Transport Equity

Transportation That Works for Everyone

HealthBridge

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Cover photo: K.Daniel

Table of Contents

Introduction

How people travel within cities plays an important role in determining people’s health, the health of the environment, and ultimately people’s quality of life (Daniel, 2016). If people are able to regularly walk, cycle, and take public transit, we increase people’s physical activity levels, which reduces their risk of non-communicable diseases such as heart disease and stroke (Hamer, 2008). We improve road safety when our cities encourage walking and cycling by making them an easy, comfortable, and safe choice (World Health Organization, 2015; Woodcock, 2009). Replacing automobile trips with walking, cycling and public transit reduces the emissions that contribute to air pollution and climate change (Giles-Corti, 2010). These benefits are important contributors to quality of life.

Cities can achieve these benefits through both urban and transport planning measures. The ease with which people can access jobs, schools, retail and services, and family and friends is partly determined by how our cities and transport systems are planned and built. Urban planning determines where homes, jobs, schools, and shops are located within a city. Cities designed so that these land uses are mixed together makes it easier to access the things that are important for daily living by walking and cycling. If these land uses are farther apart we need to either take transit or drive. Transport planning, on the other hand, determines the transportation options that are available to residents, as well as how comfortable, convenient, reliable, and affordable are the options.

Unfortunately, transport systems in many cities around the world do not benefit all citizens. Ideally a transport system removes barriers for people so they can access the goods, services, and social connections needed to lead a quality life. This is especially important for those who may have limited travel options such as children, the elderly, those living with disabilities, and those living in poverty. In addition, the costs associated with the transport system, including the financial, health, and environmental costs, are often disproportionately placed on those who can least afford those costs and do the least to create them. These concepts are commonly referred to as “transport equity” and they are an important consideration in urban and transportation planning.

What is Transport Equity?

Transport equity ensures the benefits and the costs related to the transport system are distributed fairly and appropriately (Litman, 2017a). It is about recognizing that different people have different travel needs and abilities and prioritizing the needs of those who are not already better off. This is quite different from “equality”, which means you consider and treat everyone the same. When you treat everyone the same, especially in a transportation context, you often end up creating disadvantages to those who have different needs.

Transport equity includes two important components:

a) The system meets the needs of the most number of residents, but especially those in the most vulnerable situations.
b) The system distributes the benefits and costs associated with the transportation system fairly.

Meeting the Needs of the Vulnerable

Transport equity is about using the transportation system to give people who experience some form of disadvantage greater options for their day-to-day life. People differ in terms of income, ability, and need and certain groups experience greater degrees of disadvantage than other groups. There are many factors that can contribute to an individual or group becoming transportation disadvantaged such as (Litman, 2017a):

- Living on a low income;
- Living with a disability;
- Experiencing language barriers;
- Living in an isolated or an inaccessible location;
- Having caregiving responsibilities, such as a dependent child or adult;
- Having frequent obligations such as medical treatments; and
- Not having a private automobile.

The greater the degree a person experiences one of these factor and the more factors that apply, the more disadvantaged an individual may be. Imagine these examples:

1. A young adult male has three part-time jobs in different parts of the city and no access to a car. He could use his bicycle but it does not feel safe because there are no bike lanes for most of his journey. On Wednesdays, the only day that he needs to work all three jobs, he leaves home at 6am in order to be at his job for 8 a.m. His afternoon job is at the other end of the city, which requires 3 bus transfers. He must take a taxi home from his evening job because the buses no longer run at that time. He gets home at midnight. In total, he spends four hours in transit and spends $15 a day on taxis.

2. A mother has a job downtown that is easily accessible by transit. However, on any given day she also needs to help her young children go to school, take her elderly mother to her appointments, shop for groceries for the family, and pick up her children from soccer and piano practice. She would like to take transit to her job so she can reduce the expense and stress of using her car, but the transit system in her city does not allow multiple stops on a given fare and so on the days she has extra trips, which seems like every day, she would need to pay the full fare multiple times for each new destination. It is easier to just take her car.

3. A new resident in a city has a job interview in another part of town. The transit system is confusing and he is having difficulties understanding what he needs to do in order to reach the job. He has heard from his friend that the system is expensive and he does not think he can afford it every day. He decides not to go to the job interview.

4. An elderly woman, who uses a walker, has a friend who is only a short distance away and they like to meet for tea and chat about their grandchildren. The sidewalks and

Source: Dan Burden
https://www.pedbikeimages.org/pubdetail.cfm?picid=728

streets are in such poor repair she is afraid of slipping and decides she cannot see her friend until her daughter visits and can take her.

In each of these examples, the transport system is not meeting the needs of these individuals. In each of these cases the transport system prevented these individuals from fully participating in community life.

