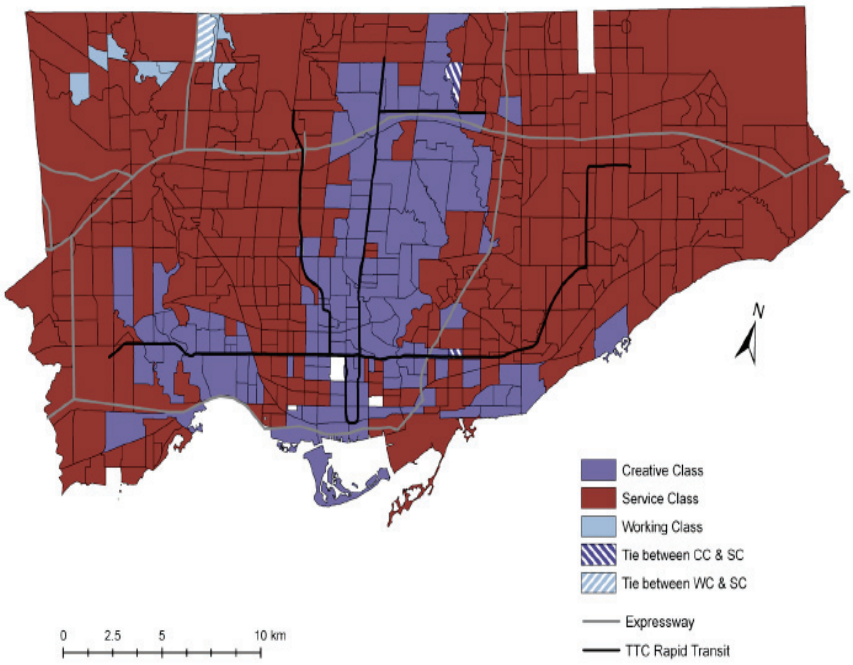
Most notable has been the other evolution of Toronto's labour market. Many North American cities, including Toronto, are experiencing a transformation of their economies with a significant geographic re-alignment in how such job opportunities are distributed.[1] The predominance of employment opportunity is now marked by creative class and service class jobs, each displaying a distinct geographic pattern (See Figure 2). For creative class employment, opportunities are concentrated in the downtown inner city and parallel to the major subway lines emanating from the core. Whereas the pattern of creative class employment is that of centralization and concentration and aligned with fixed rail transit, the pattern of service class opportunity is decentralization and dispersion (See Figure 2).

At the same time has been the near total exit of traditional working class employment opportunities in Toronto. There are a few patches of manufacturing jobs in the North-West periphery – relatively small oases in a desert of working class opportunity (Martin Prosperity Institute, 2010). These limited opportunities are adjacent to low income neighbourhoods and, combined with the availability of low cost housing, help explain some of the population shift to the periphery. However, the majority of working class employment has shifted further west to the Region of Peel with Pearson Airport serving as a magnet. Yet, just as there are limits on the availability of jobs, so too are there limits on the abundance of relatively cheap housing – not everyone can live in close proximity to these job rich areas.

While within the spaces dominated by creative class employment there certainly remains an abundance of service class opportunities, much of the latter form of employment is distributed unevenly throughout the city. For example, Paez et al (2009) found that for single mothers in Toronto while there was relative geographic access to city core jobs, accessibility was poor outside this central area. More than 50percent of service class jobs are widely distributed across the city; some tracts might contain a concentration of service jobs, while other tracts represent mainly residential areas with a scattering of local service jobs (Martin Prosperity Institute, 2010).

1 The Martin Prosperity Institute (at the University of Toronto has identified three major classes of employment: 1) the Creative Class composed of professions such as artists, physicians, teachers, architects, computer programmers and engineers; 2) the Service Class comprised of cashiers, salespeople, food preparers and administrative assistants; and, 3) the Working Class reflecting traditional occupations including factory production workers, truck drivers, welders and construction workers. Martin Prosperity Institute, Understanding our terminology.

