

# EQUITABLE ACCESS TO URBAN MOBILITY

Mobility is a social and economic need. The availability of transport options, and the way they are delivered, can present major challenges to the mobility of many residents in today's cities. Investments in urban transport infrastructure do little to alleviate the mobility difficulties of the urban poor or other vulnerable and disadvantaged groups if the services provided are unaffordable or physically inaccessible. Such barriers contribute to socio-spatial inequities in urban areas, including discrimination against vulnerable and disadvantaged groups. These barriers are not only fiscal or technical in nature, but arise from political, social and institutional factors that prevent progress towards socially sustainable urban mobility systems. Thus, this chapter focuses on the aspects of urban mobility that relate to providing affordable access to opportunities, minimizing social exclusion and improving the quality of life for all.

In recent years, transport policy has begun to focus more intently on new assessment and evaluation regimes, to better articulate the impacts of transport investments. Whereas transport projects undergo environmental and economic impact assessments, the application of social impact assessments is relatively less advanced.<sup>1</sup> Integrating social dimensions throughout the lifecycle of transport projects enhances their potential to bring life-changing benefits to the end users, while reducing the risk of negative social outcomes.<sup>2</sup> The additional effort invested in social analysis can bring disproportionate returns: projects that are more appropriate, sustainable, safe and high quality, and that enhance community engagement and participation.

As city mobility systems become increasingly motorized, travellers are vulnerable to traffic-related conflicts and accidents, congestion, as well as the costs of motorized transport, while penalizing those who cannot afford a car. Without a good public transportation system, travellers face a complex trade-off between shelter security, travel distance and travel mode.<sup>3</sup> At the same time, non-motorized road users (primarily pedestrians and cyclists) and public

transport users – particularly in developing countries – are often overlooked in the design and modernization of transportation infrastructure.<sup>4</sup>

As noted in Chapter 1, the main purpose of urban mobility systems is to provide access to basic goods, services and activities – such as work, education, medical care, shopping, socializing – and to enable people to participate in civic life. The Habitat Agenda explicitly calls for full accessibility to work, goods and services – to affordable public transport – including for those belonging to vulnerable and disadvantaged groups, stressing that priority should be given to the needs of women and children 'who often bear the greatest burden of poverty'.<sup>5</sup> Yet, in reality, people and communities do not have equal access to urban opportunities. The unequal access per se is not necessarily problematic, however, the distribution of impacts (benefits, disadvantages and costs) can be considered 'unfair', in which case this becomes an issue of social equity. Considerations of equity in urban mobility systems frequently analyse disparities in access to urban opportunities, as well as disparities in income and travel-related costs. In light of these challenges, the satisfaction of the mobility needs of all groups of society is a necessary condition for supporting equal chances in life.<sup>6</sup> Ultimately, restrictions in access to urban opportunities may imply an abuse of human rights, most notably economic, social and cultural rights (such as the rights to free choice of employment; the right to public health, medical care, social security and social services; the right to education and training; and the right to equal participation in cultural activities) and the right of access to any place or service intended for use by the general public.

This daunting information raises the question: what do we mean by socially sustainable urban mobility? As there are competing perceptions and applications of 'social sustainability',<sup>7</sup> some cities opt for a single, encompassing definition that denies much of the concept's complexity. Additionally, translating the complex subjective, qualitative and

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political dimensions of social sustainability into easy-to-measure quantitative indicators is complicated (at best).<sup>8</sup> In order to produce meaningful results, metrics must be tailored to reflect unique socio-cultural characteristics of contexts and locations, hindering the adoption of any one common measurement. Nonetheless, it is important to consider the elements of social sustainability in any evaluation of mobility modes, since these social implications affect behavioural choices, which are ultimately responsible for the success or failure of any urban mobility system.

Meeting the mobility needs of burgeoning urban populations in a socially inclusive (and equitable) manner will not be an easy task. The most critical challenge is the heterogeneity of urban populations and the spatial dispersion of social and economic activities. The best way to meet the mobility needs of the poor and vulnerable and disadvantaged groups is to provide adequate public transport and appropriate infrastructure for non-motorized modes of travel. Furthermore, improved urban planning, new technologies and infrastructure measures are needed. Notably, emphasis should be placed on moving people and goods, freely and safely, and facilitating equitable access to services.

This chapter documents global trends, conditions and challenges with respect to equitable access to urban mobility. It highlights actual and potential policy responses and practices that may address social equity and enhance social sustainability in urban mobility systems. The first section discusses affordability as an important aspect of equitable access. It notes that transport expenditures affect low-income households disproportionately. The second section discusses the access of disadvantaged groups to urban mobility systems. This provides the necessary background to understand and accommodate the differential mobility needs of various population segments. The third section explores issues relating to safety and security in urban mobility systems. It distinguishes between the problems of transport safety (accidents and damages) and the problems of transport security (privacy and freedom

from fear). The final section provides concluding comments and lessons for policy.

## AFFORDABLE URBAN MOBILITY

In order for urban mobility systems to be socially sustainable, urban public transport must be affordable to the majority of the urban population, and in particular for those that have no other way of travelling to access basic goods, services and activities. This is a critical equity objective that can reduce burdens and expand opportunities, particularly to persons who are vulnerable and/or disadvantaged. Based on the discussion in earlier chapters, this section analyses challenges and impacts related to equitable access and public transport affordability. It also examines policy responses designed to promote affordable transportation. It finishes by presenting good practices and policies from around the world, pointing the way towards successful transformation of urban mobility culture.

### Challenges and impacts of urban poverty

An understanding of the travel patterns of urban public transport users is required to determine the extent of their mobility challenges. The notion of *motility* implies the balance between accessibility (i.e. transportation opportunities: public transport and other modes) and individual skills (i.e. how to use the transportation on offer), with the user's appropriation of the mobility system (i.e. their experiences, habits, perceptions and values linked to travel mode and space).<sup>9</sup> As such, access is the most important facet of motility, because it sets the scene for possible mobility. Improved transport connections can help in tackling social exclusion through addressing barriers posed by the *accessibility*, *availability*, *acceptability*, and *affordability* of the urban mobility system (Box 6.1). In such cases, information from and the participation of all stakeholders, throughout the planning process, is needed in the development of mobility systems.

#### Box 6.1 Understanding the parameters of urban transport

**Affordability** refers to the extent to which the financial cost of journeys puts an individual or household in the position of having to make sacrifices to travel, or to the extent to which they can afford to travel when they want to.

**Availability** of transport is used to refer to route possibilities, timings and frequency.

**Accessibility** describes the ease with which all categories of passenger can use public transport. For example, buses with high steps are difficult to board, particularly if they are one-

person operated and there is no assistance. Accessibility also includes ease of finding out about travel possibilities, i.e. the information function.

**Acceptability** is another important quality of public transport, either because of the transport or the standards of the traveller. For example, travellers may be deterred from using public transport due to lack of personal security on buses and trains.

Source: Carruthers et al, 2005.

International research into the relationships between transport and poverty indicates that the poor are increasingly concentrated on the periphery of urban areas.<sup>10</sup> As a result, they travel longer distances than many better-off groups and their need for affordable transport is increased. This implies that where (transportation) inequities persist, these exacerbate social exclusion and poverty, both at the individual and at the society level. In this case, poverty is viewed as the lack of financial resources to meet basic individual or household needs, while social exclusion refers to existing barriers that make it difficult for people to participate fully in society.<sup>11</sup>

The choice of mobility mode is related to income levels.<sup>12</sup> For those with low incomes there are very few affordable choices. As a result, in many developing countries, only a small proportion of trips are undertaken using motorized vehicles.<sup>13</sup> The prevalence of long walking trips indicates poor access and lack of affordable mobility options. Therefore, it is essential that pedestrians must be accounted for in any public transport policy. In Tianjin, China, 80 per cent of all commuter trips are by non-motorized modes, mainly bicycles.<sup>14</sup> Cycling offers an inexpensive means of improving accessibility for all. In some European countries, the use of bicycles as a mode of transport is steadily increasing, both as a main mode and as a subsidiary or feeder mode.<sup>15</sup> However, in Africa and Latin America, it is often neglected in terms of design and safety, due to negative social representations, associating bicycle use with poverty.<sup>16</sup>

In developing countries, car ownership remains the privilege of a small (although rapidly growing) minority. In some countries of Africa and parts of Asia, vehicle ownership rates are as low as three motor vehicles per 1000 population.<sup>17</sup> Hence, financially deprived households depend exclusively on public transport (formal or informal) for motorized trips, and are exposed to the risks of increasing transport costs. In many developed countries, the dependency on private motorized transport tends to increase per capita transportation costs and reduce transportation affordability.<sup>18</sup> As most road infrastructure is subsidized, there is no incentive for car owners to shift to cleaner travel options, as it costs so much less to drive. Yet, urban sprawl and car-dependent urban growth continue worldwide, and can compromise the levels of accessibility among vulnerable and disadvantaged groups, such as the elderly and children.<sup>19</sup>

Socioeconomic differences in travel patterns in many developed countries (such as the UK and the US) indicate that the poor and ethnic and other minorities are less likely to have cars and are more likely to travel by public transport. From Delhi to Shanghai and Brussels to New York, the provision of economical and convenient 'last-mile connectivity' – i.e. from the trip ends to the point of accessing public

transport systems – remains a major issue of concern.<sup>20</sup> Poor walking and cycling environments further accentuate the problem for public transport users, particularly the disabled and elderly. In larger cities, the trend is towards fixed-route bus services, which often implies that journeys become more complex, often involving interchanges and lengthy waiting and walking times. Evidence suggests that public transport deficiencies in urban areas have a greater impact on the poor than on other groups.<sup>21</sup>

However, the fares charged by private informal operators are often higher than publicly operated ones, particularly if one takes into account the lack of fare integration between routes. While a passenger of a public transport service may often pay a flat rate for a trip that involves several individual legs, such fare integration is rare among informal transport providers. Consequently, the poor are forced to carefully prioritize their mobility needs and expenditure.

For many urban dwellers, the cost of mobility is very high in relation to their household incomes. In cities of developing countries, between 8 and 16 per cent of household income is spent on transport. Among the poorest households in large cities, this rises to more than 25 per cent.<sup>22</sup> Thus, the level and quality of transport services are often lower for those in low-income areas, where commuters are heavily dependent on public transport for their mobility needs. People have little option but to endure a deteriorating service. The disproportionate financial burden felt by the poor in reaching job opportunities is not limited to developing countries. Data from the US suggest that low-income earners spend nearly twice as much of their income reaching their place of employment compared to the non-poor (6.1 per cent versus 3.8 per cent).<sup>23</sup>

Constrained mobility is an important element of the social exclusion that defines urban poverty.<sup>24</sup> As outlined above: without effective transport systems, poor households are unable to access basic goods, services and activities. It is important also to consider the flow of social capital in the form of information, news or job opportunities facilitated through transport networks.<sup>25</sup> Table 6.1 illustrates how improved mobility has a significant impact on the four major dimensions of poverty.

