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Walkability and Pedestrian Facilities in Asian Cities
State and Issues

James Leather, Herbert Fabian, Sudhir Gota, and Alvin Mejia

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Acronyms and Abbreviations

ADB	Asian Development Bank
BRTS	bus rapid transit system
CAI-Asia Center	Clean Air Initiative for Asian Cities–Asia Center
CSE	Centre for Science and Environment
CTTS	Comprehensive Traffic and Transportation Study (for Bangalore)
FHWA	Federal Highway Administration
GWI	Global Walkability Index
HCMC	Ho Chi Minh City
HEI	Health Effects Institute
IRC	Indian Roads Congress
km	kilometer
KMC	Kathmandu Metropolitan City
MMDA	Metropolitan Manila Development Authority
MOUD	Ministry of Urban Development (India)
NMT	nonmotorized transport
NRs	Nepalese rupees
PM	particulate matter
PRC	People's Republic of China
Rs	Indian rupees
STI	Sustainable Transport Initiative
SUMA	Sustainable Urban Mobility in Asia
US	United States
US DOT	United States Department of Transport
UTTIPEC	Unified Traffic and Transportation Infrastructure Planning and Engineering Center
WHO	World Health Organization

Executive Summary

Asian cities have traditionally been cities of walkers, and many urban dwellers rely on walking, cycling and public transport for their daily travel. However, with the exponential increase in motorization, limited attention has been paid to pedestrian and public transport facilities. A change in focus is required which will allow people, not vehicles, to reclaim the urban environment.

Growing motorization has also led to a dramatic increase in the number of pedestrian fatalities and accidents, and high levels of air pollution—particularly exposing pedestrians who walk to work or access public transport to reach their destinations.

The study provides information on the current pedestrian infrastructure in selected cities and can be used to develop and propose pedestrian-focused solutions for Asian cities. It includes

(i) field walkability surveys in 13 Asian cities—Cebu (Philippines), Colombo (Sri Lanka), Davao (Philippines), Ha Noi (Viet Nam), Ho Chi Minh City (Viet Nam), Hong Kong, China (People's Republic of China [PRC]), Jakarta (Indonesia), Karachi (Pakistan), Kathmandu (Nepal), Kota (India), Lanzhou (PRC), Manila (Philippines), and Ulaanbaatar (Mongolia);
(ii) pedestrian preference interviews in these cities; and
(iii) an assessment of the current policies and institutions relating to pedestrians and walking environments in the cities, including discussions and interviews with public sector representatives.

Walkability ratings were derived through field surveys in which pedestrian facilities and the general walking environment were assessed. The median walkability rating for the 13 cities was 58.43 out of a total of 100. Commercial areas received the highest ratings, followed by residential and educational areas, with public transport terminals the lowest rated. Improving pedestrian facilities is a must given the fact that the highest pedestrian volumes were recorded in public transport terminals and educational areas.

The pedestrian preference interviews revealed that 41% of the respondents think that the pedestrian facilities in their cities are "bad" or "worst" (very bad). Moreover, the interviews revealed that 67% of the respondents would shift their walking trips to motorized modes of transport (with 29% shifting to cars and 10% to two-wheelers) if the walking environments in their cities do not improve.

The assessment of policies and institutions related to pedestrians and walking environments in Asia shows that, generally, there is a lack of relevant policies, dedicated institutions, and political support that cater to the needs of pedestrians. Proper allocation and use of funds for pedestrian facilities are also identified as major issues throughout Asia.

Based on the findings of this study, a number of recommendations were identified involving various stakeholders who should play a role in developing policies, projects, and/or initiatives focused on improving walkability and pedestrian facilities in Asian cities.

These actions need the support of key stakeholders, identified to be the national government, city government, civil society, development agencies, and the private sector. The city government is identified as the key stakeholder group for pedestrian facility development and implementation. The national government's substantial role is in the development of policies catering to pedestrians or building the capacity of city governments' efforts to develop their own policies. To be successfully implemented, these policies must also have the support of civil society.

Development agencies should also play a role, particularly in establishing and supporting initiatives to improve walking environments in cities and to prioritize pedestrians in urban transport planning. While the private sector generally complies with the recommendations and policies set by government, there should be a conscious effort from the private sector to provide for adequate facilities for pedestrians. Traffic impact assessment studies undertaken by private land developers should consider and prioritize pedestrian access and movement for future land developments.

There are few initiatives to promote the improvement of walking in Asian cities. The few civil society organizations and nongovernment organizations working in this area can play key roles in promoting improvements on walkability and pedestrian facilities in their cities.

Given the lack of dedicated institutions that oversee and maintain pedestrian facilities in Asian cities, there is a need to establish such institutions or units with sufficient resources within city or local governments in order to ensure that policies and projects are properly implemented.

There is a pressing need to overhaul the existing pedestrian guidelines or develop appropriate guidelines for Asian cities. The available guidelines are often ambiguous or inequitable and rarely enforced in cities. Traffic experts still rely on speed as the basis of performance measurement in urban areas, as found in the United States Highway Capacity Manual. This antiquated view emphasizes the improvement of speed rather than planning for streets that promote accessibility for all users. In practice, many pedestrian level of service concepts are based on vehicle travel, in which faster speed indicates efficient flow of foot traffic.