Figure 2 Distribution of Labour Class Employment

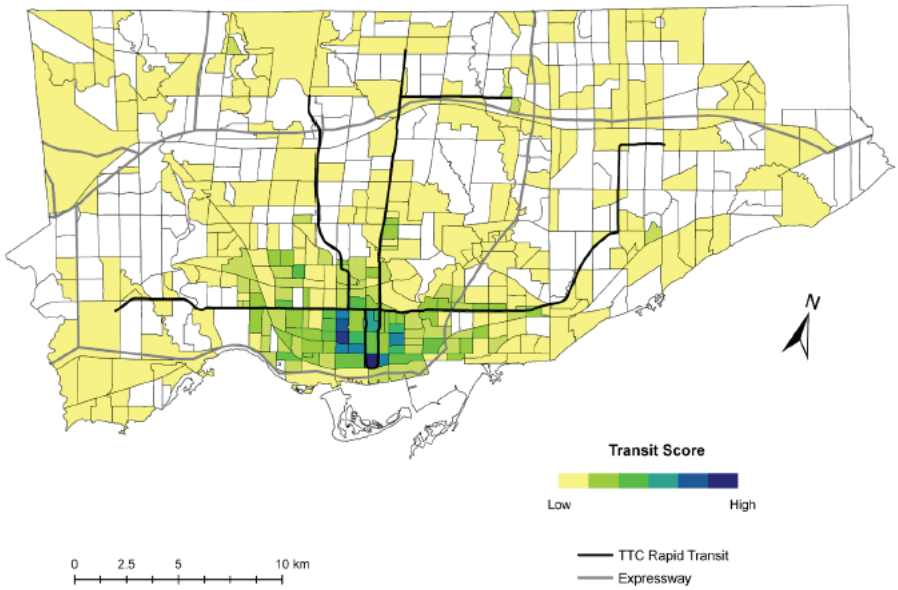


Map by Zara Matheson, Martin Prosperity Institute
Data Source: Statistics Canada

In contrast, there is a mismatch between the intensity of public transit availability and the distribution of employment. Creative class employment opportunities are overlaid by the highest intensity of public transit (See Figure 3). Not surprisingly, the most expensive housing follows a similar pattern of concentration and intensity as those with adequate financial resources select to live close to a fixed line transit well fed by other modes of transit, and/or in proximity to their jobs allowing for walking and cycling alternatives (Hulchanski, 2010). Such areas have been tagged concentrated inclusion – areas of high mobility and accessibility (Preston & Raje, 2007). Overall, 65 percent of creative class dominant census tracts are within 500 metres of a subway station, (Martin Prosperity Institute, 2010). For service class areas, only 21 percent are located within 500 metres of a subway station (Martin Prosperity Institute, 2010).

For low income areas of transit dependence the intensity of public transit is low, frequently creating what are called transit deserts (Martin Prosperity Institute, 2011). In such a transit desert not only is getting to a distant service job an arduous experience or impossibility, even employment in relatively close proximity is a significant challenge (Khosla, 2003; Access Alliance, 2011). According to the Martin Prosperity Institute (2011a), the transit gap in Toronto's inner suburbs is more significant than the income differences described in Hulchanski's Three Cities report. But not simply do such transit deserts isolate low income areas from employment, there are visible areas of distance from goods and services such as food deserts (Martin Prosperity Institute, 2011b). For some, the lack of public availability and accessibility forces the time-space financial penalty of taking a taxi to get where they want to go and within a reasonable time (Khosla, 2003; Access Alliance, 2011). Essentially public transit availability and accessibility creates areas of concentrated exclusion in Toronto.

Figure 3 Intensity of Transit Services in Toronto



Map by Zara Matheson, Martin Prosperity Institute
Data Source: Statistics Canada

In one survey of inner suburb high rise areas it was found that 56 percent of residents lack a drivers license and 42 percent do not own a car (Hess & Farrow, 2010). Even when a car is owned, 84 percent have fewer vehicles than potential drivers unlike more affluent households. For women, the lack of a drivers license and/or car is even more pronounced. Only 36 percent of women – many racialized immigrants – had a license. For single parent households, only 33 percent reported owning a car. Again, in the absence of a car or adequate public transit, many walk or use a combination of walking to the store and returning from shopping by taxi – at a significant financial cost for those with a low income (Hess & Farrow, 2010).