Although these examples are fictional, studies have shown that individuals with limited travel options make fewer trips for shopping, and socializing, have a harder time applying for employment, are less likely to access healthy foods, healthcare, educational resources (Litman, 2017a) and are more likely to experience social isolation and social exclusion (Levinson, 2010). Ultimately, transport equity is about helping compensate for the disadvantages experienced by individuals and groups.

Distributing Benefits and Costs Fairly

Transport equity also ensures the benefits and costs associated with the transportation system are fairly distributed between individuals and groups considered equal in ability and need (Litman, 2017a). Everyone should be treated equally and no one group should be favoured over another unless special treatment is justified for specific reasons. Strategies to distribute benefits and costs fairly includes (Litman, 2017a):

- Policies and regulations are applied equally to all users;
- Expenditures and cost burdens are equal for different groups;
- Quality, comfort, and convenience are comparable for different groups, locations, and modes of transportation;
- Different transportation modes, such as walking, cycling, public transit, and car use receive public support in proportion to their use;
- Individuals bear the costs they impose unless subsidies are justified.

There are many examples of transport systems not fairly distributing the benefits and costs to individuals and groups. Most cities continue to favour private automobile users over pedestrians, cyclists, and public transit users. Even for those cities that have good public transit networks, the benefits of public transit are often not distributed fairly. Most transit networks are designed to encourage discretionary users - people who have other transport options - to use the system (Hertel, Keil, & Collens, 2016). These transit systems are intended to help bring people to a major service area, such as a downtown, but not to bring people efficiently or effectively to other parts of the city. And, the systems are often designed in such a way that it is most convenient for certain parts of the city but not convenient for the some of the lower-income communities on the periphery of the city who are most in need of transit.

In addition there are costs or “externalities” created by transport systems including air pollution, noise pollution, carbon emissions, and crashes (Levinson, 2002). An important transport equity study in Brazil found that although people at the lowest income level spend a high share of their income on transport, they are the least able to easily and affordably move about their city. In addition, they contribute almost nothing to transport externalities but suffer more of the consequences of those externalities. At the other extreme, the two highest income groups that use cars intensively contribute to transport externalities 8.4–15.2 times more than the lowest income group (Vasconcellos, 2005). Ultimately, transportation equity aims to redistribute both the benefits and the costs more fairly.

What are the obstacles to equity?

Unfortunately, most cities fail to adequately address transportation equity. Levy (2013) found from her review of transit options in the global south that cities rarely consider the needs of a diverse array of users. Transport planning focuses on the needs of men in the workforce, who often have access to a private automobile. Women, the elderly, children, and persons with disabilities each have vastly different travel needs and, by not providing for their needs, the lack of transport options has the effect of denying their right to fully participate in city life (Levy, 2013). Hertel, Keil, and Collens (2016) came to a similar conclusion in their review of transit in the Greater Toronto and Hamilton Area in Canada. They found that people living on lower than average incomes, those living in neighbourhoods on the periphery of cities, women, young, the elderly, and those who identify with minority cultural groups have not historically benefitted as much as others from the transport system.

However, urban and transport planning is complex and those planning the system must consider many different many different issues. There are a variety of factors that contribute to transport inequity including:

- Automobile-dominant urban planning models;
- Measuring and evaluating transport favours automobiles;
- Automobile infrastructure is favoured;
- Drivers do not pay the full cost of driving;
- Transit does not take the disadvantaged where they need to go; and
- Transit can be expensive and uncomfortable.

Each of these are discussed below.

Automobile-dominant urban planning models

Urban planning has an important influence on the transportation system. Urban planning decides where homes, workplaces, stores, services, and amenities will be located within a city and thereby impacts the distances people must travel. The closer the different uses are to each other and the more compact the city, the more transportation options are available to residents.

The planning literature typically considers ideal walking distance for retail and services to be 400 m, which is a 5 minute walk (Dunn, 2009). Cycling distance varies by city but is typically considered between 1 km and 5 km (Mitra, 2016). The ideal distance for local transit from origin (such as a house or job) to a transit stop appears to be 400 m (Ewing & Cervero, 2010). Regional transit, on the other hand, is a destination people may be willing to travel farther to (Dunn, 2009) and should connect with local transit. Urban planning determines whether people are able to access their day-to-day needs within these distances.

Urban planning also determines, in part, how many people live and work in neighbourhoods and cities. The number of people living in a neighbourhood is important for two reasons. First, by increasing the number of employees or residents in an area, we can increase the chances that transit will be viable; that there will be enough people using transit to make it affordable and convenient. Second, by increasing the number of people who live and/or work in an area, we can help reach the critical mass needed to attract stores, restaurants and other services into the area (Frank, 2006).

Source: Dan Burden
https://www.pedbikeimages.org/pubdetail.cfm?picid=1450

Unfortunately, many cities are organized so that different types of uses, such as residential, retail, and employment are separated and the number of people living and working in a given area is too small to support transit, retail, and services. This makes distances between where people live and where they work, play and shop too long to reasonably walk and cycle.