1. Introduction

1.1 Background of the Study

Economic growth and rapid urbanization have resulted in urban transport crises in many Asian cities. The unprecedented growth in the number and use of private vehicles has led to severe congestion, high accident rates, air pollution, and greenhouse gas emissions. The common response is to focus on expanding road capacity to reduce vehicle congestion. However, growing evidence and international consensus suggest that this is a short-term approach that temporarily eases traffic flow but also stimulates growth in vehicle numbers and use that will again result in more congestion.

Managing transport demand and supply in a holistic manner is a far better approach in realizing sustainable urban transport systems that provide efficient and equitable access for people and goods. Almost every trip starts and ends on foot and walking is thus an integral part of the whole transport system. However, conventional land use and transport planning practices in Asian cities still pay little attention to walking.

The Clean Air Initiative for Asian Cities (CAI-Asia Center), with several partners,[1] implemented the Sustainable Urban Mobility in Asia (SUMA) program supported by the Asian Development Bank (ADB) through a grant from the Swedish International Development Cooperation Agency. This program promoted the integration of air quality management and sustainable urban transport in the policies and projects of Asian countries and cities. SUMA included activities on improving public transport and nonmotorized transport (NMT), particularly cycling, but activities on improving walking and pedestrian facilities were only covered indirectly.

The ADB Sustainable Transport Initiative[2] (STI) aims to align transport sector interventions within the context of the ADB Long-Term Strategic Framework (Strategy 2020).[3] A key component is enhancing the interaction of ADB with developing countries on sustainable and low-carbon transport, and urban transport is one of its targeted subsectors.

1.2 Objectives and Scope

The study provides information on the current pedestrian infrastructure in selected cities and can be used to develop and propose pedestrian-focused solutions for Asian cities. The development and use of the walkability assessment methodology can raise awareness and generate interest among policy makers and city officials and help them to improve walking in cities.

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[1] Partners included the German Agency for Technical Cooperation (GTZ-SUTP), the Institute for Transportation and Development Policy (ITDP), the Interface for Cycling Expertise (I-CE), the United Nations Centre for Regional Development (UNCRD), the World Resources Institute's Center for Sustainable Transport-EMBARQ, and key experts Christopher Cherry and Marie Thynell. For more information and outputs of the SUMA program, see www.cleanairinitiative.org/portal/whatwedo/ projects/SUMA.

[2] ADB. 2010. *Sustainable Transport Initiative Operational Plan*. Manila.

[3] ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

The study includes (i) field walkability surveys in 13 Asian cities—Cebu (Philippines), Colombo (Sri Lanka), Davao (Philippines), Ha Noi (Viet Nam), Ho Chi Minh City (Viet Nam), Hong Kong, China (People's Republic of China [PRC]), Jakarta (Indonesia), Karachi (Pakistan), Kathmandu (Nepal), Kota (India), Lanzhou (PRC), Manila (Philippines), and Ulaanbaatar (Mongolia); (ii) pedestrian interview surveys; and (iii) an assessment of the current pedestrian-related policies and guidelines in these cities, including discussions and interviews with public sector representatives.[4]

The field walkability surveys were limited to pre-determined pedestrian routes in commercial, residential, and educational areas as well as around public transport terminals. While current policies and guidelines for pedestrians in these cities were reviewed to identify strengths and gaps, the study does not provide a comprehensive analysis of the current design guidelines for pedestrian facilities in surveyed countries and cities.

1.3 Report Structure

This report includes the following chapters:

- Chapter 1 provides an introduction to the study.
- Chapter 2 presents the transport trends and externalities focusing on pedestrians.
- Chapter 3 provides a brief review of walkability and how this can be measured.
- Chapter 4 discusses the results of the field walkability and pedestrian interview surveys.
- Chapter 5 provides a discussion on the state of policies and institutional support for improving walkability and pedestrian facilities.
- Chapter 6 summarizes the findings of the study and identifies recommendations for policy makers.
- References section provides the sources, including publications and websites.
- Annexes provide separate detailed results of the surveys for each of the 13 cities.

