

**Enhanced Accessibility for People with
Disabilities Living in Urban Areas**

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EXECUTIVE SUMMARY

People with disabilities constitute a significant proportion of the poor in developing countries. If internationally agreed targets on reducing poverty are to be reached, it is critical that specific measures be taken to reduce the societal discrimination and isolation that people with disabilities continue to face. Transport is an important enabler of strategies to fight poverty through enhancing access to education, employment, and social services.

This project aims to further the understanding of the mobility and access issues experienced by people with disabilities in developing countries, and to identify specific steps that can be taken to start addressing problems. A major objective of the project is to compile a compendium of guidelines that can be used by government authorities, advocacy groups, and donor/loan agencies to improve the access of people with disabilities to transport and other services in urban areas.

The work undertaken in Phase I of the project included an investigation into the mobility needs of people with disabilities in five case study countries; and benchmark studies of current practice in Europe, Latin America, Africa and India. The five case study countries were India, Malawi, Mexico, Mozambique, and South Africa.

The needs analysis highlighted three major types of barriers to access and mobility, namely social barriers, psychological barriers, and structural barriers. Focus group participants identified high transport costs, lack of awareness among transport staff and the general public of the needs of disabled passengers, and structural barriers in the transport system as major obstacles they face. The problems identified were remarkably similar across the countries studied, and also similar to the obstacles that countries in Europe and North America have already started to remove.

In many developing countries a legal framework for addressing disability issues is starting to be put in place. Awareness among governments and society of the needs and rights of people with disabilities is growing. However, what is lacking in many cases is a framework for action to remove the barriers infringing on these rights.

First steps in addressing mobility barriers have already been taken in countries of Latin America and Asia, focusing firstly on environmental access, and to a lesser extent on transport. Technical standards on access to transport are converging across developing and developed countries. A body of knowledge regarding accessibility to the built environment and to transport is therefore growing, that could be instructive to least developed countries in improving accessibility and mobility.

Initial recommendations are made on actions that could be taken by government and transport providers, in consultation with disability groups. These include implementing incremental improvements to the pedestrian environment, disability awareness and driver training programmes, and low-cost, high-impact features in vehicles (such as a lowered first step, sufficient grab rails, high contrast colour on steps, large print destination signs, lights when stopping and reserving seats for passengers with disabilities).

Some questions that remain to be investigated are identified, including issues of technical and operational solutions that are appropriate under various conditions; and the prioritisation of improvements within constrained budgets. It is suggested that further experimentation and relatively small-scale demonstration projects can be very

valuable in finding solutions to some of these problems, and in leveraging political will. It is important, furthermore, that the compendium of guidelines produced by this project provide practical guidance to disability groups, governments, and transport providers on pursuing common goals for accessibility through effective and meaningful co-operation.

1 INTRODUCTION

1.1 Project purpose

Disability is both a cause and consequence of poverty. In developing countries, where discriminatory social attitudes persist and welfare safety nets frequently under perform, people with disabilities are overwhelmingly poor. If world poverty is to be reduced by half by 2015, a target to which the British government and the rest of the international community are committed (DFID, 1997), it is imperative that the situation of people with disabilities be specifically addressed.

Poverty among people with disabilities is perpetuated by their lack of access to education, health care and employment opportunities. However, without the ability to travel, people with disabilities can benefit from interventions in the health care, education or socio-economic sectors only in a very limited way. Transport is thus an important enabler of most other strategies to fight poverty and social exclusion.

This project aims to further the understanding of the mobility and access issues experienced by people with disabilities in developing countries, and identify specific steps that can be taken to start addressing problems. A major objective of the project is to compile a compendium of guidelines that can be used by government authorities, advocacy groups, and donor/loan agencies to improve the access of people with disabilities to transport and other services in urban areas. The compendium will be based on international best practice in accessibility provision and disability studies, validated for applicability to developing country contexts.

This report summarises the work undertaken in Phase I of the project, which investigated the status quo and needs and barriers in five case study countries; and conducted benchmark studies of current practice in Europe, Latin America, Africa and India. The five case study countries comprised India, Malawi, Mexico, Mozambique, and South Africa. The project team believes the findings vividly highlight the need for action in improving access and mobility, and the contribution that a set of well considered, widely disseminated guidelines, appropriate to the challenges of developing nations, can make.

As shown in the logframe (Annex A), Phase II of the project intends to assess the applicability of current guidelines and standards, through a combination of workshops in participating countries, further research, and small-scale demonstration projects designed to test and validate some of the solutions. The material will be further refined and packaged for easy dissemination (including audio-visual aids) in Phase III.

1.2 Structure of this report

The report is structured around 4 further sections. Section 2 gives an overview of the context of disability in the developing world, giving attention to the incidence and characteristics of disability, as well as the linkages between disability, poverty, and access to transport. Section 3 then describes the needs analyses undertaken in Africa, India, and Mexico, using a variety of qualitative survey techniques. In Section 4 a summary is given of the current practice with regard to accessibility provision in the case study countries, as well as in Europe and Latin America. This section starts to identify practices which may be applicable more widely among developing

countries. Finally, Section 5 summarises the findings and points the way forward for the rest of the project.

2 CONTEXT: DISABILITY IN THE DEVELOPING WORLD

Disability is a relatively new area of discourse in many developing countries. Figures on the incidence, causes and typology of disability are therefore rarely available. Some countries, such as South Africa, have started including questions on disability in the national census. In other countries population estimates are often made using data collected for different purposes such as eligibility for social benefits or participation in the labour market. Problems of comparison between countries arise due to variations in the definition of disability: the questions asked to categorise a person as disabled or the eligibility criteria for social benefits. Estimates can be based upon the adult population, the working age population or the total population.

Table 1 shows the variation in estimates of the extent of disability in the countries examined. The 2.5% incidence reported in India is considered to be a major underestimate partly because many people are thought to avoid declaring a disability due to the stigma associated with having a disability (NSSO, 1993). The same applies to Mexico City, where only 1.9% of the population identified themselves as disabled in the 2000 Census. The true incidence is likely to be at least as high as that estimated in the European Union, 10%.

Table 1. Estimates of the number of people with disabilities in the project areas

Area	Disabled Population (Millions)	Total Population (Millions)	Approximate Percentage	Source
South Africa	3	43	7%	1996 National Census
Mozambique	1.7	17	10%	Local study, 2001*
India	22.5	900	2%	1991 National Census
Mexico City (Federal District)	0.16	9	2%	2000 National Census
Malawi	1.0	10	10%	Local study, 2001*
Latin America**	32.5	500	6.5%	Regional study, 2001
European Union	37.14	370	10%	European Commission, 2000

* Estimate is likely based on the United Nation's average estimate of 10%

** Based on data averaged from 9 countries, including Chile, Colombia, Costa Rica, El Salvador, Mexico, Nicaragua, Peru, Uruguay and Paraguay.

Overall, the United Nations estimates that between 6% and 10% of people in developing countries are disabled (Despouy, 1993). Recent World Bank estimates show that people with disabilities account for as many as one in five of the world's poorest (DFID, 2000).

In addition to permanent disabilities, it has also been pointed out that at any one time far higher numbers of people are “mobility impaired” by environmental barriers. The European Conference of Ministers of Transport (ECMT) cites two European studies that estimate “that at any one time between 20 and 30 per cent of people travelling have a mobility impairment for one reason or another” (ECMT, 1999, p.7). This category of people would include people with temporary health conditions, pregnant women, parents with young children and people carrying shopping/luggage. The population that would benefit from accessibility improvements is therefore much larger than that shown in Table 1.

2.1 Types of disabilities

It may be useful to categorise the extent of disabilities of different types. This recognises the diversity of needs and abilities among people with disabilities, and also points to the types of access barriers that need to be addressed. However any classification should be done with caution, firstly in deference to the concerns of people with disabilities themselves about attempts to categorise them in simplistic and stigmatising terms. Classifications should be made in the context of social interaction, rather than of notions of individual condition.

Notwithstanding these concerns, data is shown here for a few broad categories of disability only. The definitions used to categorise disabilities varied between sources, for example the data for cognitive impairments was not collected in India, and whilst some sources categorised people by their main impairment others, such as Mexico, included people with multiple impairments in each type of impairment. Definitions and survey methods vary to such an extent across countries that any finer comparison of disability types is impossible. Table 2 shows the proportions of people with various disabilities reported in selected countries.

Table 2: Proportion of disabled people with different types of impairment

Area	% with type of impairment				
	Vision	Hearing/ Speech	Physical	Cognitive	Other (incl. Multiple)
South Africa (1996)	41%	15%	21%	7%	16%
India (1991)	23%	26%	51%	--	--
Mexico (2000)	29%	21%	45%	15%	1%
Malawi (1983)	21%	13%	18%	9%	39%
Latin America*	27%	20%	29%	14%	--

* *Averaged over 9 countries*

Based on these figures and studies from individual countries in Latin America that have been reviewed, it is likely that in most developing countries the number of people with sensory disabilities (including blind, low vision, deaf, hard-of-hearing, and speech) amount to about 40 to 50% of all disabled people; while people with various physical disabilities are in the 20 to 50% range, and people with cognitive disabilities in the 7 to 15% range. The significance of these numbers will become clearer when considering the need to improve various aspects of the transport system.

2.2 Causes of disability

Poor socio-economic conditions contribute significantly to disability in developing countries. The United Nations reports that poor nutrition, dangerous working and living conditions (including road accidents), limited access to vaccination programmes, and to health and maternity care, poor hygiene, bad sanitation, inadequate information about the causes of impairments, war and conflict, and natural disasters all cause disability (Fletcher and Hurst, 1995). In Mozambique land mines left behind after the recent civil war is still contributing towards rising numbers of physically disabled people. In South Africa, the armed struggle leading up to democracy is considered a major reason for the much higher incidence of disability among Black people (7.6%) than among Whites (3.5%).

The impact of HIV/AIDS on the need for accessible transport is likely to be considerable. The disease is reported to be reaching infection levels of 25% or more of the population in Sub-Saharan Africa (USAID, November 2000). A growing need for access to health care services such as HIV testing and counselling, medication, and medical treatment, is already evident. Opportunistic diseases cause various levels of disability, ranging from reduced vision to difficulty with walking. Transport that does not cater for the needs of such people effectively excludes them from receiving proper care, and contributes to isolation and earlier mortality. In addition, older adults are increasingly being left with the responsibility of caring for young children as young adults die of AIDS. This older population -- which tends to have higher levels of disability -- needs to remain mobile to be economically active. These trends all point towards an increasing need for transport services which are more accessible to the entire population.

2.3 Disability, poverty and access to opportunities

Ample evidence exists to support the link between disability and poverty. As an example, Figure 1 shows the percentage of people who are disabled per income category in South Africa. The incidence of disability is more than twice as high among the lowest income groups than among the others.

Poverty and disability reinforce each other (Figure 2). Disability often leads to exclusion from education and employment opportunities, thereby causing economic hardship. In developing societies strong social and cultural attitudes persist in isolating and excluding people with disabilities from mainstream society. People with disabilities who are denied education are then unable to find employment, driving them more deeply into poverty.

The consequences of this vicious cycle were observed in all the countries studied. In India, nearly 50 per cent of people with disabilities have never been to school, while only five per cent of children with disabilities regularly attend school.

Ninety-five per cent of Mozambicans with disabilities are illiterate, as compared to 60 per cent in the overall population. Employment is very low: in India, for instance, the rate of employment of disabled people in the top 100 companies is only 0.4%, while the share of disabled women in employment is less than 0.3%.

The situation is compounded by the lack of access to mobility aids and rehabilitative services. In India it is estimated that only 5% of the estimated 10 million people who have difficulty moving about receive the wheelchairs, callipers, and other devices, and the accompanying therapeutic services, that they need.