It also makes the provision of public transit less viable. These types of neighbourhoods can be considered automobile-dependent communities because the only realistic way to move around is by private automobile. Although this tends to be a building pattern that is prevalent in North America, there is some evidence to suggest that low and middle-income countries are also experiencing development patterns that separate uses and increase distances among residents (Schneider, 2008).

The most obvious direct effect automobile-dependent cities has on residents is making jobs, shopping, and services difficult to access for those without automobiles (Ewing, Hamidi, Grace, & Wei, 2016). In addition, this type of urban planning pattern reduces social capital by reducing the number of social connections among residents. People with higher levels of social capital can leverage their relationships to find jobs, create new opportunities, and benefit from community support (Ewing, Hamidi, Grace, & Wei, 2016). Low-income residents of automobile-dependent communities tend to spend much more of their income on transport than residents of communities with more diverse transportation options (Litman, 2017a). Designing neighbourhoods that are automobile-dependent therefore has important transportation equity implications.

Measuring and evaluating transport favours automobiles

Conventional transport planning uses measurement methods to plan and evaluate the system that favour automobiles. Modal split, for example, is the percentage of travellers using a particular type of transportation and is often used to justify spending on a particular mode of travel. Although the way modal split is measured varies widely among cities, typically travel surveys are used. Conventional travel surveys tend to undercount short trips, non-commute trips, travel by children and walking links of motorized trips (Litman, 2017a). Not collecting data on the number of pedestrians, or only collecting data on some but not all pedestrian trips will lead to cities to underestimate the number of pedestrians. If spending decisions are made on the basis of modal splits that do not calculate pedestrians accurately this will contribute to inequality.

Level of Service (LOS) is another typical measure used in transport planning. It measures the capacity of a roadway or street by examining the speed of vehicles when volumes are at capacity during a specific period of time (Litman, 2017a). Free flowing traffic is defined as a high LOS, and slow moving or stop-and-go traffic is defined as a low LOS. Typically LOS only measures vehicular traffic and not walking or cycling traffic. Therefore projects that slow vehicular traffic, even if they move more people by supporting greater levels of walking and cycling, are given a lower LOS rating. Both modal split and LOS favour motorized modes and undervalue other modes such as walking or cycling (Litman, 2017a). Ultimately the ways cities measure transportation skews planning and funding toward motorized modes, reducing transport quality for people who do not drive (Litman, 2017a).

Automobile infrastructure is favoured

It is well known that the road transportation sector is a major producer of global CO_2 emissions, which are an important contributor to climate change and air pollution (International Energy Agency, 2015). Transport emissions are rising faster than emissions from other sectors and are projected to be 80% higher than current levels by 2030 (Giles-Corti, 2010). In addition, about 1.3 million people die each year on the world's roads and between 20 and 50 million sustain non-fatal injuries (World Health Organization, 2017). Pedestrians and cyclists contribute very little to these enormous costs associated with the transport system.

However, despite the clear problems that emerge by encouraging greater car use, cities continue to invest heavily in infrastructure for cars and this is often at the expense of other priorities such as pedestrian and cycling infrastructure and transit. A recent report concludes that roads will likely remain the biggest area of transport investment, with the countries in the Asia-Pacific Region projected to spend US$5 trillion between 2015 and 2025 (pwc Global, 2015). China is planning on spending US$1.13 trillion to add five million kilometres of roads (Yue, 2017) despite only 17 percent of households having cars (Pew Research Centre, 2015). A recent report from San Francisco demonstrated that the city spent less than 1% of their transportation budget on cycling infrastructure despite the fact that cyclists made 3% of all trips (San Francisco Bicycle Coalition, 2014).

Source: K.Daniel

Automobile infrastructure is expensive in terms of both the public space required to support such travel and the funding needed to build and maintain the infrastructure when compared to comparable infrastructure for pedestrians and cyclists. Automobiles require several times as much public space per passenger-kilometre than other modes (see Table 1). Road space requirements are determined by size and speed, which means the larger the vehicle and the faster that vehicle goes, the more space that vehicle will require (Litman, 2017b).

Table 1: Typical Per-Person Space Requirements (Litman, 2017b)

	Speed (miles per hour)	Standing/Parked (square feet)	Travelling (square feet)
Pedestrian	3	5	20
Bicycle	10	20	50
Bus Passenger	30	20	75
Automobile	30	400	1500
Automobile	60	400	5000

The San Francisco Bicycle Coalition estimated the costs associated with different types of transportation infrastructure and found that one mile of roadway cost more than US$571 million whereas one mile of basic protected bikeway cost US$445,000 and one curb extension (to make pedestrian crossings safer and easier) cost $78,000. They concluded if 8% of San Francisco's transport budget was allocated to building cycling infrastructure there could be protected bikeways across the whole city (San Francisco Bicycle Coalition, 2014).