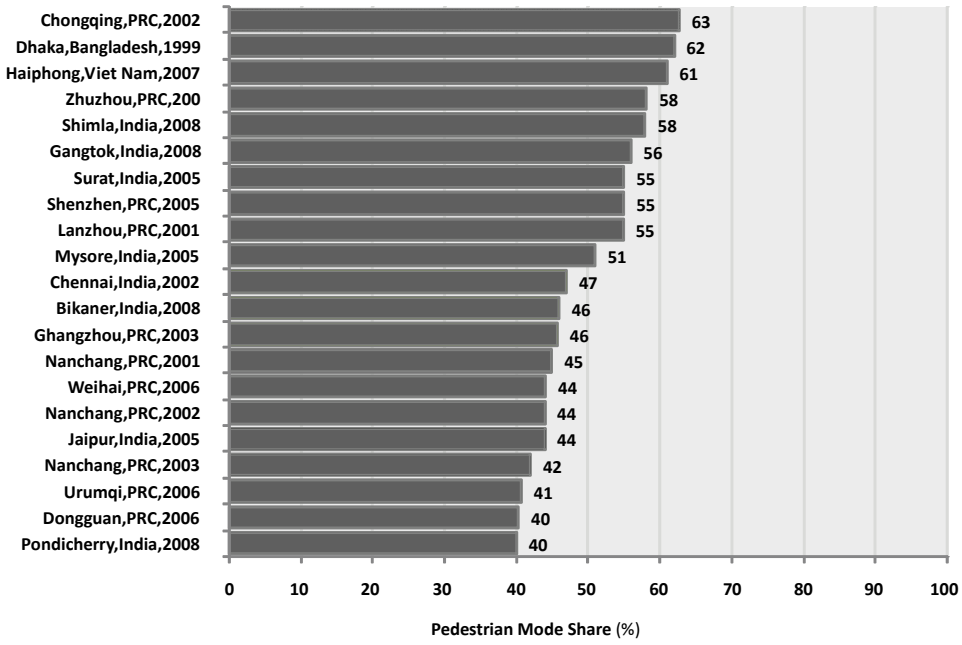
2. Walking in Asian Cities

2.1 Significant but Declining Pedestrian Mode Share

Asian cities traditionally rely on walking, cycling, and public transport for daily travel, and many cities still have relatively low motorization levels despite the current surge in personal vehicle ownership. Figure 1 shows the pedestrian mode share in cities in Bangladesh, India, and the PRC. Although compiled from various studies with different timeframes, it is clear that the mode share of walking is significant, ranging from 40% in Pondicherry, India to as high as 63% in Chongqing, PRC.

[4] These cities were selected in the countries where the CAI-Asia Center has country networks and where ADB has existing transport-related projects.

Figure 1: Pedestrian Mode Share in Asian Cities (%)



PRC = People's Republic of China.

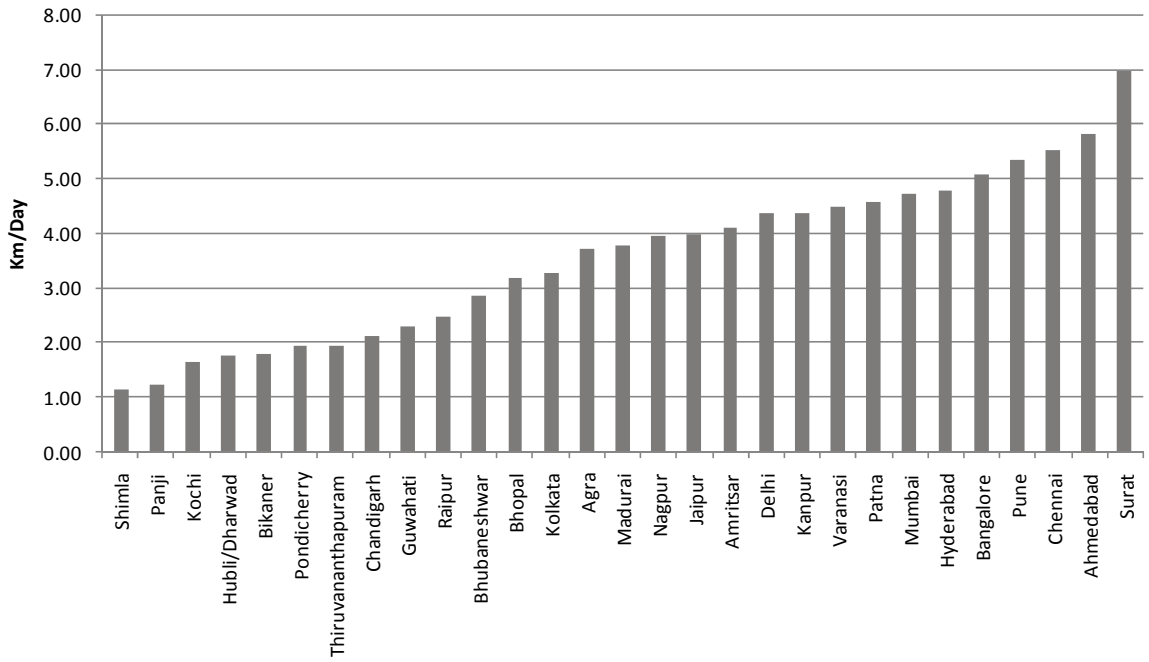
Sources: Compiled by CAI-Asia Center. 2010. Detailed sources include Asia Pacific Energy Research Center. 2007. Urban Transport Energy Use in the APEC Region; ADB. 2001. Urban Indicators for Managing Cities: Cities Data Book; ADB. 2007. A Development Framework for Sustainable Urban Transport—Regional Technical Assistance Report; China Communications Press. 2008. Sustainable Urban Transportation: Context, Challenges and Solutions; Doi, N. 2005. Urban Development and Transportation Energy Demand Motorisation in Asian Cities, presented at the APERC Workshop at the EWG30 APEC Energy Future; EMBARQ. 2009. Indian Cities Transport Indicators Database; Government of India, Ministry of Urban Development. 2008. Study on Traffic and Transportation Policies and Strategies in Urban Areas in India; Hoque, M. et al. 2006. Urban Transport Issues and Improvement Options in Bangladesh; Institute for Transportation and Development Policy. 2008. Pre-Feasibility Study for the Ahmedabad BRTS; Japan Bank for International Cooperation. 1999. Urban Public Transportation in Viet Nam—Improving Regulatory Framework; Japan International Cooperation Agency and Katahira & Engineers International. 2008. The Study of Master Plan on Comprehensive Urban Transport in Vientiane, Capital in Lao PDR, JICA; Japan International Cooperation Agency. 1999. Metro Manila Urban Transportation Integration Study Technical Report 4; Kathmandu Valley Mapping Program, 2002; Partnership for Sustainable Urban Transport in Asia; Schipper, L. et al. 2008. Measuring the Invisible: Quantifying Emissions Reductions from Transport Solutions; Seoul City Government. 2006. 4-Year Master Plan; University of the Philippines National Center for Transportation Studies.2001. Marikina Bikeways Study, Detailed Engineering Component, First Progress Report; World Bank. 2008. A Framework for Urban Transport Projects Operational Guidance for World Bank Staff; Zhou, Hongchang. 2001. Transportation in Developing Countries. Greenhouse Gas Scenarios for Shanghai, PRC.