As indicated in Table 6.1 there are several important links between transport infrastructure and services and different dimensions of poverty. Poor people's lack of assets and technologies means that production – for the market as well as for the household – is time and energy intensive. The greatest proportion of the lowest productivity, most time-consuming work is done by women.<sup>26</sup> By focusing more investment in the infrastructure and services used by (and appropriate to) women, their 'time poverty' can be drastically reduced.

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Table 6.1

**Dimensions of poverty and the impact of improved transport**

Dimensions of poverty	Expression of poverty	Impact of improved transport
Opportunity	Inadequate access to markets, employment opportunities and resources. Constraints on mobility. Time burdens, especially for women.	Improved access to markets and resources. Efficient transport networks save time that can be used for productive activity.
Capability	Lack of access to public services.	Provides access to public services.
Security	Vulnerability to economic risks and civil and domestic violence.	Reduces insecurity due to isolation but can be a source of vulnerability.
Empowerment	Being without voice and power at the household, community and national levels to influence decisions.	Enables participation in social and political gatherings.

Source: TRL Limited, 2004, citing World Bank, 2000.

**The access and mobility of the urban poor is constrained by: city planning, socioeconomic characteristics, transport facilities and the availability of services**

Other direct impacts on poverty that the transport sector can help achieve include employment generation – in transport infrastructure projects, as well as in the transport service industry. Delivery of infrastructure can be done in ways that optimize the use of local labour and resources. Similarly, local transport services have a potential for providing employment to operators and providers of other support services. However, improved infrastructure planning and service provisions are resources that, in combination, either enhance or disadvantage the livelihood of urban dwellers.<sup>27</sup>

A key example is eviction and resettlement resulting directly from urban transport infrastructure projects. As illustrated in Box 6.2, these projects often disrupt lives and livelihoods, and may form physical barriers that cause community severance. Streets that were once a place where people stopped for conversation and children played are transformed into the exclusive domain of cars. Furthermore, the quality of the local environment is vastly reduced with noise and air pollution.<sup>28</sup> Moreover, without secure tenure the poorest groups risk being displaced through gentrification. The narrow focus on solving congestion tends to mostly benefit high-income

private vehicle users. More thoughtful and holistic solutions are thus needed to bring benefits to a wider population.

Detailed and systematic consideration of social issues in urban mobility appraisals maximizes the opportunities for positive outcomes and reduces or mitigates the risks and negative impacts of transport infrastructure projects. Unfortunately, the urban poor are often marginalized in transport planning and project evaluations. However, the establishment of good relationships with stakeholders and a focus on their concerns have the potential to generate significant positive opportunities for the project and the organizations involved.

In summary, *the access and mobility of the urban poor is constrained by: city planning, socioeconomic characteristics, transport facilities and the availability of services*. The next section outlines some general ways in which policy can be refocused to give particular assistance to the poorest groups, through concentration on the needs of specific social groups, or indirectly through assistance to those modes of transport on which the urban poor are known to be particularly dependent.

**Box 6.2 Nairobi–Thika highway improvement project, Kenya**

The Nairobi–Thika highway is one of the three major corridors linking downtown Nairobi to the suburbs and satellite towns. Jointly financed by the African Development Bank, and the Chinese government, the project aims to contribute to and improve the accessibility, affordability and reliability of the transport infrastructure, as well as reduce traffic congestion. The expanded Thika Road, which was completed in July 2012, has drawn mixed reactions from residents living along the highway, who are particularly concerned about the socioeconomic impact the new road will have on their lives.

The construction of the highway disrupted neighbourhoods by relocating urban residents to the periphery and increasing their travel distances and expenditures. Severance of communities by traffic and the highway is a particular problem for people without access to a car, some older

people, people with disabilities and school children, because they often rely on walking. The project's focus on fast and free-flowing traffic has resulted in the need to construct pedestrian overpasses and barriers, which often leads to community severance and inconvenience for the local population.

The skyrocketing property values along the new road have been reported to threaten food security in an area whose residents rely on subsistence farming for sustenance, as farmland is bought up for new development. Furthermore, due to the increased cost of living, many tenants in the area have been forced to move out, as they could no longer afford the rents. Moreover, inadequate or unaffordable transport has led to excessive building and population densities, causing deterioration of the living environment.

Source: KARA and CUSD, 2012.

## Policy responses and innovative practices

This section highlights some ambitious policy responses that have been introduced in recent years to address the challenges outlined above. Achieving transport affordability objectives requires actions that support non-motorized transport; reduce the financial costs of transport services; and increase transportation affordability through improved land-use accessibility.

### ■ Supporting non-motorized transport

Transport policy measures can reduce levels of car use by supporting walking and cycling.<sup>29</sup> These modes are relatively low cost, and they are important for short trips, which make up the largest share of trips in urban areas.<sup>30</sup> Non-motorized transport can be stimulated by a policy package consisting of investments in facilities, improved transportation networks, awareness campaigns, as well as disincentives for the use of private motorized vehicles. Many cities in developed countries recognize the need to plan walkable environments and street network designs that promote neighbourly interactions, and through this, the development of social capital.<sup>31</sup>

Some significant transport interventions offer interesting lessons. Amsterdam (the Netherlands) and Copenhagen (Denmark) have high levels of bicycle use and very low death rates from road traffic accidents.<sup>32</sup> The high modal shares were made possible through decades of investment in non-motorized transport infrastructure. This includes wide-scale improvements to pedestrian and bicycle facilities; development of facilities for intermodal connectivity; and adoption of complete pedestrian and bicycle design standards, wherever feasible. Many other cities have moved away from car-centric urban models and embraced full pedestrianization of downtown commercial areas such as observed in Shanghai (China) and Curitiba (Brazil).<sup>33</sup> This has provided economic savings and benefits, reflected in increased land values.<sup>34</sup>

Combining public transport and cycling can provide a high level of affordable mobility. A case in point is *vélib*, a free public bicycle rental scheme in Paris, France.<sup>35</sup> Hangzhou (China)<sup>36</sup> and Mexico

City have also established bicycle hire schemes to encourage cycling at a minimum cost to taxpayers and users of the scheme. Such policies are increasingly linked with investments in BRT systems, for instance in Delhi (India), Guangzhou (China), Jakarta (Indonesia) and Dar es Salaam (Tanzania), placing non-motorized transport infrastructure as important feeder networks for BRT ridership.<sup>37</sup> Box 6.3 highlights recent developments in Africa that encourage increasing investments in non-motorized transport infrastructure.

The need to consider bicycle designs that will accommodate both environmental requirements and commuters' needs is essential.<sup>38</sup> Recently, the Institute for Transportation and Development Policy (ITDP) succeeded in the commercial adoption of an improved Indian cycle rickshaw. Reduced weight and greater comfort have allowed rickshaw operators to increase their wages by 20–50 per cent.<sup>39</sup> However, whereas they are important for the survival of numerous owner-drivers, rickshaws had been banned from major roads in Dhaka as a way to reduce road congestion. Such policies can have adverse impacts on vulnerable and disadvantaged persons, such as loss of employment and reduced mobility levels.<sup>40</sup> Uganda, meanwhile, was home to about 200,000 *boda bodas* (bicycle-taxis) in 2000,<sup>41</sup> which provide employment for large numbers of previously unemployed youth. Subsequently, there has been a widespread increase in the use of motorcycle taxis within both Uganda and Kenya.<sup>42</sup>

Training is an important strategic instrument not only for disseminating new knowledge but also for capacity building and increasing the awareness of the needs of non-motorized transport users. The private sector could be a key partner in supply-side interventions to increase bicycle ownership and use through the promotion of micro-credit programmes and providing cycling education. In the 1990s, women in Pudukkottai, India, were provided with loans to purchase bicycles and given cycling lessons, so that they could access a literacy programme. Additionally, the programme provided employment opportunities for the women, who were trained as bicycle mechanics. Five years later, it is now socially acceptable for women to ride a bicycle, and bicycles

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### Box 6.3 Supporting non-motorized transport investments in Africa

In 2008–2009, African government ministers participated in workshops that developed framework agreements that recognized the importance of transport infrastructure and urban planning. The need to raise investments in non-motorized transport infrastructure is identified as a key component to an integrated approach in transport for Africa.

The agreed article in the 'Eastern Africa Regional Framework Agreement on Air Pollution', endorsed the idea

of a 10 per cent investment policy as follows: 'Encourage the use of non-motorized transport systems that have many advantages and are used by an overwhelming majority, but are constantly overlooked. At a minimum 10% of infrastructure costs should be dedicated to this majority and the focus should be on safety. Particular emphasis should be given to high-demand, mixed-use roads in urban and peri-urban areas'.

Source: Worldwatch Institute, 2008, p4.

### Box 6.4 Integrating non-motorized transport into transportation systems in Bogotá, Colombia

During the administration of Mayor Enrique Peñalosa, Bogotá's visionary goal was centred on liveability, social equity and reclamation of public space. To achieve this, the administration established policies in seven areas: institutional strengthening, restraining private car use, public space, public transport, non-motorized transport, road maintenance and traffic management.

Large investment in infrastructure for non-motorized and public transport was justified by its impact on equality. Inclusive investments for all, such as bicycle lanes, pedestrian highways and the BRT system, demonstrated a commitment to public good over private ownership. Likewise, actions such as the removal of cars from sidewalks, car-free Sundays and establishing a highway solely for Transmilenio, exhibited

consideration to those on low incomes who do not benefit from investment in motorized transport infrastructure. The theme of equality was a key driver in the development of a 357-kilometre long bicycle network (known as *ciclorutas*). The bicycle network was deliberately designed to run through low-income and wealthy areas in order to promote integration and a sense that all citizens had an equal stake in city-wide development. These developments acted as 'social equalizers', providing the poor with better transport links and free leisure facilities. People supported the measures once they saw results, and Peñalosa left office with a record approval rating. Decisive leadership, political will and strong institutions were the critical factors contributing to success.

Source: Ardila and Menckhoff, 2002.