By investing heavily in automobile infrastructure and under-investing in pedestrian and cycling infrastructure, cities create several inequities. First, the public space requirement for automobiles creates a vastly unfair distribution in favour of drivers. The average pedestrian requires 20 square feet of space while travelling, while a car requires 1500 square feet or more depending on its speed (Litman, 2017b). In addition, road space is often shared between car users and transit users. This means that one bus carrying fifty passengers is required to share the same space as one automobile carrying one person, resulting in an unfair use of public space.

This trend is being seen in cities throughout the world. Even in developing countries where low-income residents rely heavily on walking and cycling, the infrastructure to support such transportation modes is often neglected in policy-making. Decision-makers consider walking and cycling as a sign of backwardness and the urban elites distort transport planning in favor of motorized modes, which they are more likely to use themselves (Pojani & Stead, 2015).

Drivers do not pay the full cost

People who drive automobiles rarely pay for the full cost of the infrastructure they use. Free parking, low automobile licensing and registration fees, and general taxes funding roadways are all examples of ways that cities subsidize the cost of driving (Litman, 2017a). A study from the United States suggests that about one third of roadway costs are subsidies, which means people who drive more than average receive greater public subsidies (Litman, 2017a). A study from Canada found gas taxes, vehicle licenses, and other revenues from drivers covered only 53% of roadway expenses across Canada during 2009/2010. In fact, although the total expenses on roads for all levels of government have been steadily increasing since 2002/2003, government revenues from road users has remained relatively static (Dachis, 2011).

Parking requirements also represent a subsidy of vehicle ownership and are worth hundreds of dollars annually per motorist (Litman, 20017a). Free and low-cost parking on city streets mean that everyone pays for the costs to build and maintain such parking, regardless of whether they drive. City bylaws that require residences to provide a certain minimum of parking are also a subsidy since even those households that do not have a vehicle must have parking. Since vehicle ownership and use tend to increase with income, these subsidies favour higher income earners at the cost to low-income earners (Litman, 2017a).

In addition, when the externalized costs of driving, such as collisions, noise, air pollution, and congestion are considered, it is clear that drivers are not covering the full spectrum of costs associated with driving (Haines & Burda, 2016). A study from Copenhagen estimated that the cost to society of driving a car is six times higher than the cost of cycling (Gössling & Choi, 2015). The study suggests current practices that favor motorized transport over other travel modes and ignore the negative impacts that motorized traffic imposes on other road users and nearby residents is unfair. Ultimately, this means that even people who do not drive automobiles end up paying for the infrastructure and the externalities and those that do use the infrastructure do not end up paying their fair share.

Transit does not take the disadvantaged to where they need to go

Transit is critically important to ensuring transport equity in cities. Public transit allows people to reach destinations that are beyond viable walking and cycling distances (Pojani & Stead, 2015). An effective public transport system is important in connecting people with jobs, serving a rapidly aging population, reducing traffic congestion, and is essential to lifting low-income families out of poverty (Hertel, Keil, & Collens, 2016).

However, while building transit is important for cities, the transit that is being built is not necessarily good for everyone. Many cities are focused on providing transit service that will be attractive to automobile users. In particular cities are hoping to convert those single-occupant commuters who have higher incomes and have many more travel options than those people who would be considered dependent on transit. Although converting car drivers to transit is a worthy goal as this will help reduce air pollution and improve congestion, these transit services are often provided at the expense of other parts of the city where transit is more needed (Garrett, 1999). Places that are already disadvantaged because they lack employment opportunities and have substandard housing are often least served by transit investments (Hertel, Keil, & Collens, 2016).

To compete with private automobiles, transit systems must offer drivers substantial incentives, which typically involves expensive public investments in new fixed rail or express bus service (Garrett, 1999). With greater emphasis on converting car drivers, the formal bus service system ends up being dramatically underfunded (Pojani & Stead, 2015). Studies have shown that bus ridership declines with rising income, but the use of streetcars, subways and commuter railroads tends to increase with higher income (Garrett, 1999). Ultimately, this results in transit investments benefiting those who have higher incomes, while doing little to change the prospects of those people who are living on lower incomes (Hertel, Keil, & Collens, 2016).

Transit can be expensive and uncomfortable

Unlike roadways, which are often fully funded through government revenue, transit systems typically rely on fares to at least partially fund the operation of the system. This has the effect of promoting driving by discouraging transit users. Although some cities do subsidize their transit system, transit fares on a per kilometre basis tend to be lower on commuter and suburban transit systems than on central city bus systems (Garrett, 1999). This is because cities are attempting to attract and retain commuters who may have other options. The result is that, for some people living on low-incomes fares can exceed what they are able to pay, creating even great transportation inequity (Haines & Burda, 2016).