Walking provides mobility to a large percentage of people in many cities, especially the poor who often do not have other alternatives. It is also essential in supporting public transport facilities, improving the overall livability of cities, providing accessibility within built areas, and providing an alternative to private vehicles for short-distance trips.

Figure 2 indicates that a large number of Indian cities can be easily accessed by walking and cycling because people travel on average only between 1 and 7 kilometers (km) per day. In Bangalore, over 20% of trips shorter than 2 km are made by motorcycle and nearly 26% of total trips are shorter than 5 km.

While the walking mode share is still high, it is declining across Asian cities. Cities seem to provide more incentives to private motorized modes, to the cost of NMT modes such as walking—thus reducing walking mode shares as shown in Table 1. The majority of the people who shifted modes chose two-wheelers and cars as their main mode of transport and consequently contributed to the deterioration of traffic conditions and the urban environment.

Figure 2: Average Length of Per Capita Travel in Indian Cities



km = kilometer.

Source: S. Gota and H. Fabian. 2009. Emissions from India's Intercity and Intracity Road Transport. Consultation draft. Available at: http://cleanairinitiative.org/portal/node/2319

Table 1: Walking Mode Share Changes in Selected Asian Cities

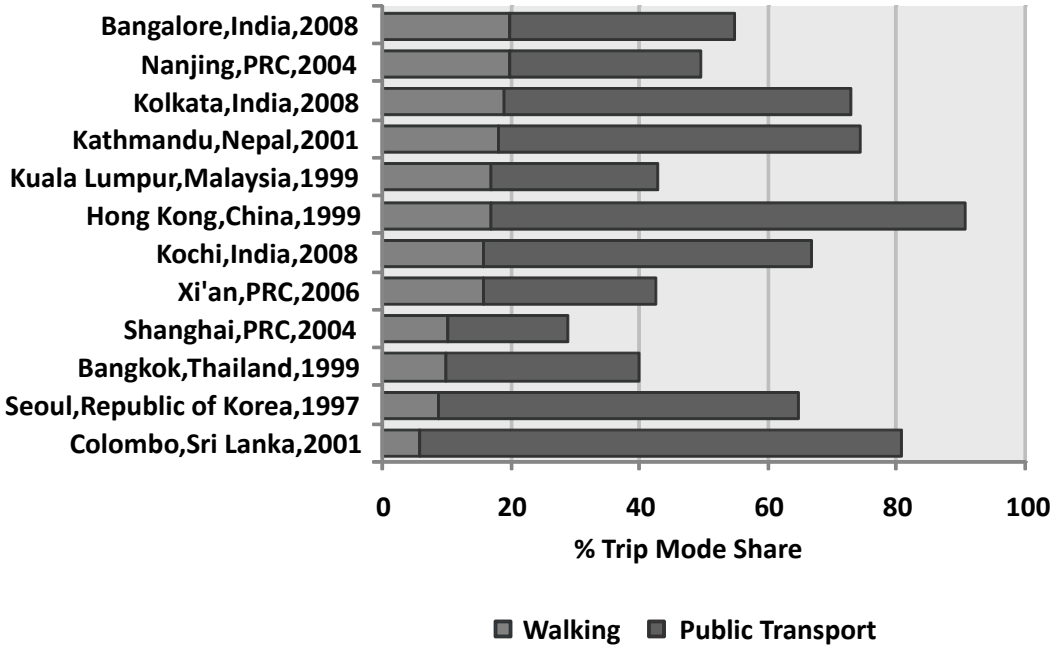
City	Year	Before (%)	Year	After (%)	Mode with Greatest Gain (Motorized)
Bangalore	1984	44.00	2007	8.33	Two-wheeler and car
Changzhou	1986	38.24	2006	21.54	Two-wheeler and car
Chennai	2002	47.00	2008	22.00	Two-wheeler
Delhi	2002	39.00	2008	21.00	Two-wheeler and car
Nanchang	2001	44.99	2005	39.11	Car
Shanghai	1986	38.00	2004	10.40	Two-wheeler and bus
Xi'an	2002	22.94	2006	15.78	Bus

Source: Compiled by CAI-Asia Center. 2010. Detailed sources include Asia Pacific Energy Research Center. 2007. Urban Transport Energy Use in the APEC Region; ADB. 2001. Urban Indicators for Managing Cities: Cities Data Book; ADB. 2007. A Development Framework for Sustainable Urban Transport—Regional Technical Assistance Report; China Communications Press. 2008. Sustainable Urban Transportation: Context, Challenges and Solutions; Doi, N. 2005. Urban Development and Transportation Energy Demand Motorisation in Asian Cities, presented at the APERC Workshop at the EWG30 APEC Energy Future; EMBARQ. 2009. Indian Cities Transport Indicators Database; Government of India, Ministry of Urban Development. 2008. Study on Traffic and Transportation Policies and Strategies in Urban Areas in India; Hoque, M. et al. 2006. Urban Transport Issues and Improvement Options in Bangladesh; Institute for Transportation and Development Policy. 2008. Pre-Feasibility Study for the Ahmedabad BRTS; Japan Bank for International Cooperation. 1999. Urban Public Transportation in Viet Nam—Improving Regulatory Framework; Japan International Cooperation Agency and Katahira & Engineers International. 2008. The Study of Master Plan on Comprehensive Urban Transport in Vientiane, Capital in Lao PDR, JICA; Japan International Cooperation Agency. 1999. Metro Manila Urban Transportation Integration Study Technical Report 4; Kathmandu Valley Mapping Program, 2002; Partnership for Sustainable Urban Transport in Asia; Schipper, L. et al. 2008. Measuring the Invisible: Quantifying Emissions Reductions from Transport Solutions; Seoul City Government. 2006. 4-Year Master Plan; University of the Philippines National Center for Transportation Studies.2001. Marikina Bikeways Study, Detailed Engineering Component, First Progress Report; World Bank. 2008. A Framework for Urban Transport Projects Operational Guidance for World Bank Staff; Zhou, Hongchang. 2001. Transportation in Developing Countries. Greenhouse Gas Scenarios for Shanghai, PRC.