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are being used for going to school, fetching water and going to hospital during an emergency. The example of Bogotá, Colombia, shows that strong non-motorized transport policies, awareness campaigns and political commitment can bring about a shift in public attitudes towards non-motorized transport, as well as enhanced social inclusion (Box 6.4).<sup>43</sup> However, there is still a lot to be done, and the Transmilenio system still needs to be further developed to fulfil its promises. One of the major critiques is the lack of coverage, as many groups of people are excluded from the current 84-kilometre system simply because it is not yet operating in their neighborhoods. Thus, many of Bogotá's residents are still relying on the traditional bus system, which is, in effect, operating in competition with Transmilenio.<sup>44</sup>

Most cities in developing countries are high density and therefore suitable for policies promoting non-motorized transport. Travel-demand management has a key role to play in this context. Such urban policies affect the demand for travel through the pricing and regulation of different modes of transport. An important benefit of travel-demand management strategies, besides improving the quality of low-cost transportation modes, has been increasing public transport affordability for low-income groups.<sup>45</sup> In the UK, there has been a change from road building towards the introduction of demand-management initiatives. Progressively, London has experienced a modal shift, in part due to its congestion charging scheme, making it possible to convert traffic lanes to bicycle lanes.<sup>46</sup> The adoption of automated bus lane enforcement has dramatically improved the speed and reliability of bus services. Generally, consumers are able to save money if they use alternative modes, routes or travel times to avoid driving on congested roads.<sup>47</sup>

### ■ Improving affordability and quality of service of public transport

Public transport fares should be set at rates that allow commuters to use it. In developing countries, fares are often set above competitive equilibrium levels.<sup>48</sup> This promotes excessive entry of buses, and is further exacerbated by the capture of the regulator. Since buses are not perfect substitutes, price competition is not an effective mechanism for regulating the optimal quantity of buses in the market. To minimize waiting time, most riders prefer to use the first bus that arrives, even though a cheaper bus may come along in a few minutes. Time, not fares, seems to be the most important variable for the rider. This simplifies the bus operator's market power to raise fares.<sup>49</sup>

Notably, consideration should be made to ensure that the fare (plus subsidies) covers the cost of operation, and at the same time remains affordable to the public. This is particularly important, as setting fares artificially low – without compensating service providers – can undermine the viability of a transport system. For instance, the bus fare needed to cover the operating costs in Lomé (Togo) was 295 CFA Francs. Yet, the fares charged were 250 CFA Francs, which was later reduced to 200 CFA Francs (by the government), thereby resulting in an operating deficit of 22 million.<sup>50</sup> Thus, a delicate balance must be struck between the consumer's convenience and willingness to pay, and the operator's need to balance its budgets (or to make a profit, in the case of private-sector operators).<sup>51</sup>

The promotion of affordable transportation requires a robust framework that defines and measures transportation affordability appropriately. Conventional planning tends to consider a relatively limited range of transport affordability impacts and objectives. To address this limitation, the World Bank has developed an affordability index to address the need for easily available and comprehensive,

Table 6.2

Public transport affordability index values for selected cities

City, Country	Per capita income (US\$ PPP <sup>b</sup> )	Income of bottom quintile population as percentage of average income	Fare for 10km travel (PPP US\$ cents)	Affordability index <sup>a</sup>	
				Average income	Bottom quintile income group
São Paulo, Brazil	8,372	10.0	130.1	11	113
Rio de Janeiro, Brazil	14,325	10.0	125.4	6	63
Brasília, Brazil	12,985	10.0	106.8	6	59
Cape Town, South Africa	14,452	10.0	75.8	4	38
Buenos Aires, Argentina	15,493	15.5	87.6	4	26
Mumbai, India	8,585	41.0	112.2	9	23
Kuala Lumpur, Malaysia	18,351	22.0	121.6	5	22
Mexico City, Mexico	9,820	15.5	39.3	3	19
Chennai, India	3,717	41.0	39.3	8	19
Manila, the Philippines	9,757	27.0	63.0	5	17
Krakow, Poland	15,579	36.5	130.6	6	17
Amsterdam, the Netherlands	28,170	36.5	226.6	6	16
Moscow, Russia	16,154	24.5	84.6	4	15
Guangzhou, China	9,165	30.0	55.1	4	14
Warsaw, Poland	26,024	36.5	142.5	4	11
New York, US	51,739	27.0	200.0	3	10
Los Angeles, US	42,483	27.0	160.0	3	10
Chicago, US	48,300	27.0	180.0	3	10
Singapore	38,797	25.0	130.3	2	10
Beijing, China	14,379	30.0	55.1	3	9
Seoul, Rep. of Korea	16,784	40.0	85.5	4	9
Shanghai, China	20,814	30.0	55.1	2	6
Cairo, Egypt	7,117	43.0	26.1	3	6
Budapest, Hungary	22,106	50.0	89.2	3	6
London, UK	53,057	30.5	116.4	2	5
Prague, Czech Republic	32,757	52.0	88.0	2	4
Bangkok, Thailand	20,386	31.0	32.2	1	4

Notes: <sup>a</sup> Percentage of income required to undertake 60 trips, each of 10 kilometres, per month; <sup>b</sup> PPP = Purchasing power parity.

Source: Based on Carruthers et al, 2005.

comparative information on affordability of public transport fares across the globe (Table 6.2). The index values may be defined as the fare expenditure (for a total of 60 10-kilometre trips per month) as a percentage of income. It can be computed for various income groups and the results may be used to determine whether the proportion of income spent on fares is reasonable, high or onerous.

The data in Table 6.2 show huge variances between cities, due to their different contexts. The low-income residents of São Paulo, Rio de Janeiro and Brasília (Brazil) are all faced with unbearable situations, as transport expenses would account for more than half of their incomes. Cities such as Bangkok and Cairo, by contrast, have low fares, due to the low public transport fares (Bangkok) and the absence of extreme poverty in the lower quintile (Cairo).<sup>52</sup> Despite this improvement, the index is limited by the simplified nature of the indicators employed, as well as the questionable quality of

available statistics. As such, there is need for a more precise analysis.

Transport subsidy is an important policy option for ensuring equitable transport access for the poor and other road users. However, such subsidies are blunt instruments and require careful design to be both socially and economically justified. Poorly targeted subsidies may result in the rich deriving a disproportionate benefit compared to the poor. A more efficient approach is a strategy involving appropriately targeted subsidies by route or through employer-based schemes.<sup>53</sup> In Brazilian cities, since 1987 employers must, by law, subsidize the transport costs of their employees (if these costs exceed 6 per cent of their salaries) under the *Vale-Transporte* ('transportation vouchers') system. This system implies that the employer buys public transport vouchers or tops up the electronic transport passes of their employees directly (i.e. without involving the government). Employers can, as an alternative,

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The affordability of urban mobility can be increased by improving land-use accessibility, and addressing the physical separation of activities and the means by which distance can be reduced

The integration of land use and travel-demand management measures can substantially enhance accessibility and lead to improved public transport affordability

provide staff transport.<sup>54</sup> However, the system applies only to the employees of the formal sector, meaning that more than 50 per cent of the urban workforce (including the major part of the poor and low-income population) is excluded from the scheme.<sup>55</sup>

The reform of the urban public transport sector in Kazakhstan is an illustration of a project resulting in poverty alleviation for the poor. Prior to reform, the public transport system was characterized by inadequate services, as well as crowded and lengthy waiting times. A transport intervention was initiated to deregulate and liberalize the provision of transport services, as well as improve the quality of the service.<sup>56</sup> Consequently, transportation affordability for transport users improved due to the reduction in fares.

Many cities (and regions) are modernizing their fare payment technologies, and integrating fare systems between different public transport routes, modes and even operators, for users' convenience. Experience with the 'Oyster' smartcard ticketing scheme in London, UK, has resulted in increased bus patronage, due to the simplified fare system and ease of interchange. This has also empowered commuters with information on the range of fully integrated fare products and improved service coordination.<sup>57</sup> Another positive development can be observed in Seoul, Republic of Korea, where the implementation of 'smart cards' allows commuters to transfer from one mode to another at a discounted rate.<sup>58</sup> A receptive institutional environment helps to create integrated and unified tariff systems, resulting in cost-effectiveness in ticketing. An exemplary model is Germany's transport federations (*verkehrsverbund*).<sup>59</sup>

### ■ Improving affordability through urban form and land use

The affordability of urban mobility can be increased by improving land-use accessibility, and addressing the physical separation of activities and the means by which distance can be reduced. The intention is to build sustainable mobility into the patterns of urban form and layouts, and make public transport, pedestrian and bicycle use practical and affordable. Accessibility planning<sup>60</sup> offers a new way to ensure that urban residents can reach the services and facilities they need by walking, cycling and public transport. Box 6.5 presents institutional arrangements created in Atlanta, US, that allow for the coordination of land-use and transport infrastructure investments, which could improve affordability and accessibility, particularly for ethnic minorities.

The integration of land use and travel-demand management measures can substantially enhance accessibility and lead to improved public transport affordability. Curitiba, Brazil, is a case in point, with 40 years of carefully integrating urbanization and transportation improvements.<sup>61</sup> By replacing cars with people, Curitiba has evolved along five well-defined linear corridors that protect the city centre. Zoning laws encourage high-density commercial development along these transport corridors, thus reducing the amount of travel needed to access basic goods, services and activities. Minibuses are used to quickly and efficiently transport individuals from residential neighbourhoods to express bus lines. Compared with other Brazilian cities of its size, Curitiba uses 30 percent less petrol per capita, and affordable fares make it possible for the average low-income family to spend around 10 per cent of its

#### Box 6.5 Metropolitan regional transport plans and priorities, Atlanta, US

The State of Georgia and the Atlanta metropolitan region have experienced constant growth since the 1990s. Suburban areas continue to expand, resulting in large-scale needs for transport infrastructure projects. However, this urban sprawl encourages disinvestment in housing and infrastructure decline, placing a strain on the provision of public transport services, particularly in older inner-city areas where African Americans and other minorities are concentrated.

Recognizing the spatial distribution (and economic and environmental impact) of highway spending, there is a growing need for Atlanta's metropolitan region to connect its evolving plans for infrastructure investment with the realities of land-use patterns. The regional transport plan for 2000–2025 helps guide the prioritization and funding of transportation investments. It has been hailed as 'an excellent example to illustrate how the metropolitan growth can be managed by proper land use-transportation planning and policy-making without compromising sustainability'.<sup>3</sup> However, Atlanta's

regional transportation policies have actually exacerbated sprawl-related problems, with unintended consequences that are not evenly distributed. The transport strategies were designed to serve commuters from distant (more affluent) suburbs, with no provision for reverse commute that might help lower-income (primarily African American) communities reach suburban employment opportunities (for example as domestic workers, gardeners, etc., in the more affluent suburban households).

This resulted in a lawsuit and subsequent reconsideration of objectives. US\$300 million state funds allocated to the proposed sprawl-inducing road programme was redirected to public transport, footpaths, bicycle paths and road safety and maintenance projects. It also led the federal government to scrutinize the distribution of transportation benefits and burdens among ethnic groups in the Atlanta metropolitan region.

Sources: Replogle and Kodransky, 2010, pp4–5; <sup>3</sup> Ong et al, 2010, p96.

income on transportation, which is relatively low in Brazil.<sup>62</sup>

Public support for suitable low-cost housing near large employment centres, or for public transport is a fundamental aspect of land-use planning. Singapore has successfully created self-sufficient new towns (in terms of jobs) and is systematically addressing the housing needs of the poor.<sup>63</sup> The regional centres are planned as commercial centres surrounded by high-density housing, integrated with an efficient public transport system. Improving the variety of services within the neighbourhood can be an effective way of reducing the transport expenditure of low-income households. However, the Singapore experience may not be readily applicable to cities suffering urban sprawl, with low-density suburbs.