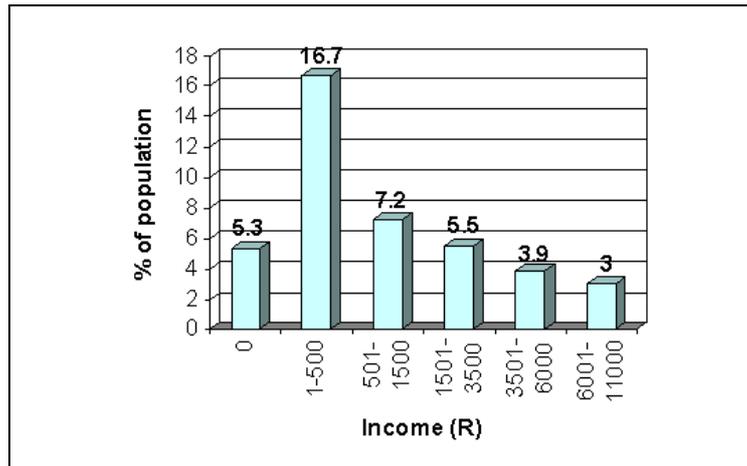


Figure 1: Percentage of South African population disabled, by income group
 (Source: 1996 South African National Census)

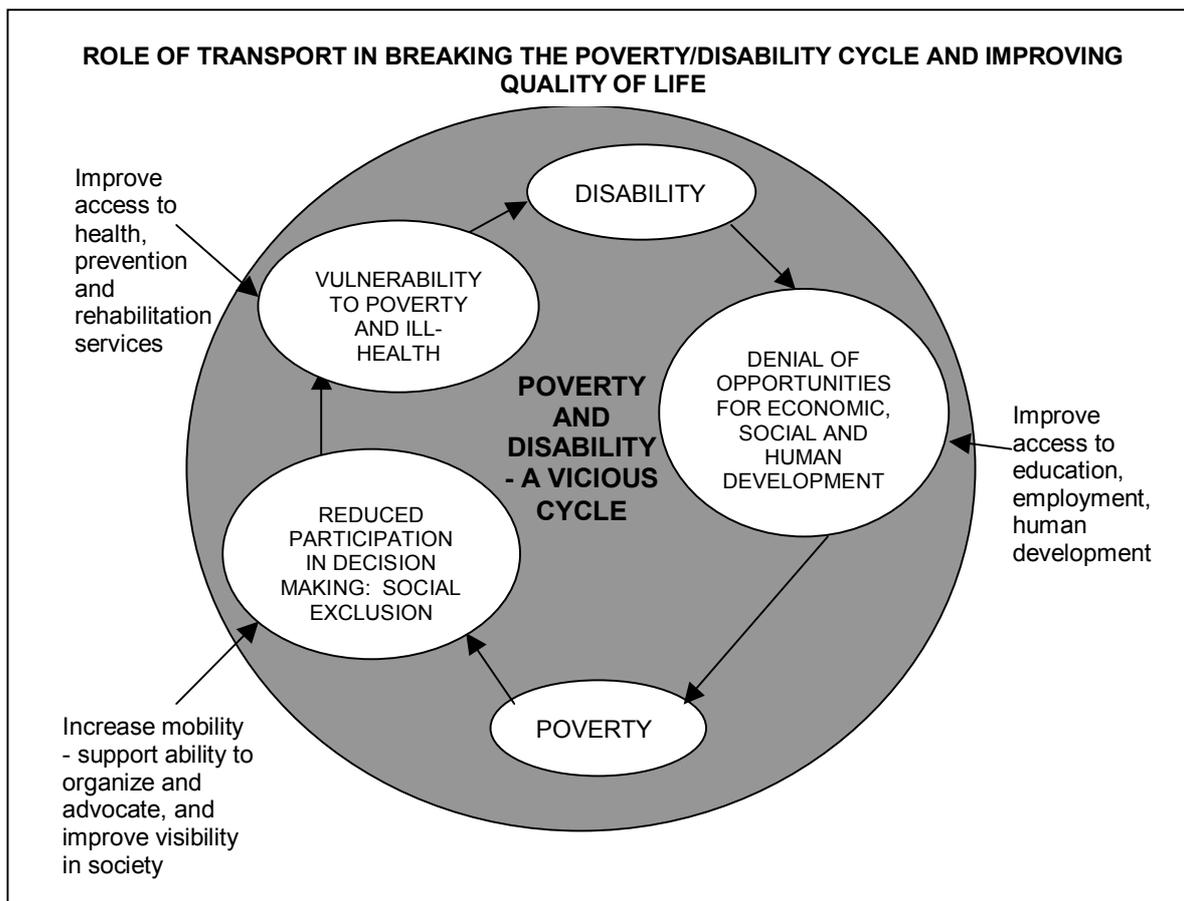


Figure 2: The disability-poverty cycle and the role of transport
 (Adapted from *Disability, poverty and development*, DFID, 2000, p.4)

Women with disabilities often suffer a double discrimination, both on the grounds of gender and of impairment. Women in developing societies generally have a lower status than men and boys, making them more prone to poverty and marginalisation.

In Malawi, for instance, female-headed households are amongst the poorest in the country. This situation is compounded for women with disabilities, as they have lower access to credit, education, and even the recourse of marriage.

Societal circumstances thus interact with the particular physical and environmental conditions faced by a person with disabilities, to help determine their specific needs for access and mobility.

3 NEEDS ANALYSIS

3.1 Methodology

A needs analysis was conducted in the five case study countries to identify and assess the mobility and access issues faced by people with disabilities in these countries. Multiple data collection methods were used, including:

Focus groups with people with various disabilities in each country

Key informant interviews with representatives of disability organisations, parents of disabled children, government, and the transport sector

More detail on the methodology followed and the composition of the samples is contained in Annex B.

3.1.1 Focus group composition and content

Focus group members were recruited with the assistance of local organisations of and for people with disabilities. As a result, most focus groups represented people with the same types of disabilities. Individual disabilities covered included vision-, hearing-, cognitive-, and physical-impairment. Care was taken to achieve a balanced range of demographic and socio-economic characteristics, including gender, age, and employment status.

In focus groups with hearing impaired people, sign language interpreters were used to assist the moderator.

Discussions focused on all modes of transport used by participants, including:

- bus;
- suburban rail;
- auto rickshaws;
- taxis, jitneys or small buses (minibus-taxis in RSA, *Chapa 100s* in Mozambique, *micros* in Mexico); and
- the pedestrian environment (including use of mobility devices such as wheelchairs).

Inter-urban transport and travel by sea or water were excluded.

The main questions addressed in each focus group were:

- the main reasons for travelling;
- the most commonly used transport mode and reasons for using them;
- when respondents preferred to travel and why;
- problems faced while reaching the bus stop, railway station, etc.;

- problems faced while getting into a particular mode, getting a seat, and alighting;
- co-operation received from the bus driver, conductor, co-passengers, etc.;
- topics related to problems faced by women in particular;
- improvements respondents expect from roads, transport infrastructure, etc.; and
- anything else they felt like sharing with the research team.



Photo 1 Participants at a focus group in Maputo, Mozambique

3.2 Results

In general, it is clear that the majority of people with disabilities experience significant barriers to mobility. Yet their mobility vary considerably according to their disability, and the financial and family resources at their disposal. People with hearing disabilities appear to be the most mobile, while people with vision impairments are often able to use specific modes to travel between familiar places. People with walking difficulties are generally better able to access smaller vehicles. Wheelchair users are almost completely excluded from most public transport and sometimes even the street environment. The situation is even more critical for people in need of mobility devices such as canes, wheelchairs, and crutches, if they can not secure these basic mobility aids. To many the assistance of family members throughout the duration of a trip is of fundamental importance.

Cost issues appear to be one of the most important barriers to greater mobility, both in terms of accessing and maintaining mobility devices, and in terms of affording to travel by public transport.

Overall, the barriers and problems reported by participants in the different countries were remarkably similar. They are also remarkably similar to problems reported in the developed world. Three main types of barriers were identified from the focus groups (see Figure 3), namely:

- Social barriers;
- Psychological barriers; and
- Structural barriers to accessibility.

All these are discussed in more detail below.

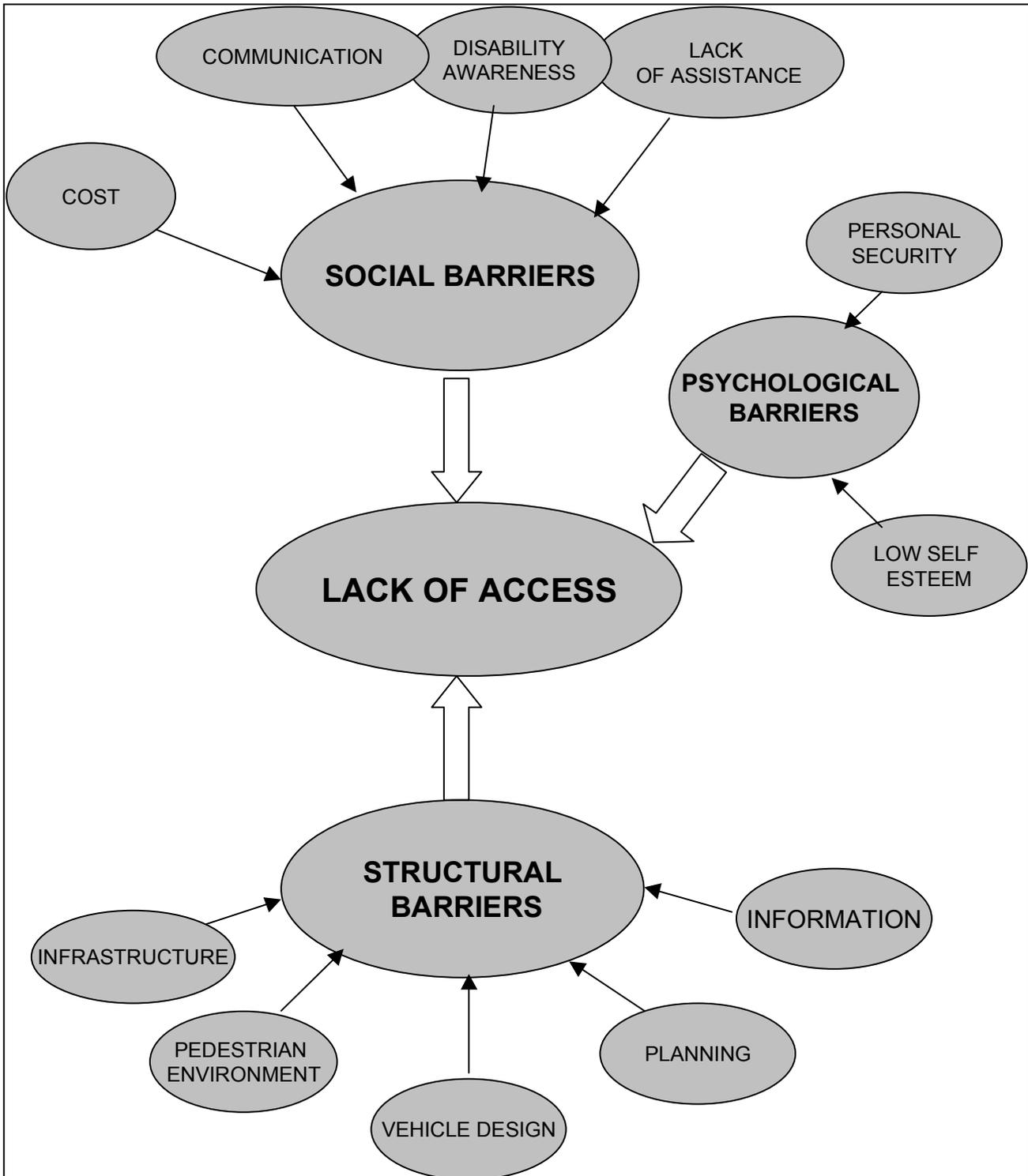


Figure 3: Barriers to accessibility identified by needs analysis

3.2.1 Social barriers to accessibility

Lack of public disability awareness

Transport staff and other passengers can create barriers for disabled people using public transport. The problems associated with a general lack of awareness among the public of the needs of people with disabilities were highlighted in almost every focus group discussion and interview.

In light of the structural barriers to access prevalent in the transport system, many participants reported needing assistance when travelling. If not accompanied by an escort (normally a family member, friend or paid escort) the disabled person had to rely on assistance from staff or other passengers. Problems were often encountered when requesting help because the participants felt other passengers offered help in a patronising or demeaning way, or due to ignorance of the needs and problems of disabled people among the public. Help given incorrectly could undermine a disabled person's self-esteem, as one participant explained:

“Many times when I request passers-by to help me cross the road, they do so either by clutching my shirt collar or shirt sleeves. At that moment I feel so inferior and insignificant” (Male, visually impaired person, India)

Other passengers appeared unaware of the difficulties their actions could cause people with disabilities. For instance, a participant with a vision impairment described an incident where the person they had asked to tell them when their bus had arrived left without informing them. Consequently, the disabled person was left standing waiting indefinitely, unaware they needed to ask someone else to help them to identify their bus.

Participants also reported problems with other passengers being unwilling to give up their seat or using a priority seat meant for disabled passengers, especially if the vehicle was crowded.

“While travelling by bus I find it difficult to stand for a long time. However, even on repeated requests no one offers his seat.” (Physically disabled person, India)

Female participants reported that some men had misinterpreted their requests for help and they had received unwanted advances. This was often linked to communication difficulties.

Yet it seems that not all people with disabilities feel disadvantaged by societal attitudes. About one third of respondents in Malawi considered their society integrative and considerate.

“I am very well accepted in my community. I do not face any problems.”
(Disabled person, Malawi)

Lack of staff awareness and training

As providers of a public service, transport staff play an important role as the interface between the passengers and the service. Yet negative staff attitudes and ignorance were reported as specific barriers to the use of public transport. Generally, focus

group participants felt the assistance that staff provided was inadequate. Staff were often unwilling to provide assistance to help passengers locate the correct bus stop, platform or vehicle; or to board the vehicle and locate an available seat; or to inform them when they reached their stop.

In South Africa people with disabilities reported that minibus-taxi drivers sometimes refused to serve them.

“They do not wait when they see you coming – and that you are disabled – they just drive away.” (Passenger with disability, South Africa)

Normal operating practices also caused difficulties for many participants. Often the amount of time allowed for boarding the vehicle was insufficient. In crowded conditions, participants had insufficient time to recognise the arrival of the bus, get through the crowd and board the vehicle. Inconsistent practices, such as skipping intermediate bus stops, made it difficult for vision and cognitive impaired passengers to identify the stop at which to alight.

The way vehicles are driven can cause people difficulties: people with physical disabilities experienced discomfort and pain as a result of fast acceleration and braking; and drivers stopping the bus some distance away from the bus stop made it difficult for disabled people to board.

Participants also reported problems using the concessions they were entitled to, such as conductors refusing to allow the disabled person to travel free with a bus pass and insisting on payment. In some cases people with hearing impairments had received abuse when they failed to produce their bus pass because they could not understand or hear the request. In Malawi so-called “call-boys” who direct passengers to waiting minibus-taxis, were reported as being abusive towards people with disabilities. In other cases, participants said conductors had prevented them from boarding from the front rather than the rear, as they were entitled to do.

Little consideration was given to people with intellectual impairments, perhaps partly because their disability is “hidden”.

Communication

People with hearing and/or speech impairments frequently experience difficulty communicating with staff and other passengers. Where visual information such as destination signs on vehicles were absent (usually the case with minibus-taxis), such passengers had difficulty identifying the right vehicle to board. Sign language was not commonly understood. The possibilities for writing down requests for tickets or information were often limited by illiteracy among drivers, disabled people and other passengers. Complicated fare structures were also difficult for some people with disabilities to understand.