2.2 Inadequate Facilities for Public Transport and Pedestrians

An important reason for this decline is the inadequacy of facilities for pedestrians and public transport. Figure 3 shows that cities with low pedestrian mode shares have surprisingly high public transport shares, such as Bangkok, Colombo, and Seoul. This suggests that walking trips are replaced not only by private vehicle trips but also by public transport trips. For example, in Bangalore where 60% of households own vehicles, including motorcycles, the percentage of trips by foot or bicycle is decreasing. One important reason for this is that trips to and from public transport stations may be excluded from surveys, neglecting an important part of trips that people make. Despite the modal and traffic enumeration inconsistencies, and including the preference for motorized modes for short trips, the data shows that there are still high pedestrian mode shares.

Figure 3: Public Transport and Pedestrian Mode Share in Selected Asian Cities

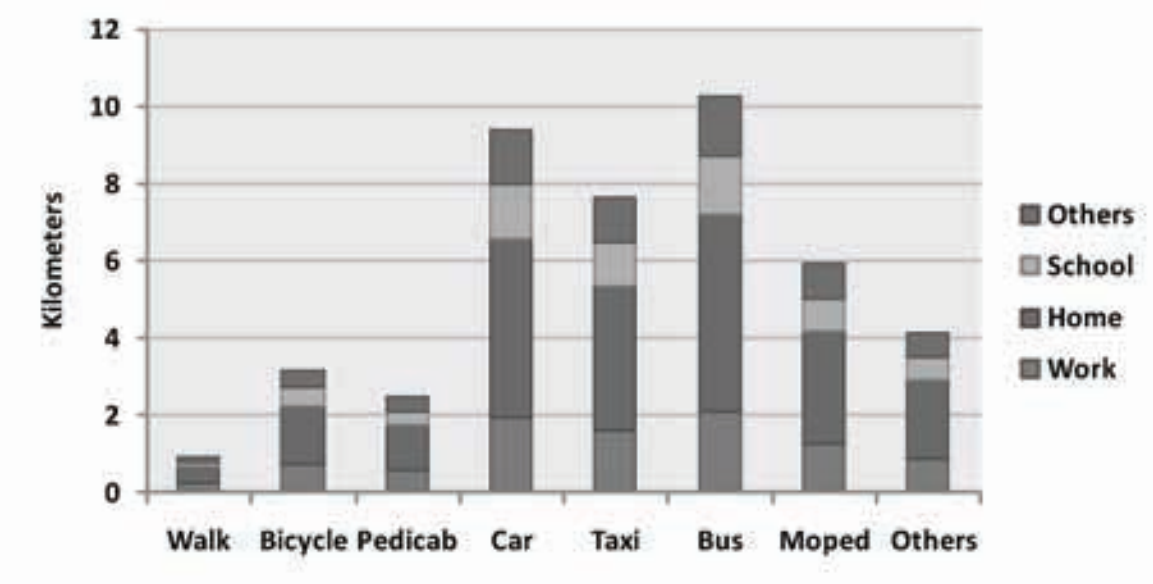


PRC = People's Republic of China.

Source: Compiled by CAI-Asia Center. 2010. Detailed sources include Asia Pacific Energy Research Center. 2007. Urban Transport Energy Use in the APEC Region; ADB. 2001. Urban Indicators for Managing Cities: Cities Data Book; ADB. 2007. A Development Framework for Sustainable Urban Transport—Regional Technical Assistance Report; China Communications Press. 2008. Sustainable Urban Transportation: Context, Challenges and Solutions; Doi, N. 2005. Urban Development and Transportation Energy Demand Motorisation in Asian Cities, presented at the APERC Workshop at the EWG30 APEC Energy Future; EMBARQ. 2009. Indian Cities Transport Indicators Database; Government of India, Ministry of Urban Development. 2008. Study on Traffic and Transportation Policies and Strategies in Urban Areas in India; Hoque, M. et al. 2006. Urban Transport Issues and Improvement Options in Bangladesh; Institute for Transportation and Development Policy. 2008. Pre-Feasibility Study for the Ahmedabad BRTS; Japan Bank for International Cooperation. 1999. Urban Public Transportation in Viet Nam—Improving Regulatory Framework; Japan International Cooperation Agency and Katahira & Engineers International. 2008. The Study of Master Plan on Comprehensive Urban Transport in Vientiane, Capital in Lao PDR, JICA; Japan International Cooperation Agency. 1999. Metro Manila Urban Transportation Integration Study Technical Report 4; Kathmandu Valley Mapping Program, 2002; Partnership for Sustainable Urban Transport in Asia; Schipper, L. et al. 2008. Measuring the Invisible: Quantifying Emissions Reductions from Transport Solutions; Seoul City Government. 2006. 4-Year Master Plan; University of the Philippines National Center for Transportation Studies.2001. Marikina Bikeways Study, Detailed Engineering Component, First Progress Report; World Bank. 2008. A Framework for Urban Transport Projects Operational Guidance for World Bank Staff; Zhou, Hongchang. 2001. Transportation in Developing Countries. Greenhouse Gas Scenarios for Shanghai, PRC