Linking urban mobility systems and housing policy makes good financial sense. Together, transportation and housing often make up a good half or more of household consumption expenditures. To the degree less is spent on transport, more income is freed up for housing consumption. This is partly the philosophy of Europe's successful car-sharing schemes. Location-efficient mortgage policies in the US encourage residents to live in high-density, high-accessibility areas that reduce their need for cars.<sup>64</sup> They allow a household to commit what it saves from not owning a car to buy a more expensive home in an area marked by location efficiency.<sup>65</sup>

## VULNERABLE AND DISADVANTAGED GROUPS AND URBAN MOBILITY

Vulnerable and disadvantaged groups – women, ethnic minorities, elderly, disabled people, youth, children, etc. – stand to gain important social benefits from improved urban mobility networks, technologies and facilities, as improved access and mobility reduce isolation, vulnerability and dependency. However, mobility networks will need to cater to the specific needs of such groups if they are to access the benefits.<sup>66</sup> Even in well-functioning public transport systems, some passengers may be unable to afford the services offered. Furthermore, it may also be difficult for some to travel alone due to poor security, or the public transport service may be physically inaccessible for many elderly and disabled persons. Vulnerable and disadvantaged groups are often overrepresented as pedestrians, and their special needs as pedestrians should be considered. For example, elderly and disabled persons often face challenges in crossing roads or navigating congested pavements.

This section outlines the determinants of the travel behaviour of vulnerable and disadvantaged groups. It identifies global conditions, trends,

challenges and impacts faced by these segments of the urban population. It also considers the extent to which urban mobility policies address or conflict with the different activity needs of such passenger groups.

### Global conditions, trends and challenges

Worldwide, societies are *gendered*, in that men and women often play different roles. In developed countries, women's commuting patterns are often different from men's, particularly if they are married with children. They are also most likely to 'trip-chain', implying that when travelling, they have multiple purposes and destinations within one trip.<sup>67</sup> This is partly due to time constraints, and the fact that they normally have less access to both private and public transport. The situation is further compounded by age. On average, women are more likely to be working in part-time and lower-wage jobs than men, contributing further to women's increased expenditure in terms of time spent travelling. In the EU for example, 31.9 per cent of employed women were working part-time in 2010, compared to only 8.7 per cent of men.<sup>68</sup> Furthermore, available evidence suggests that across the globe, the percentage of women working in transport-related employment is low; with those employed in the transport sector earning 20 per cent less than men.<sup>69</sup>

While presenting similar gender differences, women's travel patterns in developing countries are affected by their multiple roles as income earners, childcare providers, household managers and maintainers of community networks.<sup>70</sup> Whether in urban or peri-urban areas, women tend to make more trips, although over shorter distances, than men. Table 6.3 provides an overview of women's urban travel patterns and constraints in developing countries.

High costs of public transport can make such services particularly prohibitive for women when it comes to reaching places of work, education or basic services. A study in Kampala, Uganda, revealed that women spend approximately 29 per cent of their income on public transport.<sup>71</sup> As a result, women appear to work closer to home than men.<sup>72</sup> Also, women tend to walk, and they rely on public transport primarily for longer distances.

Significant levels of sexual harassment of women on urban public transport systems are frequently reported from numerous cities. For example, a Tokyo Metropolitan government survey of women who travel during rush hour in Tokyo, revealed that two-thirds of the women in the 20–30 age group said they had been groped on crowded trains.<sup>73</sup> In many cities with Islamic populations, the situation is further exacerbated by the social institution of *pardah*, which prohibits the mixing of men and women in public.<sup>74</sup> In Dhaka, Bangladesh, women's exclusion from public transport results from overcrowded buses, public sexual harassment (referred to as 'Eve teasing') and

Public support for suitable low-cost housing near large employment centres, or for public transport is a fundamental aspect of land-use planning

While presenting similar gender differences, women's travel patterns in developing countries are affected by their multiple roles as income earners, childcare providers, household managers and maintainers of community networks

High costs of public transport can make such services particularly prohibitive for women

Table 6.3

**Female travel patterns and constraints in developing countries**

Urban areas	Peri-urban areas	All areas
<ul style="list-style-type: none"> <li>• Women are more likely to walk than men.</li> <li>• Women have more diverse destinations and modal splits than men.</li> <li>• Women have a greater reliance on public transport than men.</li> </ul>	<ul style="list-style-type: none"> <li>• Women have fewer transport options than men.</li> <li>• Women incur higher transport costs and more waiting time than men.</li> <li>• The number of trips and distance travelled by women is often linked to transport accessibility rather than need.</li> </ul>	<ul style="list-style-type: none"> <li>• Personal safety and security.</li> <li>• Harassment.</li> <li>• Comfort.</li> <li>• Cultural constraints and norms.</li> </ul>

Source: Based on World Bank, 2010a.

**The major cause of drop-outs in primary schools in developing countries is the distance that children have to walk to reach their schools**

inadequate sidewalks that hinder their access to the workplace.<sup>75</sup> Markedly, women will change their transport behaviour and have their transport options constrained if they perceive urban transport to be unsafe.<sup>76</sup>

Furthermore, evidence suggests that the planning, provision and operation of public transport in particular – and urban mobility in general – is primarily undertaken by men. Given that ‘women’s travel patterns are different from men’s, and these differences are characterized by deep and persistent inequalities . . . [whereby they] have inferior access to both private and public means of transport’<sup>77</sup> there is a strong case for mainstreaming gender concerns in the working ethos of urban transport organizations.<sup>78</sup>

The mobility needs of *children* and *youth* (Box 6.6) are primarily related to their need to access educational facilities and childcare and related services. Due to their age, the majority of youth under the age of 18 in developed and developing countries alike are unable to drive.<sup>79</sup> Thus, someone has to

provide them with transportation, when distance and other factors become barriers. In most countries, the greatest burden of this passenger-serving trip-making falls on women.<sup>80</sup>

Across the globe, evidence suggests that children’s travel needs have a significant impact on household travel patterns, due to the largely car-dependent nature of those needs. This partly reflects the parents’ perceptions of traffic danger, which are supported by statistics on accident rates involving children, particularly when they are walking or cycling. In South Africa, more than 26 child deaths per 100,000 population occur as a result of road traffic crashes, compared to 1.7 per 100,000 in the EU. In Bangladesh one in every four road deaths and one in six serious injuries experienced by the poor involves a child.<sup>81</sup>

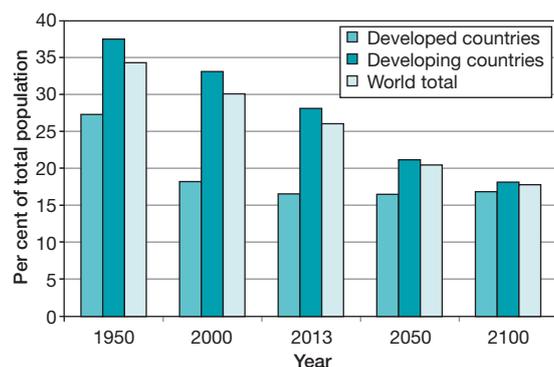
With respect to education, the major cause of drop-outs in primary schools in developing countries is the distance that children have to walk to reach their schools. Studies in Nepal show that for every kilometre a child walks to school, the likelihood of school attendance drops by 2.5 per cent.<sup>82</sup> This figure rises for girls and children with disabilities. Fatigue, exhaustion and risk of dangers, such as sexual assault, are some of the contributory factors to non-attendance or irregular attendance.<sup>83</sup>

Public and informal motorized transport provides greater mobility and a means of independent travel for youth. Whereas a majority of developed countries have dedicated school bus services in prominent schools, the poorest are often dependent on public and informal transport. In the context of developing countries, typical problems of informal transport parallel those of public transport related to

Figure 6.1

**Proportion of world population under the age of 15 (1950–2100)**

Source: Based on data from UN, 2011a.


**Box 6.6 Children and youth: Population trends**

As indicated in Figure 6.1, children and youth contribute a steadily diminishing proportion of populations world-wide. While 34.3 per cent of the global population were under the age of 15 in 1950, this figure has decreased to 26.2 per cent in 2013, and is projected to decline further to 20.5 per cent by 2050. It should be noted, however, that at the same time, the total population of children and youth under the age of 15 has more than doubled, from 869 million in 1950 to 1866 million

in 2013. Projections indicate that the population below the age of 15 will stabilize at about 1.9 billion by the year 2050.

A similar trend can be seen for the 15–19 age group, where the global population has nearly tripled from 239 million in 1950 (9.4 per cent of world total) to 601 million in 2013 (8.4 per cent of world total), and is expected to grow slowly to 628 million by 2050 (6.7 per cent of world total).

Source: UN, 2011a.

Region	All people and ages %	Males			Females		
		0–14 years %	15–59 years %	60 years and older %	0–14 years %	15–59 years %	60 years and older %
<b>Severe disability:</b>							
<b>World</b>	<b>2.9</b>	<b>0.7</b>	<b>2.6</b>	<b>9.8</b>	<b>0.7</b>	<b>2.8</b>	<b>10.5</b>
High-income countries	3.2	0.4	2.2	7.9	0.4	2.5	9.0
Low- and middle-income countries (by WHO region):							
Africa	3.1	1.2	3.3	15.7	1.2	3.3	17.9
America	2.6	0.7	2.6	9.2	0.6	2.6	9.2
South East Asia	2.9	0.7	2.7	11.9	0.7	3.1	13.2
Europe	3.0	0.9	2.8	7.3	0.8	2.7	7.2
Eastern Mediterranean	2.8	0.9	2.9	11.8	0.8	3.0	13.0
Western Pacific	2.7	0.5	2.4	9.8	0.5	2.4	10.3
<b>Moderate and severe disability:</b>							
<b>World</b>	<b>15.3</b>	<b>5.2</b>	<b>14.2</b>	<b>45.9</b>	<b>5.0</b>	<b>15.7</b>	<b>46.3</b>
High-income countries	15.4	2.9	12.3	36.1	2.8	12.6	37.4
Low- and middle-income countries (by WHO region):							
Africa	15.3	6.4	16.4	52.1	6.5	21.6	54.3
America	14.1	4.6	14.3	45.1	4.3	14.9	43.6
South East Asia	16.0	5.3	14.8	57.5	5.2	18.0	60.1
Europe	16.4	4.4	14.9	41.9	4.0	13.7	41.1
Eastern Mediterranean	14.0	5.3	13.7	53.1	5.2	17.3	54.4
Western Pacific	15.0	5.4	14.0	46.4	5.2	13.3	47.0

Source: WHO and World Bank, 2011, Table 2.2.

Table 6.4

Estimated prevalence of moderate and severe disability, by region, sex and age (2004)

unregulated fares. In Dar es Salaam (Tanzania), Colombo (Sri Lanka) and Faisalabad (Pakistan), transport operators will not ferry school children and pensioners on concessionary fares, and/or they break their journey arbitrarily to ensure a double payment.<sup>84</sup>

It has been estimated that there are more than 1 billion people in the world with some form of **disability** (i.e. 15.3 per cent of the global population). Among these, ‘nearly 200 million experience considerable difficulties in functioning’<sup>85</sup> (i.e. 2.9 per cent of the population). As can be seen from Table 6.4, the prevalence of disability is generally higher in developing countries than in developed countries and highest among older persons. More than half of the population aged 60 years or older in many developing countries are suffering from moderate or severe disabilities, compared to about a third in developed countries.