A general concern among the participants was that there was no way for a disabled passenger to communicate with the driver if they had difficulties.

Cost

High transport costs were highlighted almost universally as a significant barrier to mobility – especially since people with disabilities often have to bear higher cost burdens than their non-disabled counterparts.

The first issue relates to access to mobility aids such as wheelchairs, callipers, crutches, or hearing aids. Even where these are provided free of charge, maintenance costs can be prohibitive.

“The aid which we are supposed to get from the hospitals is not enough to sustain all the people in need. For example for one to get crutches, callipers or a wheelchair, it can take years, even just to repair these things.” (Physically impaired male, Malawi)

“Sometimes the wheels fall off [the wheelchair] due to rough terrain, and they can not be replaced in the village setting... or the quality is low due to a lack of finances.” (Disability sector worker, Malawi)

People with physical impairments, especially wheelchair users, were often limited to more expensive forms of transport because cheaper forms were inaccessible. In South Africa and Malawi, for instance, minibus-taxis were often the only mode accessible to ambulant disabled people, but this is also the most expensive option. In addition, taxis tended to charge disabled people extra for the space their mobility aids were taking up.

In some countries (such as Mozambique) concessions were available for people with disabilities, but these were restricted to some modes of transport. Interviewees in India felt that the eligibility criteria for free transport were often limited and the application procedure onerous. Participants in India had to produce proof of their disability, which was only available from one hospital, and renew their application every two years.

Many participants argued for an expansion of concessionary practices. Said one Mexican participant about his hometown of Querétaro:

“...it’s about 25 pesos a trip, 50 pesos for a round trip, and the minimum wage is 33 pesos a day ... The large buses charge either 4 pesos 50 cents or 6 pesos. Students and old people pay 2 pesos 50 cents. But there are no special rates for disabled persons” (Physically disabled person, Mexico City)

Concessions for escorts accompanying the disabled person were also requested.

3.2.2 Psychological barriers to accessibility

Some participants were self-conscious about their disability and avoided using some modes of transport or asking for assistance.

“I do not climb into six seaters because I am shy that people would come to know that I am deaf” (Female, hearing impaired person, India)

Concern about personal security was also a barrier for some of the participants. Female participants felt threatened by other passengers, as one participant explained:

“I am scared to sit in the special compartment for the disabled in suburban trains. Many times drunkards and other suspicious characters occupy it. I prefer to travel in the general ladies’ compartment even though it is extremely crowded” (Female, physically disabled, India)

Concern was also expressed about drivers of auto rickshaws or taxis. Participants were worried that the drivers would not take them to the right destination or would cheat them. Other people felt insecure moving around roads and sidewalks, especially in heavy traffic.

3.2.3 Structural barriers to accessibility

Information

Barriers to accessing information about transport were reported by people with all types of disabilities. People with sensory impairments often had difficulties identifying the correct vehicle to board, the correct fare to pay, or the point at which to disembark. Operators frequently did not display route numbers or destination signs prominently, and failed to illuminate them at night. People with visual impairments reported not being able to find the correct platforms or bays to board their train or bus, due to an absence of tactile and other information to guide them inside public transport facilities.

When information was provided people often encountered structural barriers. Signage and timetables were too small for vision impaired people to read and there was rarely information available in alternative formats. People with sensory impairments were often unaware of changes to the timetable or cancellations.

“If the platform number changes, I cannot hear the announcement. I only see everybody is moving away, and I get confused.” (Hearing impaired person, South Africa)

Wheelchair users indicated that route plans and timetables were often placed too high for them to see.

Vehicle Design

The design of trains, buses and taxis present major obstacles to their use by people with disabilities. Focus group participants identified firstly barriers which can affect all users of public transport, even non-disabled passengers. These included:

- High entry steps with high risers (particularly the first step from the ground –step heights in South African buses are typically up to 50cm from the ground);
- lack of sufficient grab rails at entrances and inside vehicles;
- narrow door openings;
- narrow aisles and seat spacing, hindering manoeuvring inside vehicles;
- vehicle floors were slippery or not level.

Some disabled passengers' needs were of such a nature that the issues listed above physically excluded them from entering the vehicle without help. Passengers with severe walking difficulties, and users of callipers, wheelchairs, and crutches, were mostly unable to enter buses independently.

“Wheelchair users cannot enter the micros -- even with help to get me on and off it is almost impossible as the doors are too narrow.” (Wheelchair user, Mexico City)

Some wheelchair users transferred from their chairs, and were either carried into the vehicle or crawled in; but problems were still experienced in finding space to stow wheelchairs. Entrances to train coaches were sometimes barred by narrow openings, and level changes between the platform and the floor.

Smaller vehicles such as minibus-taxis in Africa and six-seater auto rickshaws in India appear to offer somewhat better accessibility than large buses, as these vehicles have lower steps, more space to accommodate a folding wheelchair at off-peak times, and provide an almost door-to-door service. In India, for instance, physically disabled respondents with the financial means preferred auto rickshaws to buses, even though rickshaws charge higher fares.

An interesting design issue relates to the small Volkswagen beetles being used as door-to-door taxis in Mexico City. The practice of *removing* the front passenger seat to make space for luggage has rendered the vehicle inaccessible to a large number of passengers with mobility concerns.

“The small Volkswagen taxis don’t work for me because they have no front seat. I need a front seat to transfer to and from my wheelchair, using a board. The seat height is very important because it is easy for me to transfer straight across but impossible if the board is at an upward angle. The auto seat needs to be at the same height as my wheelchair seat.” (Wheelchair user, Mexico City)

Transport Infrastructure

Together with vehicle design, inadequate infrastructure design presents major structural barriers to the mobility of people with disabilities. Train stations, bus stops and stations, and the stops and ranks used by minibus-type vehicles are rarely designed with the needs of people with disabilities in mind.

People with physical disabilities reported being denied access to train and bus stations by the need to negotiate steps and stairs, by the absence of adequate seating and waiting areas, and by non-accessible amenities such as turnstiles, toilets and high ticket booths.

“...the gap between the car and the platform [on the metro] can be up to 10 cm. My front tyres can fall in the gap”. (Wheelchair user, Mexico City)

Bus stops that were not paved, provided too little space for wheelchairs to manoeuvre, or made use of slightly raised floors, prevented their use by wheelchair users. The absence of shelters at major bus stops affected some passengers with disabilities, such as people with albinism (lack of skin pigmentation) who needed protection from heat and sunlight when travelling.

Pedestrian Environment

The pedestrian environment often presents the first obstacle to making a trip. Problems reported by focus group participants were often a combination of faulty or inadequate design and construction practices, inadequate management of facilities, and natural features of the terrain.

In all the case study cities, the absence of adequately paved and maintained sidewalks limited the mobility of people with various disabilities. Uneven surfaces, garbage, and unkempt vegetation often forced people to use the road, which increased their vulnerability to injury. Kerbs were often difficult to negotiate for people with mobility devices. Focus group participants with visual impairments also pointed to the difficulty of identifying designated street crossings, knowing when it was safe to cross, and crossing the street within the allotted time.



Photo 2 The lack of adequate pedestrian infrastructure forces this wheelchair user in Maputo to cross the road at a dangerous location

Uninformed practices by authorities and the public created hazards for pedestrians with visual or physical disabilities. Examples included road works left open without warnings or protection; vehicles parked on footways; and vendors encroaching on footways and pedestrian areas. Indian participants, for instance, described how auto rickshaws parking in haphazard fashion caused them problems in reaching bus stops.

Natural conditions sometimes contribute to problems in the pedestrian environment. Examples include steep gradients of streets and footways, such as in the city of Blantyre, and very sandy conditions on unpaved streets in parts of Maputo, both of which limit the use of wheelchairs for travel.

Planning

Several access barriers experienced by people with disabilities relate to the planning of public transport networks and services. The absence of public transport in some areas restricted the mobility of people with disabilities, as it does for all passengers. Undersupply and overcrowding of vehicles exacerbated many of the problems experienced by focus group participants. It made it difficult to find a seat and move along the aisles to disembark. Transport staff were also unable to provide assistance in crowded vehicle or at peak hours.

In South Africa participants highlighted a lack of co-ordination between feeder and primary transport. Passengers had to walk long distances to the bus stop, rail station or minibus-taxi rank, or when transferring between modes.

Existing public transport services focused upon home to work trips with lack of access to other destinations such as medical care or education. This restricted all

passengers' access to these services, but impacted passengers with medical conditions more severely as they have greater travel needs for medical purposes.

4 INTERNATIONAL REVIEW OF CURRENT PRACTICE

The access barriers and needs identified by people with disabilities in the case study countries are remarkably similar to the needs and barriers previously identified, and occasionally still present, in the developed world. A large body of experience has been assembled in Europe and North America on how to address these barriers effectively. Given the similarities in character, if not in extent and detail, it is likely that many of the approaches and standards adopted in the developed world may be applicable, in part at least, to countries of the developing world. In fact, some countries of Latin America and middle/high-income Asia have started implementing accessibility improvements that are largely based on developed world standards. Home-grown experience is thus starting to emerge in some parts of the developing world, which may be very instructive in the search for appropriate solutions in others.

This section provides a summary of current practice in accessibility provision in Europe, Latin America, and where applicable, Southern Africa and India. Space does not permit a complete description of standards and approaches; the intention is rather to broadly highlight the state of the practice across the world. The detailed information gathered on standards and design specifications will be used in the later stages of the project to identify guidelines on appropriate interventions in developing countries. Some indications of European design standards are provided in Annex C for illustrative purposes.

In Latin America and Southern Africa, experience with accessibility provision is rather new. It would be premature to talk of *best* practice. The attention is thus focused on the range of *current* practices adopted, and indicating successful approaches where these have been identified with clarity. In Europe, due to the greater experience and research, consensus has more readily been achieved on what constitutes *best* practice; these are included where possible.

A review of technical approaches to access issues is inseparable from the legislative and organisational approaches underlying these interventions. This section thus deals with the following aspects of current practice:

- legislative approaches to access issues;
- consultation with people with disabilities;
- disability awareness training;
- provision of transport information;
- improvements to the pedestrian environment;
- improvements to transport infrastructure;
- improvements to vehicle design; and
- specialised transport for people with disabilities

4.1 Policy and legislative approaches to improve access

All the countries reviewed have some laws or regulations in place on accessible infrastructure and/or transport. In some cases (such as the UK and India) these laws are in the form of disability-specific legislation, which instructs various sectors of government (including transport) to improve the accessibility of services to people with disabilities. In other cases (such as South Africa) general anti-discrimination legislation forms the basis of government approaches to removing barriers to access.

Regardless of the approach followed, it is clear that the intent of the law is frequently not visible on the ground. Latin American countries such as Costa Rica and Argentina have been better at following legislation up with more detailed regulatory frameworks, instructing and guiding specific stakeholders on how to implement (and fund) the improvements required by the law. Others, including India, South Africa, and Malawi, have yet to decide on the detailed approach to be followed in practice.

4.1.1 European legislation

A number of European countries have introduced legislation governing the rights of disabled people or concerning accessibility to public transport or the built environment. This legislation has been summarised by the European Conference of Ministers of Transport, ECMT (ECMT, July 2000). The report highlights variations between countries: some have general civil rights legislation and others specific accessibility regulations. In some countries such as Belgium, Germany, Poland and Italy accessibility policy is regionalised.

In the UK, initial progress on accessibility was made through a variety of non-legislative measures such as the issuing of codes of practice and guidelines. Recently this approach was followed up by the introduction of legislation and access regulations. The Disability Discrimination Act (1995) created statutory rights for people with disabilities for access to employment, education, transport, goods and services and facilities. Part V of the Act gave the Government powers to make accessibility regulations for buses and coaches, trains and taxis. In 1998 the Rail Vehicle Accessibility Regulations came into force, followed in 2000 by the Public Service Vehicles Accessibility Regulations. These later regulations applied to vehicles with a capacity exceeding 22 passengers. Recommended specifications for small buses carrying 9 to 22 passengers were published in December 2001. Further regulations are planned for taxis. An informal consultation document detailing a specification for taxis was issued in 1997.

The ECMT report highlights that legislation alone cannot guarantee improved accessibility. It needs to be supported by guidance, information campaigns and training. Legislation requires support from all interested groups and industries, as well as enforcement. Legislation should also be evaluated and reviewed to assess its effectiveness against national objectives.

4.1.2 Indian legislation

India is a signatory to the Proclamation on the Full Participation and Equality of People with Disabilities, signed at the launch to the Pacific Decade of Disabled Persons (1993 – 2002) in 1993. This, in addition to lobbying from non-government organisations, led to the formulation of the Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995. This is the fundamental act in India protecting the rights of people with disabilities.

This legislation is intended to be implemented and monitored through co-ordination committees, both at central and at state levels. The committees are required to have at least five representatives from the disability sector. Apart from non-discrimination in accessibility, the Act also covers the following aspects:

- education
- community based rehabilitation (CBR)

- labour and employment

With regards to accessibility and transport, the Act instructs transport operators and government authorities to (inter alia):

- adapt rail compartments and buses to permit easy access to people with disabilities;
- install auditory signals at public roads;
- install curb cuts, ramps and slopes in pavements and public buildings to assist wheelchair users; and
- install engraving on the edges of railway platforms to assist people with visual disabilities.

The proviso for all these instructions is that it should happen *within the limits of the economic capacity and development* of the relevant institutions. This clause has been criticised as being open to abuse by government departments which fail to make adequate budgetary allocations for accessibility programmes (Jain, 2000). On the positive side, the Act has been credited with shifting public attention towards the needs of people with disabilities.