Figure 4 shows that in Ha Noi, many trips could be made by foot and bicycle because average trip lengths are low. But poor infrastructure forces people to abandon walking and cycling and use motorcycles instead.[5] The situation is similar in Manila where nearly 35% of destinations are within a 15-minute walk or bicycle trip, but the majority of short trips are made by paratransit (jeepneys and tricycles) and cars.[6] In Surabaya, a city that is only 15 km from north to south, over 60% of trips are under 3 km, but they are mostly made by motor vehicles such as motorcycle mopeds or by paratransit modes (Hook 2003).

Figure 4: Average Distance Traveled Per Trip by Mode and Purpose in Ha Noi (2006)



Source: Schipper et al. 2008. Measuring the Invisible: Quantifying Emissions Reductions from Transport Solutions—Ha Noi Case Study.

Even with high motorization rates, Asian cities still have high public NMT mode shares. In Bangkok, which has one of the highest motorization rates in Asia with 388 cars and 220 motorcycles per 1,000 people (World Bank 2009), a significant proportion (40%) of the population rely on walking.

Motorcycles in Ho Chi Minh City, Viet Nam.

Some pedestrians walk by choice even if they have the option to take alternative modes, but there are many "captive pedestrians" who walk because they cannot afford or do not have access to other transport modes. This is best illustrated by predictions that by 2020, 78% of households in the PRC and 72% in India will still not have access to private motorized vehicles (Pendakur 2000).

[5] Schipper, L. et al. 2008.
[6] Metro Manila Urban Transport Integration Study database.

Considering the deterioration of facilities and migration of people to motorized modes, it would be apt to say that "pedestrians are victims of policy neglect."[7] A recent study conducted by the World Health Organization (WHO) on global road safety concluded that "68% of countries in the world don't have national or local level policies that promote walking and cycling" (WHO 2009). The absence of such policies will contribute to the continued decline of pedestrian trips, and to shifts to private motorized modes.

2.3 Pedestrian Accidents and Fatalities

Almost half of the world's annual road traffic fatalities of approximately 1.3 million people are pedestrians, cyclists, and motorcyclists, and more than 90% occur in developing countries (WHO 2009).

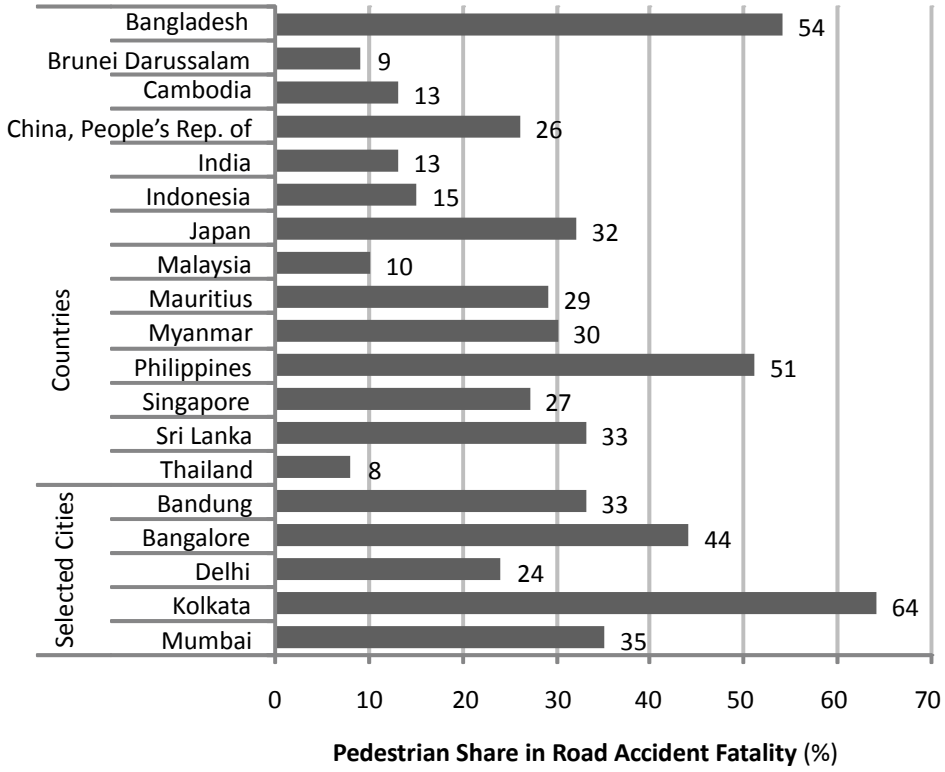
The WHO (2009) study that analyzed policies around the world related to road safety suggests that: "Our roads are particularly unsafe for pedestrians, cyclists and motorcyclists who, without the protective shell of a car around them, are more vulnerable. These road users need to be given increased attention. Measures such as building sidewalks, raised crossings and separate lanes for two wheelers; reducing drink-driving and excessive speed; increasing the use of helmets and improving trauma care are some of the interventions that could save hundreds of thousands of lives every year. While progress has been made towards protecting people in cars, the needs of these vulnerable groups of road users are not being met."