People with disabilities often find transport to be limited, unaffordable or inaccessible, and frequently cite lack of adequate transport as a barrier to accessing healthcare.<sup>86</sup> In the years ahead, disability will become an even greater concern. This is due to ageing populations and the higher risk of disability in older people, as well as the global increase in chronic health conditions such as diabetes, cardiovascular disease, cancer and mental health disorders. Since 1950, the proportion of **older persons** (i.e. those aged 60 or more) has been rising steadily, from 8.1 per cent in 1950 to 11.7 per cent in 2013, and is expected to reach 21.8 per cent in

2050 (Figure 6.2). By 2050, it is estimated that 3.2 million people will be over 100 years old; of which 1.3 million will live in developing countries.<sup>87</sup> Whereas mobility is important for daily living, many people who have got used to driving their own cars will have to stop driving due to age-related disabilities.

The challenges faced by these people vary considerably, due to the different types of disabilities and their impact on mobility. For example, hearing-impaired and vision-impaired persons in wheelchairs face different obstacles and thus need a variety of assistance methods.<sup>88</sup> Their movement is impaired by steps, stairways, etc., which require redesign of floor space requirements and facilities.<sup>89</sup> Furthermore, where there is no pedestrian infrastructure – such as signage or zebra crossings – they may need to travel with an escort, or use special guidance equipment. Older persons and persons with disabilities

**People with disabilities often find transport to be limited, unaffordable or inaccessible**

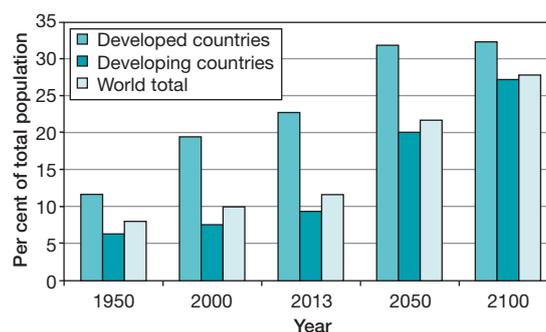


Figure 6.2

Proportion of world population 60 years and older (1950–2100)

Source: Based on data from UN, 2011a.

The participation of women transport users is critical for the establishment of equitable practice and the development of gender-sensitive understanding of transport needs and systems

would thus benefit from design modifications such as better information systems and low-floor vehicles.<sup>90</sup> Privately run services such as shared taxis and minibuses are preferred by older and disabled persons due to their demand for door-to-door services. Nevertheless, most of these vehicles are not able to accommodate the users of wheelchairs and can be prohibitively costly. The alternative of hiring private transport is often out of the price range of disabled people, and parking spaces exclusively for their use in the central city are limited.

While many countries have legislative frameworks requiring these challenges be addressed, effective responses are limited. African countries in particular suffer from insufficient monitoring, implementation and realization of such legislation.<sup>91</sup> The adoption of the United Nations' Standard Rules on the Equalization of Opportunities for Persons with Disabilities in 1994<sup>92</sup> and the Convention on the Rights of Persons with Disabilities in 2006<sup>93</sup> signalled broad international consensus on how disability issues should be addressed. National regulations are also in place on a country-by-country basis.

It should also be noted that many persons suffer from several different types of vulnerability and/or disadvantage. Women with disabilities for example often suffer compounded discrimination on the grounds of gender and available income in addition to the impairment.

### Policy responses and innovative practices

There is a wide range of policy options and initiatives in place in some cities that have worked to improve mobility for the urban poor and enhance urban access for vulnerable and disadvantaged groups. Some of the policies and programmes described here do not require expenditure. Others could result in savings or payback from spin-off effects through more cost-effective management. Cities at various levels of development can draw on the experiences

of other cities for further development or for improving existing conditions. The actual design of the policy or practice will have to be modified for the specific circumstances of each individual city.

In recent years, there have been significant developments in the methodologies associated with gender planning in respect of accessibility, mobility and transport organization. Evidence shows that many countries have integrated gender into their transport programmes and projects.<sup>94</sup> Opportunities need to be provided for women to gain meaningful and beneficial employment in the transport sector. Hiring female bus operators was a key component of the Trans Jakarta BRT initiative in Indonesia, which provided Indonesian women with a first opportunity of formal, regularized employment in the sector.<sup>95</sup> Experience shows that increased female recruitment helps advance gender equality in society in general, and also increases women's level of comfort and security in negotiating transport situations.<sup>96</sup>

Such a focus on gender issues is justified by the fact that it enhances the effectiveness of actions in the transport sector, and therefore impacts on poverty reduction. Data on user needs and access constraints should be gender disaggregated and collected through routine transport project monitoring and evaluation processes.<sup>97</sup> A recent World Bank pilot study in Lesotho that promotes the use of cognitive mapping exercises and geographic information system (GIS) for gender-sensitive transport planning is a good example of one such programme to map targeted stakeholder use patterns for integration with planning.<sup>98</sup> The participation of women transport users is critical for the establishment of equitable practice and the development of gender-sensitive understanding of transport needs and systems (Box 6.7).

Establishing a sustainable urban transport system requires a comprehensive and integrated approach to policy-making, with the aim of delivering people-oriented, affordable and environmentally friendly

#### Box 6.7 Women's participation in the transport sector in China

As part of an urban transport project in Liaoning Province, China, women were integrated into the various phases of the project, with the specific aim of increasing their participation. The project specification was established through community participation with separate focus groups for both men and women. This made it possible to identify the number of journeys made on a daily basis, which prompted priority to be given to the issue of pavements, road drainage, hard shoulders and their separation from the carriageway used by motor vehicles, lighting and signing.

By providing a specific forum for women, planners learned about specific concerns, opportunities and needs

voiced by a key stakeholder in the project that may not have been raised in mix-gendered discussions. Women expressed concerns about the lack of security encountered in using buses: dark alleys, lengthy waiting times and vulnerability to traffic accident and injury. The outcome led to changes being made to the initial project in order to hasten improvements to secondary roads and traffic management. Precedence was given to the creation of pathways and pedestrian crossings, the installation of public lighting and improved frequency of bus services.

Source: Duchène, 2011.

mobility systems. The following sections give practical examples of policy responses that seek to deliver transportation that is gender sensitive, efficient, safe and responsive to the mobility needs of vulnerable and disadvantaged groups.

### ■ Gender-sensitive design, infrastructure and services

Public transportation planning must be based on a recognition of the distinct needs of women's distinct roles, needs and experiences. As such, gender mainstreaming is essential. In Bangladesh, an Asian Development Bank project aims to improve infrastructure facilities and the design of transport vehicles.<sup>99</sup> The project takes account of women's specific needs (public toilets, separate market stalls, lower steps in buses, etc.). It also reserves 15 per cent of the small businesses located along the roads under construction for women.<sup>100</sup> The small modifications made to the existing infrastructure balance women's needs for privacy with their need for social inclusion. Furthermore, it begins the process of further integrating women into social and economic domains that are traditionally segregated by sex, and often dominated by men.

Other policy initiatives focus on safeguarding women's safety and comfort in urban transport. Passenger rail cars reserved for 'women only' have been implemented in Japan, Brazil, Egypt, Mexico, India, Belarus and the Philippines. Similarly, women-only taxis are found in countries with large Islamic populations, such as Lebanon, Syria and the United Arab Emirates.<sup>101</sup> Most of these cabs are clearly marked in pink and feature women drivers. Whereas such sex-segregated initiatives are often debated, they have undoubtedly improved conditions for female passengers.<sup>102</sup>

In France, rolling stock manufacturers pledge to follow a charter proposed by an association called *Femmes en mouvement, les transports au féminin*, which requires the association to be present during

the design of new vehicles.<sup>103</sup> Consultations are carried out in relation to safety, accessibility, internal configuration and respect for the environment. This helps to improve the gender sensitive design of public transport vehicles to accommodate women with children and/or shopping bags such as women-only carriages, child seating, storage spaces for prams and shopping.

In many developing countries, means of transport such as carts, bicycles and animals are considered a cost-effective manner to assist in meeting women's mobility needs.<sup>104</sup> Bicycles have often been recommended as a means of increasing the overall mobility of women, to enhance their socioeconomic and political participation. A study in India shows women's preference for the door-to-door demand service provided by auto-rickshaws.<sup>105</sup> The construction of segregated lanes for auto-rickshaws can reduce time burdens and benefit disadvantaged groups.

New mobility services – such as carpooling schemes reserved for women – are beginning to thrive throughout North America and Europe.<sup>106</sup> Such programmes provide the convenience of inexpensive access.<sup>107</sup> Families, commuters and employers are able to share cars at different times of the day, with subsidized or preferential parking. In Germany, well-lit parking sections have been set aside for women near stairs and elevators in multi-storey parking lots to ensure their safety.<sup>108</sup> Similarly, laws supporting disability parking privileges ensure that persons with disabilities have access to parking that does not present an undue hardship. For instance, the UK's blue badge disabled parking scheme helps disabled people with severe mobility problems to access goods and services, by allowing them to park close to their destination.<sup>109</sup>

Private transport options for many elderly and disabled travellers are also increasing (Box 6.8). There are a number of stable non-motorized vehicles, such as three-wheeled bicycles, hand-operated bicycles and a variety of carts in use. In Bangladesh,

**Public transportation planning must be based on a recognition of the distinct needs of women's distinct roles, needs and experiences**

#### Box 6.8 Private transport for special groups

Many cities, particularly in developed countries, promote the use of private transport for disabled people by licensing the use of scooters, motorized three-wheelers or electric wheelchairs. Furthermore, street or pavement designs are modified to accept them. In Belgium, loans and grants are provided for car-adaptation and training costs, both of which allow disabled people to enter the labour force. In many parts of the world, protected right or left turns are used as a safety measure particularly for the elderly, as well as designated turning lanes which aid in channelling the disabled away from through-traffic.

Many elderly people prefer to use private motor vehicles; however, the standards therein need to be tailored to

meet the needs of the elderly and frail. Car designs need to take the functional mobility limitations of elderly, frail and disabled groups into account. Extensive research in road standards is important for finding the most suitable conditions for disabled and elderly road users.

Although the issue of aging populations has been less of a political issue in developing countries, it should be noted that the conditions for many aging and disabled road users in such countries are often deplorable, thus obstructing their right of access.

Source: OECD, 2001, citing OECD, 1986.

**Integrated fare structures make it relatively easy and less expensive for vulnerable and disadvantaged groups to travel, particularly when undertaking trip-chains**

hand-propelled tricycles provide valuable local mobility and are environmentally friendly.<sup>110</sup> Other motorized vehicles on the market include electric wheelchairs, three-wheeled motorized vehicles and cars and vans with hand controls.