4.1.3 Latin American legislation

National Legislation and Regulations

In many Latin American countries, informal guidelines are being promulgated by NGO's and government agencies. These are normally limited to access to buildings and public spaces, but does sometimes involve at least some transportation recommendations as well.¹ Detailed work on bus stops, and the important relationship between transit stop infrastructure and the vehicles themselves, not to mention on-board standards, lags behind the far more developed field of access to buildings and public spaces such as sidewalks and crossings. The promotion of informal guidelines appears to be a factor in the building up of advocacy for more formal legislation and regulations which govern construction and vehicle specifications.

Over the past decade a number of formal laws or regulations have, however, come into place. A recent working paper submitted to the Inter-American Development Bank reports laws and regulations on accessible infrastructure and/or transportation in Argentina, Brazil, Chile, Colombia, Costa Rica, and Honduras (Dudzic et al., unpublished). Municipal legislation, such as that in Mexico City, is also beginning to be put in place. However, the presence of a legal framework does not imply that a detailed regulatory framework has been developed, and a regulatory framework may not imply that work plans to implement the these regulations are being carried out.

Standards

Different national accessibility standards for buildings and public space have come into being in Brazil (1985), Cuba (1991), Mexico (1993), Peru (1987), Argentina (1992) and Uruguay (1992), as well as other countries (Instituto Uruguayo de Normas Técnicas, 1998, p. 283). The degree to which these and other standards are actually followed is not always clear.

¹ These guidelines are found on web pages such as those of APRODDIS in Peru (www.aproddis.org) and Libre Acceso in Mexico (www.libreacceso.org)

4.1.4 Malawi legislation

The rights of all individuals are firstly enshrined in the Malawi Constitution. The Constitution prohibits discrimination on any grounds including disability. No other legislation specific to disability exists, except for the outdated Handicapped Persons Act (1971) which governs social welfare aspects of disability. It has been stated that “government legislation is virtually disability blind” (VSO, 2001, p.1). Disability issues are included in but a marginal fashion in a number of other laws.

A national disability policy is currently being developed. The policy recognises the almost complete absence of transport services for people with disabilities in Malawi, and suggests the need for rapid progress in developing a public transport system that is flexible and accessible.

“Without this, people with disabilities will continue to remain largely ‘invisible’ and unable to contribute to, or benefit from, the services and commercial activities available to most of their fellow citizens.” (Ministry Responsible for People with Disabilities, 2002)

The draft policy identifies the following groups of disabled people as experiencing high levels of discrimination:

- Women with disabilities
- Children with disabilities
- People with learning disabilities
- Elderly with disabilities

The issue of disability is included in the key policy statement of the existing Transport Policy of Malawi, where people with disabilities are identified alongside other vulnerable groups such as women, children, and the elderly. However no consideration is given to possible actions to address their needs. The Malawi Poverty Reduction Strategy Paper similarly identifies people with disabilities as one of the most vulnerable groups in society, and instructs legislation affecting people with disabilities to be placed within the context of poverty reduction.

4.1.5 Mozambique legislation

Disability issues are addressed, either directly or indirectly, in a variety of laws, including the Mozambican Constitution (1990).

Act 20 of 1999 established the Policy for People with Disabilities. The Policy is based on the constitutional principle of non-discrimination, and takes note of the following existing specific rights of people with disabilities:

- right to an independent life;
- right of integration into the family and the community;
- right of rehabilitation and access to compensation devices;
- right to general, special and vocational education;
- right to access to a workplace;
- right to benefit from measures of social protection;
- right to access to social services, enclosed spaces, public and private transport as well as reserved places;
- right to influence, individually or through representative organisations, in decision-making of subject-matters affecting people with disabilities;

- right to be informed and inform; and
- right of recreation.

The Mozambican Automobile Transport Regulation, 1989 (Act 24 of 89), establishes three important rights relating to people with disabilities. These are:

- people with disabilities are exempted from paying any tariff in urban transport;
- people with disabilities benefit from a reduced rate in inter-urban transport; and
- in urban transport, there will be reserved seats for people with disabilities.

A document called “Responsibilities of the State of Mozambique with Regard to Disabled People” has also recently been published. The document brings together the relevant policies, laws and strategies affecting and/or with regard to disabled people (MMCAS, 1998).

4.1.6 South African legislation

South Africa has no law dealing specifically with disability, opting instead for inclusion of disability issues in all relevant sectoral policies and legislation. Sectoral responses are meant to be guided and coordinated through the Integrated National Disability Strategy of 1997.

Major legislative and policy initiatives include:

The South African Constitution (1996)

The Constitution outlaws any form of discrimination on the basis of, amongst others, disability.

Promotion of Equality and Prevention of Unfair Discrimination Act, 2000. No. 4 of 2000.

The Act defines unfair discrimination on the grounds of disability, as (Section 9):

- (a) denying or removing from any person who has a disability, any supporting or enabling facility necessary for their functioning in society;
- (b) contravening the code of practice or regulations of the South African Bureau of Standards that govern environmental accessibility;
- (c) failing to eliminate obstacles that unfairly limit or restrict persons with disabilities from enjoying equal opportunities or failing to take steps to reasonably accommodate the needs of such persons.

Although no cases are known where these laws have been used in non-compliance litigation, they do present fairly strong mechanisms for promoting inclusion of people with disabilities into policies and programmes both of government and civil society.

Integrated National Disability Strategy (INDS), 1997

The South African Government’s official policy framework for disability equity adopted a socio-political approach to disability, whereby disability is located in the social environment. Its policy objective with regard to transport is

“... to develop an accessible, affordable multi-modal public transport system that will meet the needs of the largest number of people at the lowest cost, while at the same time planning for those higher cost features which are essential to disabled people with greater mobility needs.” (Office of the Deputy President, 1997, p.32)

Transport and built environment regulations

The **National Land Transport Transition Act**, 2000 (Act 22 of 2000) requires the needs of people with disabilities to be considered in the planning and provision of public transport infrastructure, facilities and services. It also states that these needs should as far as possible be met within the mainstream public transport system. It does not prescribe specific standards for vehicles or transport infrastructure. According to the accessible transport strategy currently being developed, it is proposed that an incremental strategy be followed, by concentrating first on improving accessibility in urban areas, and by focusing on specific high-priority corridors within each urban area as a first step (National Department of Transport, 2002).

The **National Building Regulations** sets national requirements for an accessible built environment. The Code of Practice² requires that accessibility should be provided from the outside of any building to at least the ground floor. These regulations also apply to transport interchanges. The regulations are not always enforced, resulting in a somewhat haphazard standard of accessibility provision

4.2 Consultation and advocacy

In probably all countries where progress has been made with disability issues, it has been characterised by vigorous advocacy by and consultation with disability groups. Advocacy and consultation takes place mainly through two (interlinked) channels, namely through formal consultative bodies, and non-governmental advocacy groups.

4.2.1 Formal consultative bodies

An ECMT document details consultative arrangements in its member states (ECMT, July 2000). National consultative bodies exist in a number of countries, including Belgium, Denmark, Finland, France, Greece, Norway, the Netherlands, Romania, Sweden, Switzerland and the UK, whilst Germany consults with many different organisations.

The remit of the consultative body may be general, or may be limited to transport issues as in France, Sweden and the UK. Membership of the bodies includes people with disabilities.

Both COLITRAH (renamed COLIAC, the Liaison Committee for Accessibility of Transport and Buildings) in France and DPTAC (the Disabled Persons Transport Advisory Committee) in the UK provide technical guidance on accessibility issues. Both organisations have a role in defining and monitoring transport accessibility policies.

Although not statutory organisations, umbrella organisations for a variety of disability NGOs exist in numerous other countries, including Mexico (e.g. Council of Persons of Disabilities of Jalisco), South Africa (Federal Council on Disability), and Mozambique (Forum of Mozambican Associations of the Disabled). These bodies act as fora where various national welfare organisations and organisations of disabled people and parents come together to negotiate and develop common

² South African Bureau of Standards, *Code of Practice for the Application of the National Building Regulations*, Part S, SABS 0400-1990.

positions on issues related to disability. These organisations then appear to be in a good position to consult with government on any issue.

Highly effective consultative bodies have been noted at the municipal level, such as in Rio de Janeiro and Mexico City.

The European standard is that disabled people should be consulted at all stages of the process of providing transport services, including the design stage (ECMT, May 1999).

ECMT recommends that consultative bodies have an equitable representation of all the main interest groups: administrators; operators; vehicle equipment and manufacturer suppliers; and associations for people with disabilities (with different kinds of disabilities). This allows all aspects of disabled people's travel to be considered and preserves a consensus approach.

4.2.2 Advocacy and political influence

In Latin America in particular, disability NGOs such as Mexico's *Libre Acceso* and Rio de Janeiro's Center for Independent Living (CVI) fulfil both a watchdog role (actively campaigning for change), and a promotion role. A lawsuit brought by CVI has, for instance, resulted in a court order that has led to making Rio's subway stations accessible. CVI also played a leading role in projects to provide accessible pedestrian infrastructure in the city, and in 2000 published a guide that rates the accessibility of civic, cultural, education, health, transport, and tourist facilities.

Advocacy seems to lag behind in many other developing countries. India's Persons with Disabilities Act (1995) has been instrumental in promoting a change in attitudes within disability NGOs from a pity-based to a rights-based approach. Equal access is only slowly being viewed as something that should be demanded and not requested.

The political influence of people with disabilities appears to be growing in some developing countries, where offices for disability affairs are being established at the highest government level. Examples include the Office on the Status of Disabled Persons in South Africa's President's Office, the Ministry Responsible for People with Disabilities in Malawi (a Cabinet-level Ministry), and Mexico's Office for the Promotion and Social Integration of Persons with Disabilities. These offices appear to be effective at starting to create an awareness of disability issues within government, but by and large their ability to promulgate integrated policies and, more importantly, to source adequate funding for implementation, is still open to question.

4.3 Disability awareness training

The training of public transport staff and managers has emerged as an important aspect of delivering accessible transport services in Europe. Many European countries have developed disability awareness training courses, and regularly train drivers of buses, taxis, and accessible minibuses (Annex C).

The UK's DPTAC recommends that disability awareness training courses should include (DPTAC, September 2000):

- Barriers faced by disabled people, covering attitude, environment and organisation

- Principles of access audits
- Suggestions for removing barriers faced by disabled people
- Information on all disabilities, including hidden disabilities
- Enabling staff to deal with unexpected occurrences – to ‘think on their feet’ when a problem arises
- Communication and interpersonal skills for communicating with disabled people, particularly those with a hearing impairment or with learning disabilities.

The Federal District of Mexico City partners with the private sector to include disability awareness training in weekend driver instruction programmes for bus and taxi drivers. This training is a requirement for the issuing of a license to any of the 180,000 drivers. As of March 2002, the training was to include 10 hours of instruction on relating to passengers who are disabled, seniors, women, or young people, using materials prepared by the government social service agency.

In Africa the training of jitney or minibus-taxi drivers is almost totally lacking, as these modes often operate outside the ambit of government control. However, efforts are being made in South Africa to train drivers on a voluntary basis on disability awareness issues, through the involvement of taxi collectives.

4.4 Information Provision

Experience in developed countries has shown that, in order to travel independently, it is important that information is available for older and disabled people about the whole journey. This is especially important when a transport system is partially accessible for disabled people.

The UK guide *Let's make it accessible: Improving government information for disabled people* gives a checklist on implementing a policy to provide accessible information (DfEE and COI, February 2001). This includes developing a strategy, consulting with users and anticipating their needs such as what information they will require in alternative formats. It highlights that information aimed specifically at disabled people should be given priority.

To ensure information is available for vision and hearing impaired people information should be provided in both audio and visual formats. Induction loops can be installed to enable people using hearing aids to hear audible announcements more easily. Under the UK Rail Vehicle Accessibility Regulations 1998 new trains must have audio and visual announcements. Large print versions of published information and timetables should also be available. Whatever form information is provided in it should be:

- clear;
- concise;
- accurate, and
- timely (Dejeammes et al., 2001; ECMT, 1999).

Standards on the legibility of timetables, books and leaflets have been published by various sources (see Annex C).

In developing countries the levels of literacy in the population are low, especially among people with disabilities. The benefits of improved written information and guides will therefore be limited, and other forms of communication should additionally be considered. The use of symbols in signage is recommended even in Europe, to

overcome problems of illiteracy as well as language barriers affecting visitors and tourists. In South Africa, a good practice is the use of hand signals by passengers of minibus-taxis to convey destination information to drivers. This practice benefits both illiterate and hearing/speech impaired passengers.

4.5 Pedestrian environment

Most people will start and finish a journey as a pedestrian. It is therefore essential that the pedestrian environment is accessible for disabled people. A number of national guidelines and standards exist relating to the pedestrian environment (Annex C). Major elements that have been addressed include:

Footways and pedestrian areas

Footways should be sufficiently wide enough, have a level surface, and be slip-free. Gradients should be limited to allow users of manual wheelchairs to negotiate them easily, and where this is not possible, level resting areas should be provided at 10 metre intervals. The footway or pedestrian area should also have a clear pathway, free of obstructions, street furniture, and overhanging trees and bushes.

The value of high quality footways has been demonstrated in Maputo, Mozambique, where approximately 4 kilometres of paved footway has been provided next to Via Rapida, a major arterial. The footway is on level with the road surface, but separated from it by a low kerb. At intersections the kerb is opened to allow for the access of non-motorised vehicles.

Road crossings

The use of dropped kerbs or kerb cuts is fairly widespread in Europe to allow wheelchair users and visually impaired people to cross between roads and sidewalks. This practice is also good universal design, as it serves many other passengers (for instance those with luggage or pushchairs). Dropped kerbs were installed along some key streets before transit access was even on the agenda in Costa Rica, Mexico City, and Rio de Janeiro.