In addition, formal bus services are often unreliable, inconvenient, uncomfortable, and, in some cities, even dangerous (Pojani & Stead, 2015). Overcrowded vehicles, poor loading areas, lack of safe sidewalks to access transit, lack of convenient connections, and the need to make many transfers are problems that occur daily for most transit systems (Vasconcellos, 2014). The result is that commuting by transit is not a comparable experience to driving.

Source: J. Margolis http://kuow.org/post/why-taking-bus-better-our-health-driving

What are some of the solutions?

Urban planning that focuses on car dominant models, and transportation planning that emphasizes car infrastructure while not providing appropriate walking, cycling, and transit options means that the current state of transportation in many cities does not serve the mobility needs of the population adequately. However, there are solutions that have been tried in different countries that have shown success in reducing transport inequalities.

Plan for compact communities and affordable housing

A key solution to creating better transportation equity is to adopt urban planning strategies that encourage compact growth and prioritize walking, cycling, and public transit.
Such strategies include:

- Creating mixed use communities where residences, public services, retail, and jobs exist within walking and cycling distance;
- Building affordable housing in locations where walking, cycling, and public transit are comfortable, convenient, and safe options;
- Creating employment areas that are easily accessible by public transit; and
- Ensuring the density in neighbourhoods is sufficient to support a variety of retail, services, and public transit.

Source: K. Daniel

Such measures provide equity benefits by making the distances one needs to travel easy to either walk, cycle, or use public transit. This reduces the need for a private automobile and reduces the cost burdens on disadvantaged households (Litman, 2017a).

Planning for Affordable Housing in Montgomery County, USA

Montgomery County has adopted a "Moderately Priced Dwelling Unit" zoning ordinance. This ordinance requires developers of all mixed-use projects with 20 or more residential units to make 12.5 to 15 percent of the units affordable for lower-income households. In exchange the developers receive a 22 percent density bonus, which allows them to build more units. This ordinance has resulted in the construction of more than 11,800 affordable units since it was enacted. For example, a garden apartment community across the street from a Metro station was redeveloped with a mix of 1,550 apartments, condominiums, live-work units and townhomes – 12.5 percent of which are "moderately priced" workforce housing. The development included a retail center with restaurants, a gym and services, and a landscaped central park connecting to a linear park along a nearby stream, which provides appealing public space for active and passive recreation. The development, station, surrounding neighbourhoods and nearby community attractions — including a regional park — are all linked with walkways. The provision of a pedestrian-scaled streetscape helps create a sense of place, increase pedestrian activity and transit ridership, and reduce vehicle trips.

Source: Center for Transit-Oriented Development (2009)

Change how transport is measured

In order to move towards transport equity, cities need to begin measuring and evaluating transportation system so that they account for the accessibility of the system. Transportation accessibility includes travel time, travel cost, travel options, comfort, and risk (Litman, 2017a). The goal of measuring accessibility is to determine the overall capability, efficiency, and ease of access of the transportation system. Measuring accessibility has the potential to alleviate transportation inequities by eliminating the bias towards private automobiles in transport planning.

Changing what is included in modal split to ensure that pedestrians and cycling trips are measured, regardless of distance and who is travelling, is another measurement strategy that supports greater equity. It is important to determine how many users there are for a particular mode and to not over-emphasize the importance of automobile travel. In addition, changing how Level of Service is measured will be important if walking and cycling trips are to be considered a key element of the transportation system. Focusing on number of people moved rather than number of vehicles moved would help recognize the full benefits and equity impacts of transport projects. Collecting and using planning data that includes age, gender, and income, will help highlight specific user groups that might fall outside of the typical commuter.

There is also new research underway that suggests mapping techniques can be used to measure transit inequality (Hertel, Keil, & Collens, 2016). Such mapping could improve transport data and allow planners to better understand the spatial distribution of transport in relation to those areas of the city where disadvantaged people may live or work. Improved transport data can help to better understand disadvantaged people's travel demands, and the quality of walking, cycling and public transit.

Mapping in Melbourne, Australia

Officials within Melbourne, Australia are identifying the gaps in transportation and mapping those gaps along with the areas of the city where people may have the most transit needs. They were able to create a system-wide assessment of overall transit supply to the population, which showed that 70% of the population shares only 19% of the transit supply. When employment is also taken into account, the situation is not much different; 70% of jobs and population share 23% of transit service. However, the transit supply was compared between different age, income and vehicle ownership groups. On a positive note, they found that there was a higher supply of transit for youth and low-income groups in inner Melbourne, and in all parts of Melbourne no-vehicle households lived in areas of higher transit supply. These measures are helping to make transportation inequalities visible, which has the potential to lead to system-wide improvements.

Source: Delbosc (2011).