Fare structures allow governments to determine who pays and who benefits.<sup>111</sup> In countries such as the UK, Denmark, Spain (Madrid) and Mexico (Mexico City), just to mention a few, special categories of passengers – such as students, children, the elderly and the unemployed – travel free or at least at a reduced fare.<sup>112</sup> There is a strong case for cross-subsidies to increase affordability, as has been done in Bogotá, Colombia, where the fare for low-income groups is subsidized by that of higher-income groups.<sup>113</sup> Integrated fare structures make it relatively easy and less expensive for vulnerable and disadvantaged groups to travel, particularly when undertaking trip-chains. For example, in Denmark, financial grants from the government have allowed integration of train and regional bus services, enabling passengers crossing regional borders to use a single ticket – even if the journey requires a transfer involving different public transport companies. Similar grants have allowed free public transport for children under the age of 12 who are accompanied by an adult.<sup>114</sup>

#### ■ **Increasing pedestrian accessibility and safety**

Building exclusive sidewalks as components of road and transport projects responds well to women's and other vulnerable users' travel needs by increasing pedestrian accessibility and safety. A majority of cities in developed countries have launched a curb-cut programme whereby all new sidewalks will be built with curb cuts that allow wheeled pedestrian traffic to negotiate the height change comfortably while at the same time helping sight-impaired people identify the street margin when using walking aids such as a cane.<sup>115</sup> Cities such as Mexico City, Rio de Janeiro (Brazil) and Pretoria (South Africa) have installed thousands of curb cuts to existing footways.<sup>116</sup> Agencies such as the World Bank are also increasing their focus on improving infrastructure for non-motorized transport.<sup>117</sup>

In Tokyo, Japan, a textured surface identifies the change in level, including the direction, of the pedestrian crossing.<sup>118</sup> The textured area is bright

yellow and clearly visible, with curb cuts installed in existing sidewalks. At key intersections, the timings of the pedestrian crossing lights have been increased by 20 per cent to accommodate the slower crossing speed of elderly or disabled pedestrians.<sup>119</sup> Locations for the installation of light and sound signals for pedestrian crossings are also identified. Different sounds inform pedestrians whether or not it is safe to cross and whether they are crossing in an east to west direction or a north to south direction.<sup>120</sup> In Ottawa, Canada, for example, 'peep-peep' sounds are used for east to west crossings and 'cuckoo' sounds for north to south.<sup>121</sup> Pedestrians may press a button to activate the pedestrian crossing light. In some cases, where there is sufficient wheelchair traffic, wheelchair sensors may be installed.

The make-up of streets and the built environment can play a role in physical activity promotion and active travel behaviours, especially among children to and from school.<sup>122</sup> For instance, the availability of paved roads had a significant influence in school attendance levels in a community in Morocco. Attendance rates rose from 21 per cent to 48 per cent for girls and from 58 per cent to 76 per cent for boys.<sup>123</sup> School travel is an opportunity to shift a portion of car trips to walking and cycling, if accessibility, safety and the social benefits of the experience are recognized and addressed.

#### ■ **'Universal design' or 'access for all'**

Across the globe, many countries are introducing legislation that requires transport services to be made more accessible, to conform to international law (Box 6.9). South Africa, for example, has adopted an integrated national disability strategy committed to developing accessible and affordable public transport. In 2010, the UK government passed an act that covers accessibility issues related to age, ethnicity, gender and disability as part of a single integrated approach to ensure equal access for all.<sup>124</sup>

In Europe, and more recently in North America, access to urban public transport has been transformed by the introduction of low-floor vehicles.<sup>125</sup> Passengers in wheelchairs can board the bus via a simple ramp or directly from the sidewalk if the curb is raised at stops. Inside the bus, there is space to park wheelchairs and strollers, where they can be secured

**Building exclusive sidewalks as components of road and transport projects responds well to . . . vulnerable users' travel needs by increasing pedestrian accessibility and safety**

#### **Box 6.9 Convention on the Rights of Persons with Disabilities (Article 9, paragraph 1)**

'To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, . . . and to other facilities and services open or provided to the public. . . . These measures, which shall include the identification and elimination of obstacles and barriers to accessibility, shall apply to, inter alia: (a) Buildings, roads, transportation and other indoor and outdoor facilities, including schools, housing, medical facilities and workplaces'.

Source: <http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>, last accessed 25 March 2013.

with a clamp belt. This caters for people with small children or baggage, persons with disabilities and frail elderly persons.

In Delhi, India, a local NGO has worked with transport authorities to make metro stations barrier free; to include safety features and tactile guide ways<sup>126</sup> on platforms; and to ensure carriages have adequate space for wheelchair users.<sup>127</sup> Similarly, a forum bringing together an advocacy group for the disabled in Mexico City has led to thousands of kerb ramps on major streets and the introduction of accessible buses and trolley buses.<sup>128</sup>

Accessible taxis, both purpose-built and modified vans, are also becoming more prevalent. In Canada, the Province of Ontario offers a grant to adapt taxis to accommodate all users.<sup>129</sup> Private-sector companies may adapt one or more of their fleet and provide regular service and they send accessible taxis to disabled passengers who call for them. A variation on taxi service is the 'Dial-a-ride' service that works in many cities in the US and the UK.<sup>130</sup> In Berlin, a 'telebus' operates on the same principle.<sup>131</sup> Often, disabled passengers are given a 'travel card' and then allowed a certain number of rides.

Some attempts have also been made to ensure that information is availed to passengers in an easily understood manner. For instance, a number of taxis in Hong Kong have audio devices that provide the taxi fare in English, Putonghua and Cantonese.<sup>132</sup> It is also important that authorities promote disability awareness and training of public transport drivers and conductors to improve the assistance they offer passengers with special needs. Part of Mexico City's public information campaign aims to raise awareness among the general public about the integrated system of accessible pedestrian and transport services in the city. Sensitivity training for taxi drivers has also been considered.<sup>133</sup>

## SAFETY AND SECURITY IN URBAN MOBILITY SYSTEMS

Safety and security are key components in creating sustainable urban mobility systems, particularly in making roads safer and more secure for vulnerable and disadvantaged road users, including the poor. Likewise, improving the safety and security of transport modes can be an extremely important step in encouraging transport users to change to alternative (and more sustainable) modes. Numerous terror attacks against urban infrastructure during the last two decades have compelled stakeholders to understand transport security as more than a single element of the global networks that move people and goods.<sup>134</sup> Once a routine component of modern transportation, security now represents an urgent national priority.

### Global conditions, trends and challenges

This section examines the trends and impacts of traffic accidents in urban areas.<sup>135</sup> It considers reducing the global burden of such accidents through improved policies, road design and safety and traffic management. It also looks at transportation security more generally, in terms of people's (real or perceived) assessments of personal security. Due to the paucity of data on urban areas, this section refers to road traffic accident data at the national level.

#### ■ Road traffic accidents

Road traffic accidents are the ninth leading cause of death worldwide, accounting for 2.2 per cent of all deaths or 1.2 million deaths per year. The WHO estimates that a further 20–50 million are injured in road traffic crashes each year. The highest road traffic fatality rates occur in Africa and the Middle East (about 32 per year per 100,000 population). The average road traffic fatality rate of developing countries (about 20 per year per 100,000 population) is nearly twice that of developed countries. In fact, more than 90 per cent of fatalities occur in developing countries,<sup>136</sup> despite the fact that these countries have only 33 per cent of all registered vehicles.<sup>137</sup>

About half of the fatalities are in the most productive age group (15–44 years). In the 15–29 years age group, road traffic accidents are the leading cause of death. Males are overrepresented among fatalities in all age groups.<sup>138</sup> The most vulnerable road users – pedestrians, cyclists and motorized two-wheelers – account for nearly half of all road traffic fatalities. And, as can be seen from Figure 6.3, the proportion of fatalities among such vulnerable users is significantly higher in developing countries than in developed countries.

The predominance of vulnerable road-user casualties in Asian and African countries can be attributed to the unique traffic mix on the roads, characterized by the abundance of vehicles and non-motorized transport, as well as a lack of segregated facilities in the road network.<sup>139</sup> Poor enforcement of traffic safety regulations due to inadequate resources, administrative problems and corruption, exacerbate the situation further.<sup>140</sup> Arguably, the number of accidents and fatalities is likely to increase before they can be reduced, placing a strain on the poor public health infrastructure in developing countries. In India, road traffic injury patients account for 10–30 per cent of all admissions to surgical wards.<sup>141</sup> Delays in emergency response time can compromise the patient's recovery, resulting in adverse health outcomes and long-term disability. Furthermore, lack of trained expertise in trauma care, in many developing countries in particular, often results in treatable injuries becoming permanent or life threatening.<sup>142</sup> The annual cost of road traffic accidents in developing countries has been estimated

Safety and security are key components in creating sustainable urban mobility systems

Road traffic accidents are the ninth leading cause of death worldwide

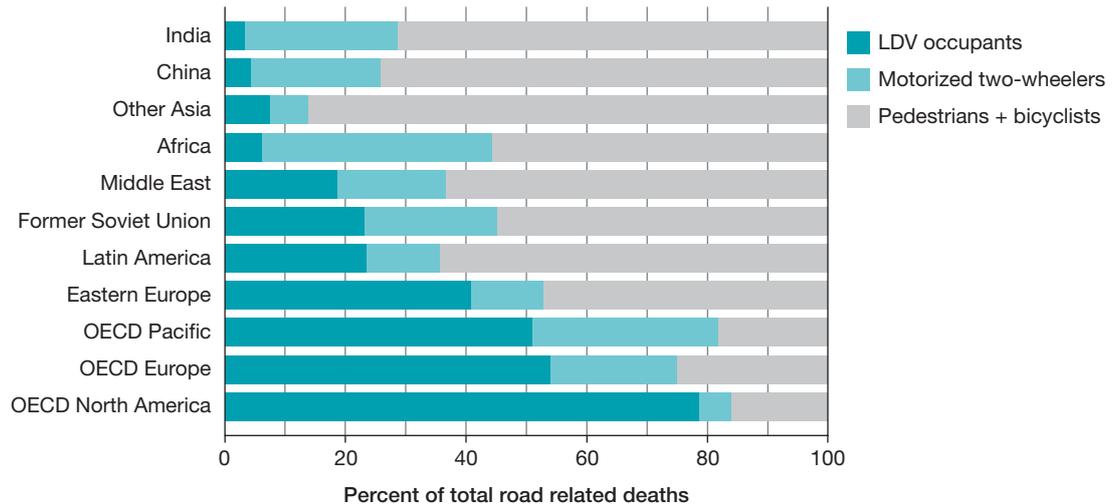
In the 15–29 years age group, road traffic accidents are the leading cause of death

Figure 6.3

**Road traffic fatalities by modes of transport**

Note: 'LDV occupants' = 'Light-duty vehicle occupants', i.e. occupants of cars, small passenger vans, SUVs and personal-use light trucks.

Source: WBCSD, 2004, p43.