Good practice that has been observed in South Africa in urban renewal projects includes the use of raised walkways across busy streets. These walkways provide both a continuous travel path for the pedestrian (i.e. no level change between the footway and the walkway), and improved safety for the pedestrian, by slowing down traffic and delineating the walkway as a pedestrian facility.

Tactile and audible signals

Tactile paving is used in a numbers of countries to enable vision impaired travellers to walk independently and safely. In the UK in particular, tactile paving is used at dropped kerbs to warn the visually impaired pedestrian of the road crossing. The UK also has 6 other surfaces, each with their own meaning (e.g. guidance path, platform edge warning). Continuous tactile guideways are very common along sidewalks in major Asian cities, and have also been used in upgraded rail stations in countries in Latin America. These guideways rely on tactile contrast with the surrounding pavement to guide pedestrians with low or no vision and should also be contrasting where possible.

Audible traffic signals are in use in cities of Europe and North America. These help visually impaired people to identify when it is safe to cross the street, or to identify the control box for the pedestrian crossing.

Street works

Guidelines exist for the safeguarding of temporary streetworks, to prevent them from posing a hazard to disabled pedestrians, particularly those with visual impairments. The UK New Roads and Street Works Act, 1991 details minimum measures which should be undertaken and are enforced.

Seating

Seating should be provided at regular intervals to provide resting places. The distance quoted in European guidelines ranges from 50 to 100 metres.

4.6 Transport Infrastructure

Various approaches have been followed towards the way in which infrastructure and vehicle design is combined to provide an accessible service. Common approaches have emerged in Europe towards the most common infrastructural elements such as bus stops, bus and rail terminals and interchanges (Annex C). Yet different approaches have been followed in some Latin American countries, as indicated below.

Rail and bus terminals and interchanges

It is now common practice in North America, Europe and parts of Latin America to design and build new terminals and interchanges to be fully accessible. Accessible features include ramps and lifts as well as stairs; accessible toilets and ticket booths; and platforms that are level with coach floors to provide direct access by wheelchair users. For example, São Paulo State has an Inter-American Development Bank (IDB) loan to build twenty new accessible bus terminals.

Efforts have also been made to retrofit existing stations, although this is usually a costly undertaking. Most major subway or metro systems in South America have a dozen or more accessible stations, including Buenos Aires, Rio de Janeiro, and Santiago.

In these systems stair lifts are more commonly used to overcome large level changes, but some disability leaders have noted concerns about inadequate staff training and maintenance to keep the lifts functional. These issues may not be as serious with elevators, which cost more to install, but better exemplify universal design and would attract higher usage by non-disabled passengers.

Universal design in bus systems

Access to vehicles has been considered in the design of the express bus system of the city of Curitiba, Brazil. 81 stops have raised platforms served by ramps for all passengers or occasionally by lifts, where needed, for wheelchair users. Passengers board the buses at floor level via bridge pieces that are automatically lowered as

buses pull up to the stop. Wheelchair users board with no delay and position themselves in a clear area opposite the doorways. Interesting to note that access by disabled passengers was not a major factor in design of the bus/platform interface.

This approach has now been replicated elsewhere, including Quito (Ecuador), and Bogotá (Colombia).

Bus stops

Stops to regular buses can be constructed or improved to be user-friendly to ambulant disabled passengers, even if no wheelchair access is provided. Provision of a sufficiently wide, paved area with seating and shelter is considered good practice. The standard kerb can be raised to a height of 160mm to decrease the height of the first step into the bus. The edge of this kerb should be colour contrasted for the safety of vision impaired passengers. Enforcement of no-parking areas is also important to allow buses to draw up close enough to the kerb.



Photo 3 Low-cost wayside platform built by participants in a rural rehabilitation centre in Projimo, Mexico. Photo by Health Wrights

Ranks and stops for minibus-taxis

Although no standard accessibility guidelines have been adopted, ranks for minibus-taxis in South Africa have incorporated some design features which improve their user-friendliness. A well-designed lay-out that clearly separates vehicular from pedestrian movement, and designates permanent departure points for different destinations, is already a major improvement on the chaotic conditions usually existent at informal ranks. Additional amenities such as rest areas, accessible toilets, and good signage sometimes provide further benefits.

4.7 Vehicle Design

The variety of approaches adopted towards the specification of accessible vehicles across the world partly reflect the variation in development paths and operating conditions across countries. Low-floor buses are now common in Northern Europe. North American cities predominantly use higher-floor buses with lifts, while experiments on various floor heights and lifting/ramp technologies are ongoing in Latin America and South Africa. In other developing countries significant questions remain regarding appropriate solutions to the inaccessibility of minibus-taxis and rail carriages.

Buses

The European Commission has been involved in technical harmonisation of vehicle construction standards for buses and coaches. The EU 'Bus and Coach' Directive³ (COM(97)0276), currently in draft form, will require vehicles with more than 8 seats in addition to the driver operating on urban services to be accessible for people with reduced mobility. Once adopted the directive will establish a minimum construction standard for EU type approved vehicles. The current specification requires vehicles to be of low-floor bus design and will require all class 1 urban buses to be fitted with a ramp or a lift in addition to a kneeling system.

Accessible features common to all vehicles, aimed at improving their general usability to all passengers including ambulant disabled passengers, include low step heights, hand rails for boarding, prioritised seating, high contrast colours on steps and handrails, and audible/visual announcements. Latin American regulations also prohibit the use of turnstiles on buses. Best practice specifications are summarised in Annex C.

Low floor buses use a kneeling system (lowering the suspension) to reduce the step height for passengers boarding and alighting. In addition to this, a ramp or lift can be used to provide level access into the vehicle. Infrastructure changes such as increasing the height of the kerb can also be implemented to reduce the height further. In the UK research has been conducted on ramp design and angle (Elliott and Savill, unpublished).



High-floor buses are more difficult to provide with wheelchair access. The approach used in Mexico City was to deploy 50 buses with lifts located in a dedicated rear door, deployed on six routes serving accessible metro stations. In South Africa similarly, equipped buses have been used in demonstration projects in peri-urban areas. These types of solutions may be appropriate where deteriorating road conditions are common.

Photo 4 Lift-equipped high-floor bus, Pretoria

The safety of wheelchair users travelling seated in their wheelchair should be considered, where practicable. Research at TRL is examining the restraining of wheelchairs and their occupants in road vehicles, including buses and taxis, and is identifying requirements for legislation and guidance to ensure wheelchair occupants are afforded the same level of protection in the event of an accident as other passengers in the vehicle.

Taxis and jitneys

Guidelines have been passed for purpose-built vehicles, minivans and MPVs which can operate as taxis in European countries, to allow boarding and transport of a

³ Council directive amending Directives 70/156/EEC and 97/27/EC (C5-0278/2001 - 1997/0176(COD))

passenger seated in their wheelchair. In Finland a proportion of the fleet should be of this type.

In Mexico City the issue of accessibility of minivan taxis (*micros*) is partly being addressed through a government-led programme to scrap and replace existing vehicles with newer, larger ones. The new vehicles have many of the features mentioned for buses above (see Annex C). These design elements can be considered as low-cost improvements with potentially high impacts, as they assist the 90 to 95% of disabled passengers who are not wheelchair users. In addition, the design of some of the vehicles may also lend itself to access for wheelchair users via ramps or wayside structures. The same is true for the current design of combis used as taxis in the states of Mexico and Puebla.

Some *micro* operators in Mexico City have been found to install an additional step under the first step to assist passengers in boarding the vehicle. This extra step halves the distance to the first step to only 20cm from the ground. This low-cost modification meets the step height requirement in DPTAC's Accessibility Specification for Small Buses recently issued in the United Kingdom (DPTAC, November 2001).

A recapitalisation programme is also being planned in South Africa, with the replacement of 120 000 minibus-taxis with larger, custom-built vehicles. It is intended that improved accessibility features be included in these designs (see Annex C). However, the recapitalisation option is likely to be outside the financial capacity of most developing countries.



Photo 5 Extra step installed under front door of *micro*, Mexico City

Trains

European specifications for train coaches govern aspects such as entrances, provision of wheelchair spaces, steps and flooring (Annex C).

In India it is current practice to construct a special compartment in suburban trains that is reserved for the use of passengers with disabilities. The compartment is primarily aimed at ambulatory people, as it has entrance steps and lacks space for wheelchair securement.

4.8 Specialised transport services

No fixed-route system can meet the needs of all disabled persons. Some disabilities lead to functional impairments which require specialist door-to-door transport.

Government-subsidised door-to-door services are the norm in North America and Western Europe, where they complement accessible fixed-route services. Sao Paulo, Brazil, operates a system of 102 accessible vehicles, while Cape Town, South Africa, is soon to introduce a metro-wide network using 15 vehicles. Use of door-to-door systems typically require pre-registration of qualifying passengers. Best practice in eligibility certification uses a functional approach that is not primarily based on the type of disability but rather on the impact of the disability on the

passenger's ability to use other forms of public transport. Door-to-door services have the drawback of being relatively expensive, and probably outside the affordability range of most developing countries.

An innovation originating in Sweden and adopted in some other countries is the service route concept. Service routes are special routes designed to connect origins and destinations used by people with disabilities, and served by (usually smaller) fully accessible buses. Disability activists in Mexico, Eastern Europe and other areas have advocated service routes as a first step in the absence of accessible fixed route bus or door-to-door services.



Photo 6 Specialised vehicle adapted by NGO for wheelchair use, Pune, India

In South Africa a service route demonstration project connecting outlying residential areas with the Durban CBD proved to be reasonably successful, and less expensive than door-to-door options.

5 DISCUSSION AND RECOMMENDATIONS

The main issues emerging from the above overview of access and mobility in the developing world include the following:

The needs of people with disabilities need to be addressed if poverty alleviation strategies are to be successful

The reviews from Africa and India highlighted the important link between disability, poverty, and the lack of access to opportunities in developing countries. People with disabilities constitute a large proportion of the poor in the developing world. If the internationally agreed targets on reducing poverty are to be reached, it is critical that specific measures be taken to reduce the societal discrimination and isolation which people with disabilities continue to face. Improving their mobility and physical access to education, employment, and social services necessarily needs to be a part of such a strategy.

Disability issues are increasingly on the political agenda in developing countries

Progress is being made with the adoption of disability rights legislation in many countries. As a result the awareness among governments and civil society of the needs and rights of people with disabilities is growing. However, what is patently

lacking in many cases is a framework for action to remove the barriers infringing on these rights. Organisations of Disabled People are growing in political power, but in many cases lack skill and resources to advocate more effectively for change.

The body of knowledge regarding accessibility to the built environment and to transport is growing

The adoption of the United Nation's *Standard Rules on the Equalization of Opportunities for Persons with Disabilities* in 1994 signalled the achievement of broad international consensus on how issues of disability are to be addressed. European and North American countries already have a long history of accessibility awareness. First steps in addressing mobility barriers have also been taken in many countries of Latin America and Asia, focusing firstly on environmental access, and to a lesser extent on transport. Technical standards on access to transport are converging across developing and developed countries, albeit with local variations.

Yet the vast majority of people with disabilities in cities in the developing world have no affordable access to public transport

Given the economic deprivation of many people with disabilities, high transport costs are a first mobility barrier for many. Costs and inefficient delivery mechanisms prevent many from having the basic mobility aids they need, such as wheelchairs and crutches. Secondly, transport problems afflicting all users of public transport, such as poorly designed vehicles, overcrowding, and poor customer service, become insurmountable obstacles to people with disabilities, as they have fewer alternatives. Thirdly, some people with disabilities have specific needs which are different from those of non-disabled people, and differ according to their type of disability. Yet most improvements that would benefit passengers with disabilities will also benefit all other users of transport services.

The resource and institutional constraints under which most governments and transport providers operate dictate that an incremental approach be followed to improve the accessibility of their services

It is recommended that high priorities in improving access and mobility in developing countries should include:

- Improvements to the pedestrian environment, such as footways and road crossings, as these often present the first barriers to travel;
- Promotion of disability awareness and training of public transport drivers and conductors, to improve the assistance they offer passengers with particular needs;
- Implementing low-cost, high-impact features in vehicles, such as sufficient grab rails, high contrast colour on step nosings and grab rails, large print destination signs, and reserving seats for passengers with disabilities;
- Improvements to the infrastructure such as seating and shelters at bus stops/train platforms, high contrast colour on step nosings and hand rails;
- Prioritised planning targeting the above improvements initially at high priority locations and routes, in a way that addresses all stages of the travel chain;
- Provision of information on all stages of the travel chain in accessible formats.

Further experimentation and demonstration projects can be very valuable in finding appropriate solutions and leveraging political will

Many questions remain regarding the technical and operational solutions that are appropriate under various conditions; and the order in which improvements should be made to achieve the highest impact at the lowest initial cost. An effective way of addressing some of these questions may be through small-scale demonstration projects in selected cities, which are low-cost enough to be easily replicable by local stakeholders if they are successful.

Demonstration projects could implement low cost measures, such as those described above, on selected routes. Measures required to make the whole journey more accessible, from door to door, should be considered including:

- Information provision prior to and during the journey;
- The pedestrian environment;
- The use of colour contrast in vehicles and infrastructure; and
- Driver Training.

Experimentation on low cost adaptations for vehicles could also be explored such as the use of various types of external or retractable steps to reduce the ground-to-first-step distance on existing vehicles.

Such demonstration projects can furthermore be useful in building capacity among local disability groups and government authorities to work together on access issues for people with disabilities.