It is interesting to note that pedestrians constitute a higher share of total fatalities in cities where pedestrian facilities do not meet the demand. For example, although the national pedestrian fatality share in India is 13% of road accidents, metropolitan cities like New Delhi, Bangalore, and Kolkata have pedestrian fatality shares greater than 40%. Similarly, in Kathmandu, pedestrians represented 40% of all road accident fatalities in the city in 2001 (Kathmandu Valley Mapping Program 2002). In Ulaanbaatar, Mongolia, 80% of the reported traffic fatalities are pedestrians (Government of Mongolia 2007).[8]

The problem is even more severe when the impact on the most vulnerable groups in society, such as children and the elderly, is assessed. For example, in Bangalore, three pedestrians are killed on roads every other day and more than 10,000 are hospitalized annually (*Deccan Chronicle* 2009). Elderly people and school children comprise 23% of the fatalities and 25% of the injuries. Children under 10 years old are the most vulnerable pedestrian group in Thailand (Hossain 2010). It is also worth noting that injuries for traffic accidents are typically under-reported; the actual values are likely to be higher than those reported.

[7] World Health Organization. 2009. Global Status Report on Road Safety: Time for Action.
[8] From 2000 to 2007.

Figure 5: Pedestrian Fatality Share of Road Accidents in Asian Countries and Selected Cities (%)



Source: Ministry of Urban Development. 2008. Study on Traffic and Transportation Policies and Strategies in Urban Areas in India; World Health Organization. 2009. Global Status Report on Road Safety: Time for Action.

2.4 Air Pollution Exposure

A special report by the Health Effects Institute (HEI) synthesizes the best available evidence on the assessment of exposure to traffic-related air pollution in the United States (US) (HEI 2010). It concludes that the high exposure zone to traffic emissions stretches from 300 to 500 meters in highways or major roads (the range reflects the variable influence of background pollution concentrations, meteorological conditions, and season). The study also estimated that 30%–45% of people living in large North American cities live within such zones (HEI 2010).

Considering the density of many Asian cities, the percentage of people living or working within high exposure zones is likely to be higher. Pedestrians are also exposed to very high levels of air pollution as they often walk along these busy roads. In a study conducted by the East-West Center (2007) in Ha Noi, pedestrians were found to be exposed to 495 $\mu g/m^3$ of particulate matter (PM), motorcyclists to 580 $\mu g/m^3$, car drivers to 408 $\mu g/m^3$, and bus passengers to 262 $\mu g/m^3$.

3. Assessing the Walkability of Cities

"Walkability" is a term used to describe and measure the connectivity and quality of walkways, footpaths, or sidewalks in cities. It can be measured through a comprehensive assessment of available infrastructure for pedestrians and studies linking demand and supply.

Some cities have undertaken comprehensive studies and city plans to improve walkability. Transport for London (2004) defines walkability as "the extent to which walking is readily available to the consumer as a safe, connected, accessible and pleasant activity." For New Zealand, it was defined as the extent to which the built environment is walking-friendly (New Zealand Transport Authority 2007). Abu Dhabi has developed an Urban Street Design Manual that integrates the concept of the pedestrian realm into overall street composition. Other cities, particularly in Europe, have developed plans and supporting policies specifically to improve the walkability and cyclability of the whole city.

In India, a walkability index was used in one of the studies commissioned by the Ministry of Urban Development (MOUD). The index was a function of the availability of footpaths and a pedestrian facility rating. This study indexed 30 cities of all sizes on walkability and assessed them based on the availability of footpaths on major arterial roads, and the overall facility rating by pedestrians themselves (Government of India, MOUD 2008). The perception of pedestrians was gauged on the availability and quality of footpaths, obstructions, maintenance, lighting, security from crime, safety of crossings, and other qualitative factors. A low rank indicates inadequate and substandard pedestrian facilities. The national average index in 2008 was 0.52 (Centre for Science and Environment 2009). In addition, the MOUD also developed an urban transport benchmarking tool that uses three indicators to calculate the pedestrian facility rating—signalized intersection delay(s) per pedestrian, street lighting (Lux), and the percentage of the city covered with footpaths wider than 1.2 meters.

A popular website calculates walkability based on the distance from your house to nearby amenities.[9] Walk Score measures the ease of a car-free lifestyle, but it does not include any assessment of the quality of pedestrian facilities, such as street width and block length, street design, safety from crime and crashes, pedestrian-friendly community design, and topography. Many Asian cities can generate high scores in Walk Score because of the traditionally mixed-use character of the cities.

The Global Walkability Index (GWI), as developed by H. Krambeck for the World Bank, provides a qualitative analysis of walking conditions including the safety, security, and convenience of the pedestrian environment.[10] This analysis provides a better understanding of the current walkability of Asian cities and is able to identify ways to improve pedestrian facilities.

[9] See www.walkscore.com/

[10] More information on the Global Walkability Index is available at http://cleanairinitiative.org/portal/node/4238

4. Field Walkability and Pedestrian Ratings

4.1 Methodology

The methodology used in this study is based on the GWI and includes a field walkability survey and a government policy and institutional. The study added a pedestrian survey to gather people's sentiments regarding their walking environments. The details of the methodology are provided in Annex 1.