Using Multi-Modal Levels of Service in Ottawa, Canada

In 2013, the city of Ottawa's Transportation Master Plan included provisions for using a Multi-Modal Level of Service (MMLOS). The MMLOS is to be used by both city-led and developer-led projects and measures comfort, convenience, and safety for pedestrian, cyclist, transit, truck and vehicle level of service.

Source: (IBI Group, 2015)

Institute user fees for private automobile travel

User fees for roads have the potential to increase transportation equity. User fees include fuel taxes, tolls, congestion charges, parking charges, distance based vehicle insurance and licensing, and environmental taxes and emissions fees. These types of fees contribute to transportation equity by making the price associated with the roadways more accurately reflect the true costs, and by assigning those costs to those who actually use the roads (Litman, 2017a).

Road user fees, such as tolls and congestion charges, are becoming a more common tool used by cities. Typically these types of fees are used to reduce congestion in cities and as a revenue generation tool. There are three decisions that affect equity when it comes to user fees for roads: who is affected by the charges; how is the revenue collected used; and, how are the externalities distributed (Levinson, 2010). Studies suggest that road pricing policy can create more transport equity when the wealthy are the most affected by the road pricing charges and when the revenue collected is spent on public transit improvements, which most benefits women and those with low incomes (Levinson, 2010). However, it is possible road user fees could increase social exclusion for some drivers, especially for low-income travellers who have no other options (Levinson, 2010). In these cases, strategies such as issuing exemptions and re-distributing some of the funds collected to those less well-off have been used to lessen some of the equity impacts for low-income travellers (Levinson, 2010).

Congestion Charges in Stockholm, Sweden

In Stockholm congestion charges were introduced as a six-month trial and an extensive monitoring and evaluation program was carried out. After the congestion charge was introduced there was a substantial reduction in traffic. Commuting trips by car across the tolling area decreased by 24% and nearly all of these trips switched to transit. Only 1 % switched route to avoid the toll. In addition, public opinion changed from hostile to a small majority being in favour of the charges.

Source: Börjesson, Eliasson, Hugosson, & Brundell-Freij (2012).

Congestion Charges in London, England

In 2003, the city introduced a congestion charge in central London with the intent to reduce traffic congestion, improve air quality, and raise investment funds for London's transport system. Since the congestion charge was introduced, more than £1.2 billion in revenue has been invested in transport including £960 million on improvements to the bus network, £102 million on roads and bridges, £70 million on road safety, £51 million on local transport plans, and £36 million on sustainable transport and the environment.

Source: Transport for London (2014)

Reallocate road space to better encourage walking, cycling and public transit

Roadway designs have a significant impact on a community's character and can help determine transportation equity. Unfortunately, current transportation planning practices favour motorized transport over other travel modes by allocating most space to car traffic lanes and parking. The result is that public transit, cyclists, and sometimes pedestrians are forced to mix with motor vehicles. Reallocating road space so that all modes are treated fairly is an important strategy for ensuring transport equity. This includes:

- Ensuring pedestrians have sidewalks or footpaths on both sides of every road;
- Providing safe ways for pedestrians to cross streets;
- Building bicycle lanes that are separated from vehicular traffic and protected from vehicle parking;
- Ensuring bicycles are able to safely navigate through intersections; and
- Giving priority to public transit vehicles by separating them from automobiles and giving them priority at streetlights.

Source: City of Toronto

These measures help ensure that pedestrians, cyclists, and public transit users are protected from the risks imposed by drivers and recognize the value of these modes of transport (Litman, 2017a).

Complete Streets Approach in Toronto, Canada

The City of Toronto used a Complete Streets approach to provide better facilities for pedestrians and cyclists. Simcoe Street was redesigned with separate biking lanes. A vehicle parking lane acts as a buffer for a bike lane that moves in the opposite direction of vehicle traffic. In order to accommodate this new facility, a road diet approach was taken, as 3 traffic lanes were converted to 2, including an off-peak parking lane. The public realm has seen many benefits and as a result pedestrians are increasingly choosing Simcoe as a route since the street improvements. The street has provided a key connection in the cycling network and fills an important gap. In total there were more than 1400 cyclists per day using the facility within the first month of installation.

Source: Toronto Centre for Active Transportation (2014).

Creating Complete Streets – A Key Transport Planning Tool

The National Complete Streets Coalition in the United States promotes the development and implementation of Complete Streets policies and professional practices. Complete Streets are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work. They allow buses to run on time and make it safe for people to walk to and from train stations.

Creating Complete Streets means transportation agencies must change their approach to community roads. By adopting a Complete Streets policy, communities direct their transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation. This means that every transportation project will make the street network better and safer for pedestrians, bicyclists, transit users, and drivers.