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ANNEX A: LOGICAL FRAMEWORK

Narrative summary	Measurable indicators	Means of verification	Important assumptions
<p><u>Goal:</u> Improve the mobility of rural and urban poor for meeting their livelihood needs</p>	<p>1. Mobility barriers and needs quantified 2. Indicators for comparing accessibility criteria of transport investments</p>	<p>1. International comparison of barriers and needs 2. Comparison of investment criteria across global funding sources</p>	<p>No Input required</p>
<p><u>Purpose:</u> Develop a compendium of guidelines and standards for improving the access of disabled people to transport and other services in urban and peri-urban areas</p>	<p>Local authorities, disability advocacy groups, and donor agencies in collaborating (and other developing) countries adopt guidelines for use within two years of project completion</p>	<p>Verify adoption and use of guidelines</p>	<p>That local authorities and advocacy groups in least developed countries have sufficient resources to start addressing special needs issues</p>
<p><u>Outputs:</u> 1. Compendium of guidelines to achieve improved access, including: a) Manual on formulating integrated special needs policy through consensus building between government and NGO groups; b) Video/slideshow material for facilitating stakeholder engagement and creating political awareness; c) Design guidelines of suggested best practice to improve access to transport and buildings in developing countries. 2. Successful dissemination of material and training in its use 3. Small-scale demonstration projects launched in South Africa, and Malawi, Mozambique, or India 4. Increased awareness and coordination among int'l funding sources regarding accessibility criteria for transport projects</p>	<p>1. A final report recording the project method, findings, and lessons learnt, published by TRL 2. Compendium of material including audio-visual and text material 3. Electronic dissemination of compendium via CSIR and TRL websites and possibly electronic conference 4. Local workshops to disseminate findings 5. Small-scale demonstration projects launched in South Africa, and Malawi, Mozambique or India 6. Papers for journals and/or conferences 7. Increased research capabilities of the Mozambican, Malawian and Indian collaborators 8. Position paper assessing accessibility criteria for donor funded transport projects</p>	<p>1. Number of reports requested through CSIR and TRL libraries 2. Number of copies of the compendium distributed and requested 3. Number of participants attending workshops, and their evaluation of the event 4. Monitoring and evaluation of the demonstration projects by CSIR and TRL 5. Conference proceedings 6. Local collaborators co-author and present papers 7. Number of funding agencies cooperating</p>	<p>1. That international best practice and further research within the project budget produce relevant and robust guidelines for low-income countries 2. That small-scale demonstration projects confirm relevance and effectiveness of guidelines</p>
<p><u>Activities:</u> 1. Project design 2. Assess status quo in participating countries regarding policy/legal framework, capabilities of</p>	<p>1. Quarterly progress reports to monitor project activities 2. Working reports on status quo situation in</p>	<p>Management information sources, and the normal reporting procedures required by DFID</p>	<p>1. Participation, capability and commitment of collaborating organisations remains</p>

<p>disability sector</p> <ol style="list-style-type: none"> 3. Assess characteristics of disabled population and mobility needs/barriers through surveys/focus groups 4. Benchmark studies of best practice in Africa, Latin America, Europe and India 5. Assess gaps in best practice with respect to developing world conditions 6. Develop locally applicable methods, standards, solutions, including policy development, stakeholder engagement, data collection and problem identification, design of accessibility improvements to pedestrian, transport and built environment, and implementation, monitoring and evaluation of improvements. 7. Undertake local workshops for dissemination of material and training 8. Examine and compare accessibility criteria of funding agencies 9. Launch small-scale demonstration projects to validate and refine material 10. Preparation and dissemination of final material 	<p>South Africa, Malawi, Mozambique, and India</p> <ol style="list-style-type: none"> 3. Working reports on best practice in developed and developing countries 4. Working report on additional research undertaken on locally applicable guidelines and standards 5. Draft compendium of material produced 6. Assessment reports of small-scale demonstration projects completed 7. Final compendium of guidelines and standards produced 		<p>stable</p> <ol style="list-style-type: none"> 2. Data and key informants can be accessed in collaborating countries 3. Additional data collection can be completed timeously 4. Political and social environment allows successful planning and implementation of small-scale demo projects 						
<p><u>Inputs</u></p> <p>TRL staff: Dr D Maunder for 80 days Mrs T Savill for 95 days</p> <p>Collaborators: Dr C Venter for 105 days Mr M Mashiri for 133 days Mr T Rickert for 90 days Local collaborators in Malawi, Mozambique and India</p> <p>CSIR's Media services for production of visual/text material</p> <p>Travel & Subsistence: Visits to South Africa,</p>	<p>Performance budget</p> <p>FY</p> <table border="0"> <tr> <td>01/02</td> <td>£125,978</td> </tr> <tr> <td>02/03</td> <td>£143,056</td> </tr> <tr> <td>03/04</td> <td>£151,295</td> </tr> </table>	01/02	£125,978	02/03	£143,056	03/04	£151,295		
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Malawi/Mozambique, and India from TRL; Malawi & Mozambique from South Africa; South Africa and India from San Francisco; Visits to TRB, CODATU and local workshops by team members			
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ANNEX B: METHODOLOGY AND COMPOSITION: FOCUS GROUPS WITH PEOPLE WITH DISABILITIES

India

In India the city of Pune was selected as the case study location. In Pune city the disability movement is relatively active with various disability associations playing a key role as far as rehabilitation of persons with disabilities was concerned. Focus groups discussions were conducted at the following organisations:

- **Pune Blind Men's Association**, which concentrates on rehabilitation of the blind. The group consisted of fifteen respondents nine of whom were males. Most of the respondents were from the lower income group. They travelled mostly for work purposes and by bus (Pune Municipal Transport).
- **Queen Mary Technical Institute**, that is dedicated to the cause of training and rehabilitating disabled soldiers. The focus group here consisted of 12 soldiers and 2 ladies with locomotor disabilities.
- **Deaf school at Chinchwad**, which is a special school educating students with hearing impairments. The children are mostly from the lower socio economic strata. Interactive discussions were held with students of the age group 15 – 16 (now studying in Std. 6th & 7th) and with their teachers (who too were deaf and dumb).
- **Sir Parhurambhau (SP) College**, a prestigious academic institute, which admits disabled students. The group consisted of eight students including 2 girl students. Two of the lot were polio / orthopaedic affected while the others were blind. All of them were studying in second or third year of graduation.
- **Pune Deaf Association**, a voluntary group that meets twice in a month to address various issues concerning the hearing impaired. The research team conducted a focus group discussion during one such meeting. An interpreter was used to facilitate communication. There were 26 participants 12 of who were females. The age group of the participants was between 25 and 40. Most of them were employed with decent salaries.

The disabilities thus covered by the focus group discussions were:

blindness;
orthopaedic disability; and
deafness.

The basis of choosing the above-mentioned organisations for conducting focus group discussions regarding accessibility was mainly that it provided different perspectives to accessibility. For instance, the Pune Blindmens' Association had as its members, persons from the lowest economic strata struggling for their daily survival whereas the blind students of the SP college were from the middle income group and were aware of their fundamental rights. Similarly, the soldiers of Queen Mary technical institute were coping both physically and psychologically with disabilities acquired by them during the past two years as a result of injuries during the course of war whereas the orthopaedically disabled students of SP college were affected right from their childhood days.

The discussions focussed on the following modes of transport:

public bus transport;

suburban rail transport;
auto rickshaws;
six-seaters; and
personalised modes (such as wheelchairs and tricycles).

All attempts were made to involve both genders in the discussions since women with disabilities could be facing different types of accessibility problems than their male counterparts.

Apart from focus groups, interviews were also conducted with representatives of the cross-disability network **DisabilityNet** in order to obtain their views and recommendations regarding measures to make the built environment accessible. The project team also interacted with officials of the bus service providers **Pune Municipal Transport** and **Pimpri Chinchwad Municipal Transport** to verify whether they are planning to make bus travel more accessible than what it currently is.

Mexico City

Mexico City was added as a case study area during the course of the project, in order to study its approach to the accessibility of jitneys or *micros*. The needs analysis was not a major focus of the work done in this city.

However, the opportunity arose to involve disabled users of public transport in a focus group discussion prior to a regular monthly meeting of **Libre Acceso** (= *Full Access*), Mexico's City most active disability NGO. The group was largely composed of persons with mobility disabilities: the 8 participants included 4 wheelchair users, 3 semi-ambulatory persons (one used a cane, two used different types of crutches), and one person with reduced vision. The wheelchair users varied greatly in upper body strength. Six of the focus group participants lived in Mexico City and two lived in Querétaro, the capital of the Mexican state of Querétaro.

In addition, the National Consultative Council for the Integration of Persons with Disabilities in Mexico has declared the elimination of the following physical and attitudinal barriers as having special priority in response to input obtained from seven major disability NGOs and institutions serving disabled persons.⁴

The fundamental problem is the lack of sensitivity of the population toward persons with a disability, resulting in a critical need to carry out a public information campaign using . . . radio, television, film, newspapers, magazines, etc.

Another concern is that drivers of land-based transport vehicles are ignorant of regulations and in most cases fail to provide courteous service to disabled passengers. This concern should be addressed by training and sensibility awareness sessions.

Society in general fails to respect spaces prioritized for those with visual and mobility disabilities in urban buses and the Metro.

Taxi drivers, when they see a disabled person, react in two manners:

⁴ *Informe de Actividades: Cuarta Reunion Bimestral de la Subcomisión de Accesibilidad (Report on Activities: Fourth Bimonthly Meeting of the Subcommission on Accessibility)*, Colegio de Ingenieros Civiles de Mexico, A.C., September 11, 2001. Translated and summarized by T.E Rickert.

- a minority of drivers stop and provide attentive service
- a majority of drivers pass up the intending passenger

Urban public transport vehicles do not stop at designated areas to board or deboard passengers. The first step is too high, making it almost impossible for disabled passengers to board.

Getting on or off the buses and micros is dangerous for disabled persons, since vehicles tend to start up before everyone has gotten off and do not have adequate hand grasps for passengers to stabilize themselves, in addition to the problem presented by the high final step.

Passengers with disabilities in air terminals are not well served in terms of waiting areas and travel between waiting areas and their flights.

Passengers with guide dogs are sometimes detained and not permitted to have access to their flights and to buses with their dogs, even though the law permits this.

Malawi

The needs assessment study of transport and mobility issues for people with disabilities was carried out in the City of Blantyre, Malawi. A number of approaches were used, including:

Individual Interviews

Individual interviews were conducted with 66 persons with disabilities stratified as follows:

33 males and 33 females

63 individuals had single disabilities and 3 had multiple disabilities

33 individuals were physically disabled, 20 had visual impairment, 7 were albino, 5 hearing impairment, 1 was physically disabled and had a hearing impairment, 1 was blind and had a hearing impairments and 1 had both visual and hearing impairments
2 had never attended school, 37 had attended primary school but not secondary, 22 attended secondary school, 2 had completed third level education and 4 did not provide information on their educational attainment

37 were salaried employees, 9 ran small-businesses, 9 were unemployed, 5 worked at home and/or on the their own farm, 2 were beggars, 2 were students, 1 was retired and 1 was looking for work

Of the 37 who were salaried employees, 25 worked for disability organisations and 26 were skilled employees such as weavers, carpenters and machinists.

Key Informant Interviews

Key informant interviews were undertaken with representatives of 17 key organisations, stratified as follows:

7 disability member associations

4 disability service organisations

4 state bodies (3 Ministries and 1 city assembly)

2 transport associations

Focus Group Discussions

Focus group discussions involving 26 persons with disabilities were stratified as follows:

One parents group consisting of 9 mothers

One women's physically impaired group consisting of 4 females

One men's physically impaired group consisting of 5 males

One deaf individuals group consisting of 2 males and 1 female

One women's physically and visually impaired group consisting of 5 females
One women's physically impaired group consisting of 3 females

Individual Interviews with Parents of Children with Disabilities

Individual interviews with 7 parents of children with disabilities stratified as follows:

Two mothers of mentally challenged girls
One mother of an albino girl
One mother of a physically disabled boy
One mother of a physically disabled and mentally challenged girl
One mother of four albinos; two girls and two boys
One father of a physically disabled girl

Individual Interviews with Taxi Drivers

Individual interviews with 3 taxi drivers (all male)

Mozambique

The data relating to mobility needs and barriers experienced by people with disabilities has been gathered from a number of sources, including:

Focus groups with 120 people with disabilities, undertaken in the Maputo and Matola areas.

Interactions and interviews with people with disabilities undertaken at special schools dedicated to people with disabilities.

Other ad hoc interactions and interviews with people with disabilities met elsewhere.
Walk through/photographs to assess existing physical barriers to mobility/accessibility experienced by people with disabilities as well as current practices with regard to addressing these barriers.

Focus Groups

The focus groups were aimed at identifying problems encountered while travelling, and soliciting suggestions on improvements to the transport system. Four sets of focus groups were formed based on the modes of transport that people have been exposed to, including the following:

- bus users;
- mini-bus taxi (*Chapa 100*) users;
- train users; and
- those who seldom use public transport.

Where enough people were available, the focus groups consisted of 6 to 10 respondents, grouped together by type of disability. Types of disability included people with hearing impairment, people with visual impairment, people who walk with difficulty, and wheelchair users. The recruitment/identification of people to take part of the focus groups was done with the help of the disability associations ADEMO, ADEMIMO, ADESU, ACAMO and ASUMO. A further two focus groups of hearing-impaired people were conducted at the Communitarian School of ADEMO.

The table below summarises the various causes of disability identified by focus group participants. Landmines contributed to a significant proportion of the disabilities.

Causes of disability	No.	Percentage
Born disabled	19	16%
War/ landmine victims	62	51.5%
Illness	23	19%
Car accidents	3	2.5%
Other cause*	13	11%
TOTAL	120	100%

*Other causes indicated include unknown causes, work accidents, crime victims, etc.

The Communitarian School of ADEMO

Students at this school include people with hearing and intellectual impairments. Besides the interviews conducted with two focus groups of pupils with hearing impairments, and with the dean of the school, interviews were also conducted with parents of hearing-impaired children who had to accompany their children to school.