And yet, we are reminded that while these areas of concentrated exclusion map out against many of the priority neighbourhoods, the largest number of low income, low transit availability persons live outside these areas (Martin Prosperity Institute, 2010). The 'spatial trap' is not simply an artifact of geography; it is created in relation to socio-economic characteristics, demographic factors, the distribution of jobs and the patterns, and mode of public transit. The implication, many have observed, is that the decentralized character of service class jobs is not well suited to public transit based on linear fixed line solutions to areas of concentration; instead, decentralization is better supported by flexible bus routes (Barett & Taylor, 1999; Blumenberg, 2004; Ihlanfeldt & Sjoquist, 1998; Lucas, 2012; Mercado et al, 2012; Paez et al, 2009). With opportunity and life resources for transit dependent persons spread there is a transit mismatch so to speak.

In summary, the local context of Toronto is relatively consistent with the literature view findings from other jurisdictions of a spatial trap with the presence of peripheral outer areas of high social need and employment opportunity highly decentralized.

Transit Affordability

Less prominent than the sealing of the Eglinton West subway tunnel, but with deep consequences for low income transit dependent users, was the cutting of the remaining provincial subsidy for TTC operations in 1997. With all operational costs falling on municipal revenue tools, the loss of subsidy commenced a rapid transference of costs to users. In just over a decade, the cost of a TTC fare increased from $1.50 to $3.00 – an increase of 100 percent. Needless to say, the income of the working poor or those requiring social assistance have not maintained pace with transit price increases. For many, public transit is not an option bringing "mobility down to zero" due to financial cost (Khosla, 2003; Access Alliance, 2011). The net effect of this cost shift from public funds to consumer cost has made Toronto public transit the second most expensive in Canada (Toronto Public Health, 2013).

The cost of public transit has regularly been identified as challenge for people on low income in Toronto (City of Toronto, 2005; Community Social Planning Council & Family Service Association of Toronto, 2004; Fair Fare Coalition, 2010; Khosla, 2003; Shapiro, 2012; Toronto Public Health, 2011). Although some health and community services offer special programs to off-set the cost of transportation to receive services, the depth and width of such programs are limited (Fair Fare Coalition, 2010). Of course, such programs only apply to the receipt of professional services and do not apply to regular life activities such as shopping, recreation or employment.

Recently, the Ontario Public Health Association (2012) created a number of scenarios exploring the affordability of a Metro Pass, adjusting for levels of income, family size, and cost of rent and healthy food. For Ontario Works and Ontario Disability Support Program participants, there would be insufficient money to buy a monthly transit pass. Nor would there be much financial discretion for the working poor working even when they are working fulltime for a full year, a less stable assumption with the growth of precarious labour. Essentially, precarious work is matched with precarious access to transit. Although the issue of transportation was regularly flagged during Ontario's development of a Poverty Reduction Strategy responsibility was passed off onto municipalities.

Conclusion – Framing Equitable Public Transit As A Social Determinant Of Health

The spatial trap of limited employment opportunity, constrained social mobility and connectedness, and truncated access to goods and services is well established in transportation research. Equally robust are studies of the negative health effects of low income, precarious employment, underemployment and unemployment, inadequate access to healthy food and other preconditions for good health, all of which is reinforced by poor public transit accessibility. In essence, public transit access and mobility is a critical intermediary social determinant of health and the spatial trap a silent architect of health inequities.

Empirical investigations by the Martin Prosperity Institute and Toronto Public Health have helped identify the prevalence of spatial traps in the City of Toronto. There are a large number of geographic

areas in which transit deserts have been identified, as well as a pattern of low transit availability that is shaped by low socio-economic status. Individuals and areas with the highest need for and dependence on public transit are trapped in geographic circumstances of the lowest transit availability and accessibility. Nor is the spatial trap limited to the geographic boundaries of priority neighbourhoods; the challenges of public transit are dispersed around the city. Particularly problematic is the dispersed characteristic of service class employment that does not easily lend itself to rapid transit solutions such as fixed rail lines.