For more information visit: https://smartgrowthamerica.org/program/national-complete-streets-coalition/

Designing transport to better support the disadvantaged

A connected transport network is one that provides a range of travel options, provides the greatest number of choices possible for the greatest number of people, and at a price that all people can afford. A safe and comfortable transport network also ensures that people who are disadvantaged due to income or physical ability, for example, do not experience barriers to access (services, amenities, shopping, etc.) and are able to travel where they need to go conveniently and with dignity (Hertel, Keil, & Collens, 2016).

To achieve this type of equity, it is important that transport networks are designed so that multiple users can go to a variety of locations easily and quickly. Building a transit system on the assumption that everyone travels to the same place at the same time for the same reason, will deliver the opposite of equity (Hertel, Keil, & Collens, 2016). Similarly, building a network of roads and highways and ignoring pedestrians, cyclists, and public transit users assumes that all residents have access to a private vehicle and will create transport inequity.

The following strategies can assist in developing transport systems that meet needs of everyone, especially the disadvantaged (Center for Transit-Oriented Development, 2014):

- Use evaluation tools that assess how well the existing transportation network meets the needs of low- and moderate-income riders;
- Integrate multiple modes of transportation into local planning processes;
- Urban and transport planners should coordinate to improve connections between affordable housing and jobs, services, and other destinations;
- Improve the walking and bicycling infrastructure; and
- Prioritize projects that improve connections for affordable housing and other low-and moderate-income residents.

Supporting Low-Income Bus Users in Bogotá, Colombia

In 1998 Bogotá's mayor Enrique Peñalosa was facing crippling traffic congestion and social inequality. Some of the city's urban planners proposed building a network of elevated highways across the city. However, the Mayor did not believe this solution would fix the congestion and social equity problems the city was facing. For a fraction of the cost of the proposed elevated highways, the city invested in a bus rapid transit (BRT) system called TransMilenio. The BRT system includes over 1,300 large buses that can hold up to 160 passengers that travel throughout the city, and smaller feeder buses that take care of the outlying areas where low-income residents live. The buses have dedicated lanes with elevated stations in the center of the roads. The floor of the bus is level with the floor of the station, making it easy for wheelchairs, the elderly, and people pushing strollers to enter and exit. TransMilenio has high ridership levels, is cost-effective, has flexible operations, and has been successful at improving transportation options and travel times for low-income residents on the outskirts of the city.

Source: Guevara-Stone (2014)

Adopt Universal Design principles

Universal Design refers to transport designs that accommodate the widest range of potential users, including people living with disabilities such as mobility and visual impairments and other special needs. Although Universal Designs are specifically intended to address the needs of people living with disabilities, such designs are a comprehensive concept that can benefit all users. For example, a mother pushing a stroller would not be considered disabled but her needs should be considered when designing transportation systems (Victoria Transport Policy Institute, 2017). Examples of designs that consider the needs of a diverse group of users include:

- Increased walkway widths
- Low-floor buses
- Smooth walking surfaces
- Curb ramps
- Automatic door openers.

Universal design gives people with physical impairments better mobility, which makes them less disadvantaged than they would be with traditional transport design strategies (Victoria Transport Policy Institute, 2017).

Universal Design in Hong Kong

Hong Kong has created a *Universal Design and Technical Requirements* document that outlines the city's comprehensive Universal Design approach. In order to achieve accessibility for all transportation users, the complete travel chain must be considered. This means that the experience of the individual on the journey from residence to public transit, while on public transit, to the drop off point, to the destination, and then inside the destination building must all be considered. The principles they use for their universal design strategy are that the transportation system must be:

- Equitable
- Flexibile
- Simple and intuitive
- Easy to understand
- Forgiving
- Easy in terms of physical effort

Source: Hong Kong Architectural Services Department (n.d.)

Source D. Burden; J.Moser https://www.pedbikeimages.org

Create Affordable Transit

Creating transport equity requires that transportation systems remove barriers for those who might be considered disadvantaged either due to age, ability, or income. Students, seniors, those living with disabilities, and low-income individuals rely heavily on transit to conduct activities of day-to-day life. Expensive transit fares restrict their options and opportunities available to them, creating significant transportation inequity. To address this inequity many cities offer discounts to these groups to ensure that the transit system is accessible and meets their needs. Cities such as Paris, London, Seattle, and San Francisco, offer such discounts. The fares are subsidized through city funds and are considered an important way to ensure transportation equity.

Sliding Scale Fare Charges in Calgary, Canada

The city of Calgary uses sliding scale fare charges to help eliminate the financial barriers for Calgarians to use the transit system. Sliding scale is a pricing system that assigns a purchase price based on income. The less an applicant earns, the less they will need to pay. The slide scale uses three price categories and uses a person's income along with the number of people in the household to determine which pricing category a person fits into. A single household person earning less than $12,474 per year will pay $5.05 for a monthly bus pas; a single household person earning between $12,475 and $21,206 per year will pay $35.35 for a monthly bus pass; and, a single household person earning between $21,207 and $24,949 per year will pay $50.50 for a monthly bus pass (which represents a 50% reduction).