Special Schools no. 1 and no. 2, Maputo

School no. 1 accommodates children with hearing impairments, whilst school no.2 is dedicated to children with intellectual impairment. Informal interactions were made with students and other people met at the schools, and did not follow the focus group outline formally.

South Africa

The mobility needs and barriers experienced by people with disabilities were summarised from a number of sources. These include:

focus groups with 156 people with disabilities, undertaken in the Cape Town area by the Cape Metropolitan Council in 1998⁵. The ten focus groups were aimed at identifying problems encountered while travelling, and soliciting suggestions on improvements to the transport system; information obtained through questionnaires from various disability organizations in the Tshwane (Pretoria) Metropolitan Area in 1997⁶ and 2001⁷. Individual inputs from people with disabilities were also solicited through the media; and other *ad hoc* interactions and interviews with people with disabilities undertaken by the project team.

⁵ Cape Metropolitan Council, *Study to Determine the Transport Needs of Mobility Disadvantaged Persons*. Cape Town, January 1999.

⁶ Greater Pretoria Metropolitan Council, *Public Transport Demand for People with Disabilities*. Pretoria, 1997.

⁷ City of Tshwane Metropolitan Council. *Tshwane AccessBus Pilot Project: Preliminary Investigation into the Establishment of an Accessible Bus Service*. Pretoria, 2001.

ANNEX C: FURTHER DETAIL ON ACCESS SPECIFICATIONS AND BEST PRACTICE

DISABILITY AWARENESS TRAINING

Disability Awareness Training tends to focus on the individual impairment and uses simulation exercises (such as putting participants in wheelchairs, blindfolding them) to demonstrate what it is like to have that disability. The trainer will also cover issues such as etiquette and language. Disability Equality Training is based around the Social Model of Disability and explores the concept that people are disabled by society's attitudes. It will normally cover 'awareness', etiquette and appropriate language but is unlikely to use simulation exercises. A disabled person will normally deliver the training.

In the Netherlands staff of public transport companies receive 3.5 hours disability awareness training. The training is delivered by a disabled person who has travelling experience and aims to show staff the difficulties disabled people encounter when using public transport.

DPTAC recommends that disability awareness training courses should include:

- Barriers faced by disabled people, covering attitude, environment and organisation
- Principles of access audits
- Suggestions for removing barriers faced by disabled people
- Information on all disabilities, including hidden disabilities
- Enabling staff to deal with unexpected occurrences – to 'think on their feet' when a problem arises
- Communication and interpersonal skills for communicating with disabled people, particularly those with a hearing impairment or with learning disabilities (DPTAC, September 2000).

To increase awareness of passengers' disabilities among transport staff, DPTAC has produced leaflets for bus and taxi drivers which highlight how some passengers' disabilities are 'hidden' (such as deafness or learning disabilities) and makes a number of suggestions on how drivers can assist these passengers (DPTAC, 1996; DPTAC, November 2000). Disability awareness training is compulsory for taxi drivers in Finland and Sweden. In Northern Ireland a Code of Practice has been issued for taxi drivers.

Training is also recommended for drivers of accessible minibuses. MiDAS is a driver training programme for minibus drivers organised by the Community Transport Association UK (CTA). Along with modules to assess the driver's ability to drive a minibus the course covers disability awareness training and training in the use of equipment to transport passengers in their wheelchair safely (such as the use of boarding devices and wheelchair restraint systems).

INFORMATION PROVISION

Good practice on the legibility of timetables, books and leaflets (DPTAC, 1996; ECMT, 1999; DfEE and COI Communications, 2001) suggest:

- Type should be in lower case and use an upright sans serif typeface of medium weight. Other type faces which could be used include: Univers, Helvetica, Airport, Futura, or Folio.
- Font size on timetables should be a minimum of 8 point type (pt). Generally, 12pt should be used for a general audience.
- Large print versions should use a minimum size of 14pt, preferably 19pt.
- The print should be contrasted against the background paper. Black type is recommended whilst green and red should be avoided.

Research has shown that for people with poor sight the size of lettering on signs should be 25mm for a viewing distance of 7.5m, increasing to 75mm at a distance of 20m (ECMT, 1999). Transport for London (TfL, formerly London Transport) use a standard of 10mm letter height for every metre distance with a minimum letter height of 22mm.

Variable letter signs should display text for at least 10 seconds before changing. They should have non-reflective glass screens and be shielded from direct sunlight.

All signs should be well lit and visible. COLITRAH recommend the use of symbols in signage to convey information to passengers. This is especially useful for people with low levels of literacy.

In recent years new technology, such as the Internet and telephone services, have been used to provide information on all transport links in European countries. Recommendations on the standardisation of Information, Communications Technologies (ICT) so that they can be used by everyone were given in the ICTSB team report 'Access for All' (2000). This follows the work of COST 219 on ICT for older and disabled people. There has also been research into the provision of real time information for public transport users and the use of public information terminals in the UK (the EC funded ROMANSE project). If a telephone information service is provided text phones should be considered for severely deaf people.

PEDESTRIAN ENVIRONMENT

A number of national standards and guidelines exist relating to the pedestrian environment. Those consulted for this and subsequent sections of the report are listed in Table C1.

Table C1. Guidance for accessibility to the pedestrian environment

National standards	
Germany	DIN 18024-1
Guidance	
UK	Oxley (2001), DETR and the Scottish Office (1998), IHT (1991)
Spain	Instituto Nacional en de Servicios Sociales (1994)
Norway	Norges Handikapforbund (2001)
Denmark	Vejdirektoratet (2000)
France	CERTU (2001b)
ECMT	ECMT (1999), ECMT (1991)
EU	Ambrose et al. (1996); Barker et al. (1996);

These documents highlight a number of features that should be addressed to improve the accessibility of the pedestrian environment. Dimensions sometimes varied between documents so the figures quoted in the latest UK guidance were used (Oxley, 2001).

Footways

- Footways should be wide enough to allow a wheelchair user and walker to pass one another. A minimum width of 2000mm is recommended and allows two wheelchair users to pass one another. The footway width should increase to 3000mm near bus stops and 3500mm in front of shops. The absolute minimum width of clear space, where an obstacle exists, is 1000mm.
- Most guidelines recommend a gradient of 5% (1 in 20). The maximum gradient of a ramp should be 8% (1 in 12). Wheelchair users can only manage steeper gradients over short distances. If a steeper gradient is unavoidable level areas should be provided at 10m intervals so the person can rest.
- Crossfalls, which are needed for drainage, should not be more than 2.5% or disabled people have difficulty steering in a straight line.
- A 100mm upstand should be incorporated at the rear of a footway if there is a steep slope or drop to protect wheelchair users and act as tapping rail for long cane users. Fences and guardrails should be at least 1100mm high and colour contrasted from their surroundings.
- Footways should have a level surface to ensure wheelchair users can manoeuvre easily. Uneven surfaces, such as cobblestones, cause stability problems and discomfort for people with ambulant disabilities. Joints between paving slabs should be closed and flush to avoid catching the wheels of a wheelchair.
- The footway should be made of non-slip material. Gratings and covers should also be non-slip and level with the surface.
- Street furniture such as bins, traffic signs and lamp posts should be clearly visible, contrasting with their background and positioned at the edge of the pavement so they do not create an obstacle or hazard for people with disabilities.
- Footways should be kept clear of overhanging trees and bushes.

Pedestrianised areas

- Ramps and lifts should be provided when there are changes in level
- Gradients - as footways
- Street furniture - as footways
- Use of tactile guidance surface for visually impaired people.

Road crossings

Dropped kerbs should be installed at all pedestrian crossing points to enable wheelchair users and visually impaired people cross the road and travel on the pavement. On side roads these should be positioned to one side of the direct line of the footway along the main road so visually impaired people do not walk into the road.

The dropped kerb should be flush with the carriageway and a minimum 1200mm wide. It should have a maximum gradient of 8% (1 in 12) on the direct approach and 9% on the flared sides. At controlled pedestrian crossings the dropped kerb should extend the same width as the crossing.

Tactile paving should also be installed to warn the visually impaired pedestrian they have reached a road crossing and align themselves in the correct direction to cross. Tactile surfaces are discussed further below.

To assist visually impaired people use a controlled pedestrian crossing audible signals can be used to indicate when it is safe to cross. In the UK and France electronic systems have been developed which extend the safe crossing period. Audible sounds or tactile cones can be used to help visually impaired people locate the control box for the pedestrian crossing.

Level access to the road crossing can also be provided using raised crossings. The raised area should be at least 2400mm wide and level with the footway.

Tactile and audible signals

Guidance on the use of tactile surfaces has been published by ECMT (July 2000c) and the UK government (DETR and the Scottish Office, 1998). The latter were largely based upon research conducted at TRL and Cranfield University (Savill et al., 1996; Gallon, C., 1992; Gallon et al., 1991)

Tactile surfaces need to be rough enough for vision impaired people to feel through shoes including those with diabetes but not so rigorous it cause discomfort to other pedestrians, such as ambulant disabled people and wheelchair users. TRL research is available on the desired height and profile (flat topped domes 5mm high) of tactile surfaces, and the use of different textured surfaces in different situations (Savill et al., 1996; Gallon, C., 1992; Gallon et al., 1991). Tactile surfaces should be colour contrasted for people with some sight.

Street works

- Should be safeguarded as they pose a hazard for disabled people particularly those with visual impairments.
- Should be guarded by continuous barrier min 1000mm high with a tapping rail 150-200mm from the ground for long cane users, colour contrasted to background
- Audible warnings if there is a diversion, illumination at night
- Temporary footway should follow standards highlighted above - min 1200mm wide
- Scaffolding or temp structures – head room 2100mm min. Hoardings should be available

Seating

Seating should be provided at regular intervals. The distance quoted in the guidance ranges from 50 – 100m.

TRANSPORT INFRASTRUCTURE

A number of national accessibility standards and guidelines exist relating to the design and construction of transport infrastructure. Those consulted are listed in Table C2. Major standards are summarised in point form below.

Table C2. Guidance for accessibility to infrastructure

National standards	
Germany	DIN 18024-2
UK	BSI 8300:2001
Regulations	
UK	The Building Regulations 1998, Part M
Guidance	
UK	Oxley (2001), DETR and the Scottish Office (1998), IHT (1991), Strategic Rail Authority (April 2001), Office of the Rail Regulator (1994), Oxley et al. (1996)
Spain	Instituto Nacional en de Servicios Sociales (1994)
Norway	Norges Handikapforbund (2001)
Denmark	Vejdirektoratet (2000)
Finland	Somerpalo et al. (1998)
France	CERTU (2001)
ECMT	ECMT (1999), ECMT (1991)
EU	Ambrose et al. (1996); Barker et al. (1996);

Bus stops

- Short distance – 400m from residential areas taking into account gradients of footpaths reduce distance to bus stop by 10m for 1m rise or fall
- Sweden used 200m bus stops on Swedish Service Routes
- Locate stops as close as possible to amenities and places disabled people use
- Signs – should indicate if it's a hail and ride route and embossed lettering should be used
- Raised boarding area – important for low floor buses 240-25mm
- Standard kerb = 125mm – 140mm need to increase to 160mm
- Gradient = 1 in 20 max = 1 in 12
- Shelters should be provided to protect passengers – need to be within 2000mm of boarding alighting area
- Seating in shelters: 580mm high bench/shelf type with contrasted colour
- Space for wheelchair user under shelter
- Shelter should be transparent and well lit for security
- Enough room to permit pedestrian movement

- Unobstructed boarding area of 2000mm by 2000mm
- Bus stop flags 2500mm from ground
- Bus stop flags 450mm square
- Numbers min 50mm high
- Should contain timetable information
- Enforce parking near bus stop which prevent bus pulling up close to kerb

Taxi ranks

- Locate near buses and rail, amenities
- Enable people to board and alight from nearside of vehicle
- Manoeuvring space width allow 4040mm
- Clearly signed
- Seating close by
- Signs should use embossed lettering, telephone numbers of taxi company should be displayed

Terminals and interchanges

Entrances

- Doors should be avoided
- If used doors should be automatic
- Min 1200mm width
- Each double door should be 90mm
- Glass doors must be marked with brightly coloured banding 150mm and 800-1000mm from ground
- Kick plate 400mm depth
- Lever type handles 900mm height 30- 35mm diameter
- Avoid steps

Changes in levels

Ramps, lift and stairs required – steps are a barrier for wheelchair users but people with conditions such as arthritis prefer to use them as opposed to ramps

Ramps

- If there is a change in height there should be a ramp 1 in 20 ideally – max 1 in 12
- Length – no more than 6 m
- 2000mm wide
- landings required

Steps (if ramp length more than 200mm)

- Uniform size
- Risers max 150mm high 100mm min – shallow risers cause problems
- Treads 300mm deep and non-slip, min 250mm
- Nosings – rounded and colour contrasted
- Risers should be vertical
- Handrails on both sides
- Minimum width between handrails = 1000mm
- Tactile warning positioned at top and bottom of flight of steps
- Max number of steps in a flight = 12
- Landings required
- No open treads – these are unsafe and a trip hazard
- Should be well lit

Handrails

- Handrails on either side and centre of 1800+mm stairs
- Height 900-1000mm
- Handrails should be circular – 35-50mm diameter, if not should be 50mm wide by 38mm deep and have rounded edges
- 50-60mm space between handrail and wall
- Extend 300mm beyond end of stairs
- Colour and tonal contrasted

Lifts

- 2000mm wide
- 1400mm deep
- 1100mm wide door
- 2300mm height
- 1700mm turning circle outside door
- control panel 900mm – 1100mm from floor
- buttons 20mm across, 10mm apart, emergency button located at bottom of panel
- raised braille letters and text on buttons
- visual and audible announcement of each floor level
- slow doors, colour contrasted with surroundings
- non slip floor
- mirror on rear wall so wheelchair users can see floor indicators or obstacles when moving backwards