The prominence of The Big Move has drawn the majority of attention to regional transit issues, arguably at the cost of a focus on localized transit priorities. While The Big Move proposes a number of initiatives that will improve localized transit needs, the mandate of regional transit planning imposes a restricted viewpoint and dialogue. However, the issue is not expanding the mandate of Metrolinx, but rather, refocusing municipal discussions on what is outside the boundaries of The Big Move. Closing the transit gap between high and low intensity areas of public transit will not be solved only through the building of fixed rail lines. In other words, implementing a health equity policy frame also calls for renewed discussions of TTC operations and in City of Toronto budget development.

The following outlines four critical steps towards addressing equitable access to public transit as a social determinant of health in public transit planning at local, regional and provincial levels. The purpose of each step is to re-set thinking on public transit, and encourage the development of tools and processes to achieve the goal, rather than set out specific policy instruments.

Framing Public Transit As A Health Equity Issue

While public transit is back in the public eye, current planning and debate has been dominated by the economic and population health policy frames. Critical as these frames are for understanding transit issues and identifying options, the literature review on public transit as a determinant of health indicates a need for greater attention to and priority setting in reducing inequitable differences access to flexible, timely and affordable public transit. Doing so will help to address the critical connection between public transit and access to the social determinants of health such as employment and the everyday goods and services that contribute to well-being.

The key elements of a health equity policy frame would be an analytical lens on:

- Social need – a higher priority placed on the transit need of those identified as caught in a spatial trap marked by high unemployment, under-employment, low earnings or having low trip frequency or a small geographic zone of travel for personal activities. Such a lens is in contrast with the economic policy frame emphasis on critical mass (i.e., a large number of choice riders).
- Decentralized Access – identifying and implementing options that address the decentralized character of service class jobs widely distributed across a large geographic area. This lens differs in from the economic frame that focuses option identification on concentrated areas of creative class employment most often in the city core.
- Periphery – with a preponderance of spatial traps located in the inner suburbs, residents will be less able to take advantage of solutions designed to move people from population centres outside Toronto boundaries. Accordingly, addressing the transit needs of the periphery require prioritizing reversing patterns of high transit dependence/low transit availability through localized transit planning.
- Operational – A critical factor in reducing the spatial trap is re-directing the near exclusive attention on capital investment in fixed rail options so prevalent within the economic policy frame. Instead,

more attention is needed to improving flexible transit accessibility through non-capital operational policies, such as buses and routing, evening and weekend hours and affordability (pass/ticket price).

Asking The Right Questions: Health Equity Impact Assessment

In considering the characteristics and strategies of the economic, population health and health equity policy frames for public transit, the issue is not a matter of either/or or zero sum solutions. Public policy for equitable access to public transit is not a case of displacing one of the existing frames, but rather, re-balancing the weight accorded to each frame and re-aligning priorities and solutions. And yet, enhancing the prominence of the health equity policy frame generates a different set of concepts and questions to generate equity-focused priorities and strategies.

One such instrument for moving the health equity policy frame in public transit from concept to empirical inquiry would be the mandatory application of a Health Equity Impact Assessment (HEIA) of planned transit options. For example, Edinburgh, Scotland has explored the use of impact analysis (Gorman et al., 2003), while a statutory requirement for transit authorities to assess local accessibility with a focus on the most transit deprived was introduced in the UK in 2006 (Lucas, 2012). HEIA is a tool that incorporates an inter-sectoral perspective on infrastructure development, as well as a wide range of service, program or policy changes, on health disparities and/or health-disadvantaged populations. (Wellesley Institute, 2012).

Most HEIAs are generic in format and content in order for application across a broad range of human service and infrastructure sectors. As a starting point for shaping a public transit application of HEIA, the following questions can be viewed as the minimal requirements for transit planning, option development and priority setting:

5. Does the proposed transit option place a priority on low income transit dependent areas and populations?
6. Does the transit option target known transit deserts in the suburban periphery and/or increase the intensity of service in an area of high transit dependence/low transit availability?
7. Does the transit option address the dispersed and decentralized character of service class employment opportunities?
8. Does the transit option increase hours of operation for evenings and weekends needed to support work schedules and opportunities, including for more precarious and service jobs?
9. Does the transit option reduce the cost of travel for socially excluded groups?