Source: City of Calgary (n.d.)

Organize citizen-led planning

The role of citizen participation in improving transport systems has become increasingly recognized in recent years (Sagaris, 2014). Citizen-led organizations have helped to bring about transport equity improvements and are often at the forefront of the public debate around transportation projects (Hertel, Keil, & Collens, 2016). Often citizen-led groups address issues related to where transit lines go, overall access and comfort, and affordability. Citizen-led organizations have used a number of different strategies to bring attention to the transport inequity they have experienced including legal actions, political actions, technical innovation, and economic incentives.

Experiences throughout the world have shown that strategic approaches to citizen participation can introduce innovation into existing transportation systems (Sagaris, 2014). An example from Santigo, Chile suggests that thinking about citizens as planners in their own right, rather than as mere participants at specific points in a planning process, opens the way to more effective strategies in transport that address the social, environmental and other challenges facing city dwellers today (Sagaris, 2014). Citizen-led movements have led to improvements in transport equity by preventing expensive highway projects (Sagaris, 2014) and by improving transit through reduced or fare-free pricing structures (Hertel, Keil, & Collens, 2016).

Bus Rides Union in Los Angeles, United States

The Bus Riders Union is a progressive civil rights and environmental justice membership organization in Los Angeles. The Bus Riders Union promotes environmentally sustainable public transportation for the entire population of Los Angeles, on the premise that affordable, efficient, and environmentally sound mass transit is a human right. They identified key inequities in transportation priorities. Rail projects were noted to serve a disproportionate level of white riders in the Los Angeles region and consume a disproportionate amount of both the capital and operations budgets. Bus riders, on the other hand, are 90% visible minority, with an average income of $14,000 and were more likely to have a disability than the general population. Operation funding gaps were filled by cutting bus service and raising fares, which produced a double hit on low income and minority riders. The cuts meant they received less service than before the rail projects opened, while riders served by the rail projects benefitted from the new transit investments. Low-income riders were also more likely to have multiple jobs at off-peak travel times where cuts were disproportionally targeted. More affluent riders were also in a better position to absorb fare increases that have a relatively lower impact on their disposable income. The Bus Riders Union began a campaign to stop the cuts to bus service and to prevent fare increases and encouraged greater walking and cycling options throughout the city.

Source: Strategy Center (2009)

Saving Neighbourhoods in Santiago, Chile

In 1996, a local citizens group called Ciudad Viva (Living City) was formed in Santiago, Chile to stop a highway project called "Costanera Norte" being planned that would slice east to west through the middle of the city, destroying the most important of Santigo's few parks. Architects, engineers, and artists joined local citizens to undertake a campaign to speak out against the highway project. As a result of their efforts, journalists were won over by their arguments and began publishing articles highlighting the problems the highway would cause to the community. Although ultimately the highway was built, the government announced that the project would be rerouted, thereby protecting the neighbourhoods. Since its inception, Cuidad Viva has expanded its role and is working on important city-building activities in the city and plays an important role in regional and international efforts related to transportation.

Source: Sagaris (2001)

Conclusion

Urban and transport planning in many cities around the world do not benefit all citizens. Ideally urban and transport planning will remove barriers for people so that everyone, including those who are disadvantaged, can access the goods, services, and social connections needed to lead a quality life. Focusing on transport equity is one method to ensure the benefits and costs related to the transport system are distributed fairly and appropriately.

By creating transport systems that meet the needs of the majority of residents, especially those in the most vulnerable situations, and that distributes the benefits and costs associated with transport fairly, we can create transport equity. Unfortunately, many cities struggle to achieve transport equity, in part because there are many competing interests in the transport system. And, although many cities may have transport equity goals, often such goals are not translated into clear objectives and meaningful action (Manaugh, 2015).

However, there are many good examples throughout the world of transport equity solutions being integrated into local urban and transport planning. These examples suggest that urban planning models favouring walking and cycling as the primary mode of travel helps create transport equity, especially for those unable to access a private automobile. Many cities are experimenting with measuring and evaluating transportation so that walking, cycling and public transit are recognized as important modes of travel.

Cities that focus on re-allocating road space to ensure walkers and cyclists have safe, comfortable, and convenient infrastructure have created greater equity and increased modal share of these important travel options. Creating such infrastructure to meet the needs of the most vulnerable, including those who are living with disabilities, has proven to be key in ensuring people can access the goods and services they need for a good quality of life. In addition, in order to achieve transport equity, we must ensure that funding is allocated to walking, cycling and public transit, which are the modes we want to encourage, while also making sure drivers pay the full cost of their transportation. By focusing on these strategies, cities have a much greater chance of achieving transport equity. And with transport equity, the health and well being of city dwellers is markedly improved.

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