There is . . . an urgent need for an effective system of accident recording and analysis

Crimes . . . such as being robbed or killed while waiting at a bus stop – discourage many people from using public transport

Inadequate street lighting and poor design of public transport stops tends to 'facilitate' sexual harassment and gender violence

as at least US\$100 billion a year.<sup>143</sup> Add to this the already considerable cost of congestion in cities, and the combined cost of a lack of road safety and accessibility is daunting.

Older pedestrians are also associated with very high rates of road injury and death. In 2002, some 194,000 older persons (aged 60 years and above) died as a result of road traffic accidents; this figure is equivalent to 16 per cent of all such fatalities globally.<sup>144</sup> Despite elderly drivers having the lowest crash rates of all age groups, there is a widespread misconception that they are a threat to traffic safety.<sup>145</sup> In Japan, for instance, incentives such as discounts in restaurants are offered to elderly drivers aged 65 years and above to encourage them to give up their licenses.<sup>146</sup>

Transport safety is not limited to private motorized vehicles only. Some 88 per cent of all motorized travel in Mumbai, India, is by bus or rail.<sup>147</sup> Accidents at railway level crossings clearly dominate the railway accident picture in Asia, where they are more frequent and can also be more severe in their consequences, involving injuries and fatalities to railway passengers, road vehicle occupants and other users of railway level crossings. In several developing countries, passengers in buses and informal transport systems also constitute a significant group at high risk of road traffic casualties.<sup>148</sup> Along with the profit motive of overloading, additional factors such as reckless driving, poor driver training and driver fatigue have led to the increased fatalities.

Most countries have some form of national system for aggregating data on road crashes, using police or hospital records, or both. However, the quality and reliability of data on traffic accidents is particularly weak in developing countries.<sup>149</sup> There is thus an urgent need for an effective system of accident recording and analysis that would be useful for a range of agencies (police, judiciary, emergency personnel, etc.).

### ■ Transportation security: Risks and fears related to the use of public transport

Across the globe, security risks and fear of crime while engaged in transportation activities have skyrocketed. The terrorist attacks in Madrid, Spain (March 2004)<sup>150</sup> and London, UK (July 2005)<sup>151</sup> show that public transport systems are vulnerable and potential targets for terrorists. Transport hubs and facilities have come under terrorist attacks as they concentrate large numbers of people. When attacks occur, there are disruptions in the public transport service, which leave many commuters stranded. Evidence suggests that passengers' confidence in the London metro and buses declined, and instead preference was given to two-wheelers and bicycles.<sup>152</sup>

While the most dramatic attacks have occurred mostly on major systems in major cities, this does not mean that local bus services or smaller cities are safe from attack. Crimes ostensibly unrelated to the use of public transport – such as being robbed or killed while waiting at a bus stop – discourage many people from using public transport. Table 6.5 summarizes the four main types of threats to security of person and property. In each case, while the origin of the problem may not lie primarily in transport conditions, questions arise about the planning and management of transportation facilities and services. Sexual harassment is widespread in many countries on and around public transport facilities, and inadequate street lighting and poor design of public transport stops tends to 'facilitate' sexual harassment and gender violence.<sup>153</sup>

A growing phenomenon in many cities is the expansion of criminal gangs that extort money from transport operators and passengers. Nairobi, Kenya, for instance, has seen the emergence of criminal youth gangs such as Mungiki. In April 2003, over 50 armed Mungiki members attacked a *matatu* (mini-bus) crew, killing five people.<sup>154</sup> These are indications of widespread social malaise. While it affects the

transport behaviour of everybody, in most cases, low-income groups cannot afford alternatives.<sup>155</sup> As a result, indispensable trips for work, health or education are reduced.

It is also well established that older persons have higher safety and security concerns than other age groups.<sup>156</sup> Many are aware of their frailty and vulnerability, which make them susceptible to certain forms of crime (such as bag snatching). This in itself generates a range of safety concerns (i.e. road safety, skateboard users in shopping malls, living alone, etc.) that have implications for policy and operations.<sup>157</sup>

### Policy responses and innovative practices

This section explores policy responses and examples of good practice initiatives to reduce traffic accidents and improve road safety and transportation security. It should be stressed that the type of traffic, the mix of different categories of road users, and the type of road traffic accidents in developing countries differ significantly from those in developed countries. Furthermore, the traffic patterns of developing countries today have never been experienced by developed countries in the past. Hence, technologies and policies cannot be automatically transferred from developed to developing countries without adaptation.

#### ■ Reducing road traffic accidents

Most developed countries have been experimenting with radical measures to reduce the number and severity of road traffic accidents. Based on a combination of engineering, enforcement and education measures, improvements have been made in infrastructure design; vehicle characteristics (e.g. seatbelt use, enacted by 57 per cent of countries surveyed by the WHO<sup>158</sup>); and driving behaviour (including speed limits and campaigns to dissuade drunk-driving). An estimated 96 per cent of countries have a national or sub-national policy on drinking and driving. Furthermore, some 49 per cent of countries

Type of threat	Manifestations
Sexual harassment	Occurs in overcrowded or isolated places. Includes physical or verbal harassment.
Theft by stealth	Function of crowded buses. Includes unattended parking of motorized and non-motorized vehicles.
Theft by force	Occurs in less-crowded locations. Includes vandalism and violent physical attack.
Political and social violence	For example burning of buses or attacking of commuters.

Source: World Bank, 2002a.

Table 6.5

Threats to security of person and property

have restrictions on the blood alcohol concentration of drivers.<sup>159</sup> Sweden's 'vision zero' initiative is exemplary, with a clear vision of reducing traffic accidents to zero in the near future. Some three-quarters of the significant reduction of deaths and injuries on Swedish roads have been attributed to the effects of the implemented traffic-calming measures.<sup>160</sup> A key lesson from these experiences, however, is the importance of maintaining the goodwill of all road users.<sup>161</sup>

In developing countries, the policy focus has been on the protection of poor people who are disproportionately affected by road traffic accidents owing to the mixture of vehicles and unprotected road users on the same roads (Box 6.10). Simple, low-cost interventions have been found to have a significant impact on their safety. For example, in Accra and Kumasi (Ghana) the introduction of speed bumps in the form of rumble strips and speed humps resulted in a 35 per cent drop in road crashes between 2000 and 2001.<sup>162</sup> Road designers in Malaysia are working towards new regulatory guidelines requiring pedestrian risk assessments in order to separate road users.<sup>163</sup>

With respect to new transportation projects, mandatory safety audit procedures have existed in a number of countries (including Australia, Denmark, New Zealand and the UK) for several years.<sup>164</sup>

Most developed countries have been experimenting with radical measures to reduce the number and severity of road traffic accidents

#### Box 6.10 Rwanda's road-safety programme

After the genocide that plunged Rwanda into mourning in 1994, the nation embarked on the improvement of its road infrastructure that was damaged by the effects of war, leading to many road traffic deaths. New regulations were enforced in 2001, which included the mandatory wearing of seatbelts, speed limits, vehicle inspections to ensure standards of roadworthiness and limits on blood-alcohol concentrations. These legislative changes were followed up in 2003 by a public awareness campaign and a law introducing further penalties for lack of seatbelt use or

failure to wear helmets on motorcycles. This led to a 30 per cent reduction in traffic accidents.

The Rwandese government also introduced national speed limits of 60 kilometres per hour, which is 20 kilometres per hour lower than neighbouring countries. Plans to extend this successful programme of road-safety measures include further reinforcements for the traffic police to better enforce the law, as well as more public education about how to prevent accidents and observe good conduct.

Sources: WHO Regional Office for Africa, 2006; Brown, 2007.

**Box 6.11 Toolkits for road safety**

The International Road Assessment Programme (iRAP) has developed a toolkit that rates roads according to criteria for safety design, maps fatalities and serious injuries across the road network, and makes cost/benefit calculations for fatality reductions based on implementation of proposed countermeasures. It then applies tailored solutions. The iRAP methodology provides:

- ‘Star rating’ tables and maps showing the safety of roads or car occupants, motorcyclist, cyclists and pedestrians.
- A road inventory database with 30 inspected attributes describing the network.
- An estimate of the numbers being killed and seriously injured on each inspected road.

- A recommended network-wide countermeasure programme for consideration by local stakeholders and funding bodies.

In Malaysia, it has been estimated that an investment of US\$180 million in road design improvements could deliver US\$3 billion in benefits and prevent over 30,000 deaths and serious injuries over 20 years. iRAP has pilot projects in Chile, Costa Rica, Malaysia and South Africa showing positive cost–benefit ratios. Positive economic outcomes combined with the alleviation of human suffering make investment in safer roads a development priority.

Sources: iRAP, 2009a and 2011.

**The enforcement of traffic regulations . . . is essential for the safety of cyclists, other non-motorized vehicle users and motorcyclists**

**Traffic calming and the redesign of roads can reduce the vulnerability of pedestrians and cyclists to road traffic accidents**

Such procedures are also at various phases of implementation in developing countries such as India, South Africa and Thailand.<sup>165</sup>

The enforcement of traffic regulations, governing all road users and vehicles, is essential for the safety of cyclists, other non-motorized vehicle users and motorcyclists. In Iran, a law was passed in 2004, making the use of helmets compulsory countrywide for motorcycle users. By 2007, fatalities per 100,000 inhabitants decreased from 38.2 to 31.8. Some 40 per cent of countries surveyed by the WHO have a comprehensive motorcycle helmet law, in which some countries have clearly defined standards for both motorcycle drivers and their passengers.<sup>166</sup> Exclusive motorcycle lanes can be created and separated from the main carriageway by a physical median, as observed in Kuala Lumpur (Malaysia). Box 6.11 presents a toolkit for addressing road safety.

Most countries provide some pedestrian facilities, but in most cases the road environment is not designed with pedestrians in mind. In many developed countries ‘pedestrian refuges’ – elevated islands designed usually in the middle of streets – are a common feature to offer pedestrian safety when crossing the road. Such crossings are rare in developing countries. Instead, zebra crossings (where

pedestrians are supposed to be granted immediate priority over approaching vehicles) are provided in some developing countries. Other low-cost pedestrian facilities – which are affordable at a wide scale and can be easily implemented – include pedestrian footways, controlled signals for at-grade pedestrian crossings, grade-separated crossings, and segregated bicycle lanes. As evidenced by pilot projects, traffic calming and the redesign of roads can reduce the vulnerability of pedestrians and cyclists to road traffic accidents.<sup>167</sup>

Other effective interventions for road safety include better land-use management for optimized traffic flow and the promotion of alternative modes of transportation such as public transport (Box 6.12). For instance, Singapore has been successful in reducing car journeys and alleviating traffic congestion through a combination of integrated land-use and transport planning, and demand-management measures. This can help to reduce traffic accidents by minimizing the number and length of motorized trips.<sup>168</sup> Similarly, in Brazil, Curitiba’s high-capacity traffic-management system has not only improved urban transport and mobility but has also reduced the number of accidents along its routes, through the construction of safer infrastructure.<sup>169</sup> Higher occu-

**Box 6.12 Reducing road traffic fatalities in Bogotá, Colombia**

Since 1993, Colombian legislation requires all vehicle owners to be insured. As a result, a 3 per cent levy was instituted on all vehicle insurance policies, earmarking that money for a ‘road accident prevention fund’. This resulted in Colombia’s time-record high for the reduction of traffic fatalities – 7874 in 1995.