Escalators

- Unpopular with ambulant disabled people – a lift should also be available
- Direction of travel should be show at top and bottom of each flight using red and green signs
- Lighting should be used to show step edges
- Tactile warning

Travelators

- Max 1 in 8 gradient
- Not suitable for wheelchair users so need parallel passageway

Pedestrian clearway 2000mm

- Seating every 50-60m

Seating

- 420mm- 580mm height, 700mm perch seating
- 500m width
- armrests 200mm above seat level – not essential

Facilities

Accessible refreshment facilities

- entrance, gangways, clearway between tables
- colour contrasted tables and seating

Toilets

- wheelchair accessible
- handrails
- emergency cord/alarm

Ticketing

- Lower desk for wheelchair users
 - Induction loop if security screen is in place
 - Handrails in queuing area
 - Auto ticket machine buttons/slots should be no more than 1200mm from the ground
 - At least one gate/turnstile should be accessible for people in wheelchairs or with buggies/luggage etc
- Heated waiting rooms

Rail platforms

- Level access with vehicles and new platforms (max diff 20mm for wheelchair users)
- Mobile ramp or lift access for those not level
- Minimise gap between platform and vehicle – max gap 45mm for wheelchair users
- 2000mm width safety zone on platform
- Slip resistant and non-reflective surface
- Drainage covers should be avoided where possible
- Seating should be provided
- Platform edge warning surface
- Vending machines should be colour contrasted
- Information post should include a tapping rail
- Light Rapid Transit (LRT) platforms need be no more than 350mm high to provide level access to train
- Access to on-street LRT platform from footway should be by shallow ramp - max gradient = 13%

VEHICLE DESIGN

Table C3. Guidance for accessibility to vehicles

Regulations	
UK	The Rail Vehicle Accessibility Regulations 1998, SI 1998 No. 2456. The Rail Vehicle Accessibility (Amendment) Regulations 2000, SI 1998 No. 3215. The Public Service Vehicle Regulations 2000. SI 2000 No, 1970.
Consultation document	
UK	DETR et al. (1997)
Guidance	
UK	DETR (2000)
UK	DPTAC (November 2001)
COST	COST 322 (1995), COST 335 (1997), COST 335 (1999)
Denmark	Vejdirektoratet (2000)
Finland	Somerpalo et al. (1998)
France	CERTU (2001)
ECMT	ECMT, (June 2001), ECMT (1999), ECMT (1990)

Accessible features common to all vehicles:

- Colour and tonal contrasted
 - Step noses
 - Handrails
 - Bell pushes/communication devices
- Audible announcements/visual display
- Priority seating , with room for a guide dog
- Max. step height 250mm
- Step treads min. 280mm, preferably 300mm
- Handrails at entrances
- Handrails should be slip and grip resistant

The European Commission has supported the **COST** Transport research programme. Best practice guidelines has been produced on low floor buses⁸ and on passengers' accessibility of heavy rail systems⁹.

Buses

Low floor buses use a kneeling system (lowering the suspension) to reduce the step height for passengers boarding and alighting. In addition to this, a ramp or lift can be used to provide level access into the vehicle. Other infrastructure changes such as increasing the height of the kerb can also be implemented to reduce the height further. COST 322 encourages the adoption of low-floor buses by highlighting the operational benefits of faster boarding and alighting of passengers.

Accessible features recommended for large buses and small accessible buses for 9 –22 passengers.

- At least one wheelchair space for reference wheelchair 750mm x 1400mm
- Restrain wheelchair and passenger using a backrest and restraints
- Entrance 800mm wide and 1800mm high
- Single step into vehicle 250mm high at primary entrance, subsequent steps 120mm –200mm
- secondary entrance should have no more than 3 steps from ground into vehicle
- Gangway width 750mm min, preferably 800mm
- 50% single low floor area free of steps
- 1800mm min headroom
- Stanchions 1050mm apart
- Leg room 650mm from seat back, 500mm between facing seats
- Ramp max slope 12% single width
- Lift capacity 300kg 750mm x 1200mm, colour contrasted handrails and audible signal when in use
- Route and destination displays – number 200mm high at front and rear, destination 125mm high at front. 70mm route number on side of vehicle.

⁸ COST 322 (1995) **The Low Floor Bus System**. Final report of the action. Brussels: EC DG VII.

⁹ COST 335 (1999) **Passenger's accessibility of Heavy Rail Systems**. Final report of the action. Brussels: EC DG VII.

Taxis

Purpose built vehicles, minivans and MPVs which can carry a passenger seated in their wheelchair. In the UK it was proposed that all hackney carriage taxis should be of this type (DETR et al, 1997).

The UK consultation document recommended the following features, although no agreement has been reached on a final specification.

- Level transfer to seat
- Wide door opening and angle
- Swivel seat
- Wheelchair space – 1200mm x 700mm
- At least one door should be wheelchair accessible
- Single width ramp or lift
- Ramp specification - 750mm wide, 1700mm long, 1 in 4 slope
- Lift specification – 750mm wide, 1200mm long
- Wheelchair restraint and passenger restraints
- Headroom 1400mm within taxi
- Wheelchair users can travel forwards or rearwards, never sideways

Sweden's Lund University ergonomic standard for taxis:

- 900mm door width
- door opening 1400mm saloon cars and 1650mm for van/purpose built type
- max slope 1 in 12
- wheelchair space 800 x 1300mm

The economic aspects of taxi accessibility have been considered by the ECMT. Their recommendations are detailed in their publication '*Economic aspects of taxi accessibility*' (ECMT, June 2001). This document stresses the need for consultation at a local level with both disabled people and industry. Provision should be based upon local needs- based assessment.

Trains

Regulations in the UK (DETR, 1998a and DETR, 2000a) and COST 335 (1999) include the following features:

- 2-7 vehicles should have 2 wheelchair spaces, 8-11 vehicles 3 wheelchair spaces and 12 or more vehicles 4 wheelchair spaces
- Wheelchair space 1300mm x 750mm
- Wheelchair accessible toilet – wide corridors with turning space so these can be used (problem on Austrian trains)
- Colour contrasted doors, audible warning
- Push button to open doors 90mm from platform height
- Steps 200mm high
- Step treads 450-500mm
- Steps should be illuminated
- No internal steps in carriage
- Slip resistant floor
- 10% priority seats for disabled people
- removeable armrests
- Lift as bus

- Ramp 800mm wide

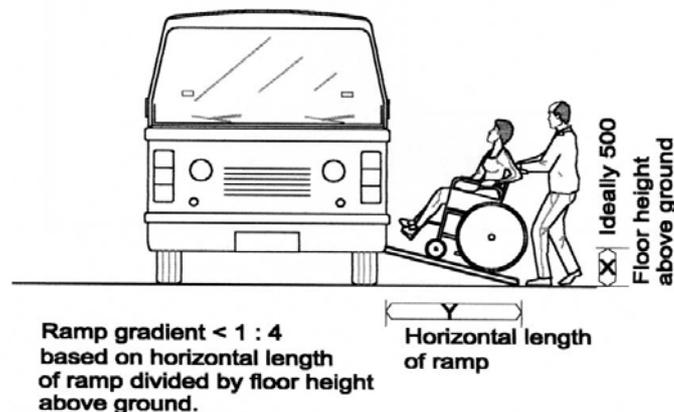
Trams/light rail – ECMT (2000)

- At least 1 wheelchair space per carriage
- Doors colour contrasted
- Push button to open doors 90mm from platform height

Jitneys/minibus-taxis

The South African Federal Council on Disability has issued recommended requirements for Universal Access to the proposed vehicles for the Taxi Recapitalisation Programme¹⁰. It is not yet clear which of these requirements will be adopted in the vehicle design. The requirements include amongst others, the following standards:

- Access to the vehicle shall be provided through an entrance on the left side of the vehicle by steps and removable ramps. The minimum clear opening of the **door** should be 850mm wide.
- **Steps** should be at least 800mm wide, 200 deep, and the first step at most 250 mm above ground level. Each step, or its front edge, shall be of a bright contrasting colour.
- The portable **ramps** should be set at a maximum gradient of 1:4 with a minimum width of 150mm, formed in a “U” shape facing upwards. The ramps should be positioned with a gap of 330mm between the ramps to permit one person to stand and assist the wheelchair user. Ramps shall have a safe working load of not less than 300 kg.



- The **wheelchair position** should face forward or backward in the vehicle, with minimum dimensions given for the space needed.
- Ideally at least one seat on any vehicle should be fitted with a waist **restraint** or seatbelt. Wheelchair positions shall be fitted with at least one waist level restraint

¹⁰ *Broad summary of requirements for special universal access on taxi vehicles*, Document issued by South African Federal Council on Disability, Cape Town, South Africa, 2001.

- Sufficient **grab bars** or handles shall be provided to accommodate both wheelchair users and ambulant persons. The grab bars or handles shall be accessible from ground level
- The **fare collection** and other interfaces to the electronic management systems should be design with due consideration to ensuring universal access for all passengers.

In Mexico City the authorities are replacing 10,000 micros which are considered over-aged, polluting, and inefficient. The new vehicles are somewhat larger and with design features which improve their accessibility. The following chart compares the features of old micros with new model vehicles, while noting areas where additional features would enhance their accessibility¹¹. The design features noted here are not specifications, but rather observations and suggestions on best practice.

Selected design features	
Old micros	New model replacement vehicles (small buses)
External destination signs	
Signs usually on front only, sometimes on sides. While print size may be large with good color contrast, this practice is not consistent.	No changes noted. <u>Needed:</u> Consistent use of large print high-contrast signs on front and side of vehicle, and preferably on rear.
Distance to first step	
40 cm. (The owners of 2 of 50 surveyed micros had added a permanent step under the vehicle front entrance behind the front tire, to reduce distance to approx. 20 cm.)	40 cm. maximum is specified <u>Needed:</u> Extra or removable step to decrease this critical dimension (one of the most important design elements for many disabled passengers) to 25 cm.
Front and rear steps & related hand grasps	
Ground to floor: app. 85 cm Steps: • Narrow: app. 35-40 cm. usable width • 2 additional steps to floor level, with an approx. 20 cm. rise. The 1 st of these steps is highly irregular in shape due to the folding door, with the leading edge at an angle which poses a trip hazard. Hand grasp: • Single exterior vertical hand grasp by right side of front entrance. Hand grasps lacking or inadequate once inside stair well. Passengers with limited upper body strength on right side would be at risk when boarding. All boarding passengers are at risk if vehicle moves, due to lack of any easily reached hand grasp in the	Ground to floor: 96 cm maximum specification Steps: • Wider: 65 cm. minimum specificat'n. in front, rear narrower in some models • 3 additional steps to floor level, with approx. 22 cm. rises (Min. specification is 2 more steps with 28 cm. rise) The 2 nd and 3 rd steps beveled in some models due to folding door, but leading edge is not irregular. Hand grasp: • Diagonal railing parallel to stairs is mounted on right side of passenger only and significantly improves access over old micro, but only for passengers with upper body strength on right side. <u>Needed:</u> Added hand grasp mounted on folding door on left side of passenger.

¹¹ Cited specifications for new model vehicles are from the *Official Record of the Federal District (Technical Manual for Public Transport Vehicles)* February 25, 2000.

Selected design features	
Old micros	New model replacement vehicles (small buses)
stair well in most vehicles.	Door frame may need to be redesigned and/or strengthened to accomplish this.
Anti-skid stair treads and flooring	
Yes	Yes
Seats	
Number: 21 seats, up to 24 or more in some models Forward facing double seats on one side and aisle facing bench seat on other side. Passengers seated on bench seat have no way to stabilize themselves during ride. All seats are small with little leg room.	Number: 24 seats, up to 30-40+ seats as other models approach standard bus size All seats forward or rearward facing. Improves stability while vehicle is in motion, with hand grasps affixed across tops of all seats. Seats somewhat larger with more leg room. Additional leg room at prioritized seat behind driver in some models, marked with disability logo and easily reached via continuous hand rail from right side of front entrance past driver to seat.
Hand grasps for standing passengers	
Standees must rely on (1) grasps affixed to forward facing seats on one side only or (2) a single horizontal ceiling-mounted rail running length of vehicle. A total of 2-3 vertical stanchions in front and rear of vehicle near top of entrances is inadequate. Short or mobility-impaired passengers may not be able to reach any hand hold when vehicle is crowded.	Standees must rely on (1) grasps affixed to all forward facing seats on <u>both</u> sides, or (2) <u>two</u> horizontal ceiling-mounted rails running length of vehicle. 6 vertical stanchions in front and rear of vehicle near top of entrances are an improvement, but lack of vertical stanchions along length of aisle means some short or mobility-impaired passengers may not be able to reach a hand grasp when vehicle is crowded. <u>Needed:</u> Although significantly improved, additional vertical stanchions should be considered along the length of the aisle.
Use of color contrast	
Not used. Stair tread edges and other key surfaces inadequately marked and interior features difficult to distinguish by passengers with limited vision.	Excellent color contrast on stair tread edges on some models, not on others. Other key surfaces (hand grasps) not marked. Interiors are brighter and access features somewhat more contrasting in some models, less in others. <u>Needed:</u> Contrasting colors (typically "safety yellow") on all key edges and surfaces.
On-board written and audio passenger information	
Lacking.	Lacking in models observed
Passenger complaint number	
Yes, in large print on exterior of vehicle but not in interior	Yes, in large print on exterior of vehicle but not in interior <u>Needed:</u> Complaint and commendation

Selected design features	
Old micros	New model replacement vehicles (small buses)
	number in interior of vehicle

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