Only by consistent application of such questions and a greater weight of priority allocated to the answers during policy development will the frame of health equity be routinized in planning and decision making processes.

Answering The Right Questions: Health Equity Transit Metrics, Data And Targets

Asking the right questions is, logically enough, contingent on the availability of qualitative and quantitative information to answer the questions. Certainly there is a rich mix of qualitative data that has been generated through a wide variety of consultations in priority neighbourhoods, and such information provides a foundation for identifying challenges with public transit. While such qualitative information is excellent in problem identification, it does not allow for empirically identifying the full size and distribution of such problems and challenges. Not only does the lack of quantitative information constrain the articulation of

full and robust answers, it similarly restrains the evolution of measurable transit equity targets that can be used to evaluate progress and success.

Enacting a health equity policy frame is contingent on expanding the existing array of transit data (e.g., Transportation Tomorrow Surveys, Census/National Health Survey) with a particular emphasis on capturing data related to socio-economic factors such as low income, racialized status and recent immigrants. Expanding the public transit data set using a variety of sources can open the door to explorations of different modes of public transit informed by socio-economic data such as the use of complex time-consuming bus routes with frequent transfers compared to more upscale rapid transit like GO Transit. Similarly, data expansion can improve our understanding of socio-economic variations in the use of public transit for other daily life activities such as day care, grocery shopping or medical care, or begin to fill in the current blanks on the invisible rider – those unable to access transit due to affordability or residing in a transit desert. Equally important is a re-orientation of operational cost assessments (e.g., load factors) that suggest a given route or time period with fewer riders is inefficient when, in fact, from a health equity perspective there are gains in employment opportunities and earnings.

Concurrent with the evolution of socio-economic transit data is the necessity of developing transit equity targets that can be used to measure and evaluate performance in terms of availability and accessibility of localized TTC services and regional transit services and social benefits such as employment.

Who Pays For Equitable Public Transit?

The elimination of all provincial subsidies for operational costs of municipal transit systems was the end point of an ongoing decline in transit equity. Increasingly, the costs of public transit is being transferred to the transit user such that the cost of a monthly transit pass as a percent of monthly minimum wage income in Toronto is now the second highest in Canada at 7.1 percent (compared to other urban areas like Vancouver and Winnipeg where the rates are 5.6 percent and 5.0 percent respectively). Essentially, public transit has been firmly positioned within the economic frame of efficiency at the expense of the health equity frame of social need. Less understood is how the shift toward efficiency has affected availability and affordability as the TTC reduces economically inefficient routes, frequency, and hours of operation to adapt to budgetary constraints. Most international research would suggest the burden of efficiency has most affected the intensity and accessibility of public transit in low socio-economic periphery areas.

What remains critical to the discussion is who pays for (and who gains from) transit equity. In considering the issue of equitable public transit and who pays for equity, it is critical to adopt a multi-sector whole government approach to identify what human service systems might gain from public transit operational expansion and subsidy. Increasing the availability and accessibility of public transit options might seem inefficient from a single sector perspective, yet the broader effects of improved employment and access to goods and services carry the potential to reduce costs in social assistance or lower rates of health care expenditures. Accordingly, there is a need to begin calculating the social and health costs of transit inaccessibility within public transit policy development. An excellent starting point for this more cross-

cutting type of analysis is the Ontario government's refreshing of the 2008 Poverty Reduction Strategy with a new five-year-strategy.

Concluding Remarks

Without the equitable connections of available, accessible and affordable public transit, those with often the greatest level of travel dependence are locked in narrow work and activity zones and reduced occupational and social engagement in wider society. This spatial trap contributes to increasing inequality in access to employment, income and other determinants of health and to reinforcing systemic health inequities. More positively, improving access to public transit can be one key means of enhancing the conditions and opportunities of disadvantaged and marginalized populations, and can help to reduce health inequities. In 2013, that must be a key goal of public policy for transit.

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