In Bogotá, several programmes have been introduced to prevent and mitigate road traffic deaths and injury. Typically,

bars are closed at 1am instead of 3am, and citizens are cautioned against driving under the influence of alcohol. The stiff penalties deter people, who instead opt for alternative means of transportation (such as carpooling), resulting in the reduction of road traffic fatalities in Bogotá from 1387 in 1995 to 697 in 2002.

Source: WHO, 2004.

pancy vehicles are given priority in the road network, thus reducing the exposure risk of pedestrians and other road users. Surrounding areas have also been improved with better lighting and other equipment to make the transport system safer, more efficient and more user friendly.

The responsibility for regulating traffic and enforcing rules falls with the police. However, many police agencies in developing countries are plagued with poor enforcement of regulations – due to a lack of resources, unsatisfactory systems or general inefficiency on the part of the staff. Evidence suggests that a sustained systemic approach to road policing, with international support, can improve the performance (and image) of the police. A study of enhanced traffic enforcement in Uganda showed a 17 per cent drop in road deaths. The implemented scheme was worth US\$72,000 and an average cost-effectiveness of US\$27 per life year saved.<sup>170</sup>

Partnerships between community groups, civil society and NGOs and the police can help in preventing and mitigating traffic accidents, and enforcing transport safety measures.<sup>171</sup> For example, in Bangalore, India, the World Bank's Global Road Safety Partnership has created partnerships to launch a campaign against drunk-driving, and to improve roadways in high-traffic areas to enhance safety.<sup>172</sup> In addition, the Centres for Disease Control and Prevention have been working with the ministries of health and other groups in Mexico, Colombia and El Salvador to reduce injuries to pedestrians, cyclists and motor-vehicle occupants.<sup>173</sup>

#### ■ Improving the safety and security of vulnerable groups

'Safe route to school' programmes exist worldwide.<sup>174</sup> Spearheaded by Denmark in the 1970s, the programme focuses on engineering enforcement, education and encouragement of safe walking and cycling for schoolchildren.<sup>175</sup> Under the Road Traffic Act, police and local authorities are responsible for the safety of children on school journeys. This involves many improvements on local roads, including slow-speed areas, 'road narrowings', traffic islands and separate foot and bicycle paths. The programme has been highly successful, and in some localities the accident frequency has been reduced by 85 per cent.<sup>176</sup> Denmark's experience with these programmes has provided an example for many other countries worldwide.

Many European cities are working towards limiting through-traffic on their streets to protect children, deaf people and those in wheelchairs from accidents.<sup>177</sup> The Netherlands has developed an amicable street-design solution for sharing of space between pedestrian and motor traffic in residential areas.<sup>178</sup> Selected areas are designated *woonerfs* ('living streets') and they are clearly marked with a traffic sign based on the image of a house. The street

design is modified giving priority to pedestrians, with the pavement clearly demarcating areas where parking is acceptable. Through-traffic slows down due to the judicious use of speed bumps and winding thoroughfares. The harshness of asphalt and concrete is softened with amenities such as trees and flower boxes, small areas where children may play and benches where adults may meet with each other. By 2011 it was estimated that some 20 per cent of the population of the Netherlands were living in *woonerfs*.<sup>179</sup> Similar initiatives have been introduced in a number of other countries as well, including Norway (where they are called *gatetun*)<sup>180</sup> and the UK ('home streets').

Since the 1980s, transport planners in some countries have taken into consideration the personal security of passengers using public transportation systems, especially women. In Toronto, Canada, a 'request stop' service was launched in 1980 for the hours after dark, allowing a female passenger to ask the bus driver to stop along the route, where it is more convenient for the woman to get off, not necessarily at the bus stop. This was done to shorten the woman's walk between bus and destination. The service was later adopted in Montreal in 1996,<sup>181</sup> and later in a few UK cities.<sup>182</sup> Other measures taken to improve the personal safety of passengers in Toronto include increasing the presence of security personnel in stations, adding more services at night and raising awareness among station employees, drivers and passengers.<sup>183</sup>

Environmental design plays an important role in reducing crime in public transport. In the US, the Washington Metropolitan Area Transit Authority<sup>184</sup> and the New York Port Authority Bus Terminal are classic examples of success stories of applied security design against crime in rail transport environments.<sup>185</sup> In each case, environmental design shares the credit for increased security with strategic policing, strict maintenance procedures and 'zero tolerance' policies in enforcing rules and regulations. Another example of crime prevention through environmental design is evident in the UK, where closed circuit television cameras are used widely to monitor public spaces such as shopping malls, car parks and a few residential areas.<sup>186</sup>

The emergence of low-cost open-source mapping tools; widespread cellular network coverage in developing countries; declining costs of mobile phone hardware; and increasing internet use by public agencies have resulted in unprecedented opportunities to support transport planning and management in developing countries.<sup>187</sup> Some three-quarters of the world's inhabitants now have access to a mobile phone. The number of mobile subscriptions grew from fewer than 1 billion in 2000 to over 6 billion in 2012; nearly 5 billion of these are in developing countries. In 2011 alone, more than 30 billion mobile applications, or 'apps' (the software that

**Many European cities are working towards limiting through-traffic on their streets to protect children, deaf people and those in wheelchairs from accidents**

The importance of the social sustainability of urban transport cannot be underestimated; it is a key prerequisite for social development

To minimize poor accessibility, appropriate urban planning and land use is essential

Accessibility planning is viewed as a mechanism for ensuring equity and reducing mobility

Greater equity in urban mobility is an essential prerequisite for achieving sustainable urban mobility systems

extends the capabilities of phones, for instance to become mobile wallets, navigational aids or price-comparison tools) were downloaded.<sup>188</sup>

Advances in technology now make it possible to respond to specific needs, including those of particularly vulnerable groups such as women, persons with limited mobility and persons with disabilities. This could mean benefiting from new opportunities through safer and easier transport access. In Egypt, an innovative website ‘HarassMap’ was launched in December 2010 to help report and map cases of harassment.<sup>189</sup> Due to the affordable and adaptable technology, victims of harassment are able to anonymously report incidents by simply sending an SMS message to this website.

Another innovation is the ‘Access Advisr’, a pilot web application in the UK that uses crowd-sourcing to identify local people’s needs in order to improve accessibility to the existing public transport network for disabled and older persons.<sup>190</sup> The application identifies problem areas for accessible transport, and allows the review of information about the physical infrastructure, and to rate it – through a live feedback community of users who can contribute their views, photos and videos based on their own experiences.

## CONCLUDING REMARKS AND LESSONS FOR POLICY

Mobility is required to ensure access to basic goods, services and activities, and in that sense it is essential to social equity. Restrictions on such access may imply an abuse of human rights. In order to ensure equitable access, cities need to understand the transport needs of *all* urban dwellers, distinguishing between the priorities of men and women, the young and old, the able and the disabled. There is thus a need to understand the purposes and uses that would be derived from improved access, and the constraints preventing those needs from being fulfilled. While social objectives are often acknowledged in transport strategies, experiences show that very little practice goes beyond pilot schemes and case studies. Yet, the importance of the social sustainability of urban transport cannot be underestimated; it is a key prerequisite for social development.

In theory, there are already both awareness and some knowledge of the role that mobility plays in terms of improving – or worsening – a person’s quality of life. However, the complex dynamics are often not well understood. This leads to a situation whereby those responsible for taking action fall back on traditional solutions; namely: infrastructure development, improvement of conditions for private transport, and lump-sum payments or untargeted

subsidies. Transport subsidy is an important policy option for ensuring equitable transport access. However, it is essential that such subsidies are designed carefully to target the poor and other vulnerable and disadvantaged groups.

Good mobility policies should contribute to poverty reduction by recognizing both the necessity of improved macroeconomic efficiency, and the need for direct targeting of transport interventions. There has been a tendency to treat these two dimensions of transport policy separately, with the result that an effective and unified approach to urban mobility has been lacking. One way of dealing with this is by ensuring that poverty reduction becomes an explicit objective of transport policies, with clear strategies to bring the benefits of economic efficiency to poor people, through redistribution and direct targeting programmes, including preferential treatment of specific vulnerable and disadvantaged groups.

In order to minimize poor accessibility, appropriate urban planning and land use is essential. As a derived demand, transport infrastructure that enables access to low-cost transport can make a crucial contribution to poverty reduction. However, large-scale transport infrastructure projects tend to benefit high-income groups the most. The poor and other low-income groups are often displaced to make way for the projects, and may derive little or no benefit.

Accessibility planning is viewed as a mechanism for ensuring equity and reducing mobility. Developing services and facilities on a localized basis that places transport within easy and affordable reach of the poor, forms a central principle within a sustainable urban mobility paradigm. Greater attention should be given to investments in bus-priority and non-motorized transport facilities, in order to reduce the negative impacts of congestion. In some developed countries, it may even be possible to learn from the experience of some developing countries, where the urban poor are supported by the existence of cheap (mostly informal) transport solutions. Many low-cost actions can be implemented, which focus on both walking and cycling facilities, especially in poorly equipped areas. Such interventions could contribute to the welfare of the urban poor, as well as the economic activities of petty traders and hawkers.

While great strides have been made in developing gender-appropriate transport policies and universal design solutions, consistent implementation is still lacking. Moving towards greater equity in urban mobility is an essential prerequisite for achieving sustainable urban mobility systems. Concerted efforts must be made by decision-makers to establish mobility systems that address the needs of all population groups, especially the poor, the young, the elderly and the disabled.

The mere existence of gender-mainstreaming materials and official (international or national) policy

documents alone does not mean that gender is successfully integrated in the transport sector. Particular attention needs to be paid to gender issues, and consideration given to the differential needs and demands arising from varying gender contexts. Similarly, it is increasingly being recognized that there is a need for an analysis of gender that acknowledges income differences, in order to assess how individuals experience urban mobility. Accordingly, it is crucial that women are represented in the planning, design and decision-making of all transport investments (including user panels).

As noted earlier in this report, urban mobility is primarily a means to an end: to provide access to basic goods, services and activities. In this context, the core social requirement for an urban mobility system is that it delivers its services equally to different localities, interest groups and across generations. Similarly, the negative impacts should be distributed fairly among all users. Granting

equitable access for all will involve developing and implementing appropriate measures and control mechanisms, which include the following:

- Fare and pricing policies;
- Flexible routing and servicing;
- Establishing schedules that are considerate of people's activity patterns and time budgets;
- Acknowledging the importance of the services provided by the informal sector and by non-motorized transport;
- Introducing innovative transport services that also make use of opportunities provided by information and communication technologies;
- Addressing the safety and security concerns and other needs of transport users;
- Eliminating gender biases by integrating the transport needs of women into transport policy and planning processes.

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