4.1.1 Field Walkability Survey

To provide a holistic approach that links design and execution with user perception and the built environment, the GWI was slightly modified to accommodate complete route assessments.

For each city, field walkability surveys were carried out in residential, educational, and commercial areas and around public transport terminals. Pedestrian volume is the main parameter used in the selection of the survey areas. Reconnaissance surveys and suggestions by the local partners implementing the survey were used in selecting the areas to be surveyed. Complete route assessments were conducted in these preselected areas by following the logical pedestrian routes in the specific areas.

The areas were surveyed using the parameters in the GWI, with slight modifications to the descriptions to make them more applicable in the Asian context, as shown in Table 2.

Table 2: Field Walkability Survey Parameters

Parameter	Description
Walking Path Modal Conflict	The extent of conflict between pedestrians and other modes, such as bicycles, motorcycles, and cars on the road.
Availability of Walking Paths	This parameter is added to the original Global Walkability Index (combined with the original parameter "Maintenance and Cleanliness"). It reflects the need for, availability, and condition of walking paths.
Availability of Crossings	The availability and distances between crossings to describe whether pedestrians tend to jaywalk when there are no crossings or when the distances between crossings are too long.
Grade Crossing Safety	This refers to the exposure of pedestrians to other modes while crossing, the time spent waiting and crossing the street, and the sufficiency of time given to pedestrians to cross signalized intersections.
Motorist Behavior	The behavior of motorists toward pedestrians, which may well indicate the kind of pedestrian environment there is in that area.

continued on next page

Table 2 *continued*

Parameter	Description
Amenities	The availability of pedestrian amenities such as benches, street lights, public toilets, and trees. These amenities greatly enhance the attractiveness and convenience of the pedestrian environment, and in turn, the city itself.
Disability Infrastructure	The availability, positioning, and maintenance of infrastructure for the disabled.
Obstructions	The presence of permanent and temporary obstructions on the pedestrian pathways. These ultimately affect the effective width of the pedestrian pathway and may cause inconvenience to the pedestrians.
Security from Crime	The general feeling of security from crime in the street.

Source: Krambeck, H. 2006.

Field surveyors were asked to rate the road stretches from 1 to 5 for each parameter (1 being the lowest and 5 the highest) in each of the area types. The averages for each of the parameters were translated into a rating system from 0 (lowest score) to 100 (highest score). The walkability ratings in the different area types in each city were derived by taking the average of the individual parameters' averages. The final city walkability ratings were derived by averaging the walkability ratings in the different area types in each city.

The method of deriving the “walkability rating” in this study differs from the GWI as the latter is influenced by the number of people walking (pedestrian count) during the time of the survey and the length of the stretch being surveyed. This study excludes these two factors to eliminate the inherent bias generated by the number of people walking on a certain stretch and its length. Utilization per se should not be used as a parameter in assessing the walkability of a certain area because it penalizes good areas with lower utilization rates. This argument also holds true for distance. The lengths of surveyed roads and/or streets were documented and pedestrian counts conducted, but not used in deriving the walkability ratings (Table 3).

One of the limitations of the field walkability surveys is the subjectivity of responses, as they greatly depend on the individual assessments of the surveyor, especially in this case, where there were various organizations and individuals involved in carrying out the surveys.

4.1.2 Pedestrian Interview Survey

A short questionnaire on travel and social characteristics as well as the preferences of the respondents was prepared. The questionnaire was filled out by a surveyor while interviewing pedestrians. However, in some cases it was difficult to stop pedestrians for an interview. In these cases, other people in the area, such as pedestrians waiting for a ride, were interviewed.

Both the field walkability survey and the pedestrian interview survey were mostly conducted from 3 p.m. to 5 p.m. to capture the afternoon peak-hour pedestrian movement.

4.2 Results of the Field Walkability Surveys

Table 3 provides an overview of the length of roads and/or streets surveyed in the 13 Asian cities. It is noted that due to some field constraints, only short stretches of roads and/or streets were surveyed as compared to the suggested minimum length per area, i.e., 4 kilometers (km) for residential and educational areas, 5 km for commercial areas, and 2 km for public transport terminal areas.

The pedestrian count showed logical results (Table 3), as the highest numbers of pedestrians were found in higher pedestrian volume areas, such as commercial areas, public transport terminals, and educational areas, and the lowest numbers of pedestrians were found in residential areas.

Table 3: Surveyed Length and Pedestrian Count

City	Residential		Educational		Commercial		PT Terminal	
	Length (km)	Ped Count	Length (km)	Ped Count	Length (km)	Ped Count	Length (km)	Ped Count
Cebu	2.65	934	3.11	3,451	2.40	4,630	3.56	4,777
Colombo	6.00	247	16.00	1,457	11.00	1,459	1.00	825
Davao	1.62	279	1.48	1,770	1.77	1,546	1.16	441
Ha Noi	2.00	592	4.25	1,264	4.81	1,408	1.80	221
Ho Chi Minh City	2.72	613	4.45	1,319	5.05	1,830	0.54	160
Hong Kong, China	3.20	654	2.40	517	6.30	6,653	–	–
Jakarta	12.80	1,165	3.10	1,620	10.40	4,727	3.70	969
Kathmandu	19.84	4,196	12.64	3,783	8.24	7,557	18.28	12,180
Lanzhou	4.51	209	6.31	183	3.90	222	3.60	385
Metro Manila	–	–	2.20	3,730	2.54	2,956	1.52	2,243
Ulaanbaatar	5.70	783	7.10	2,855	5.97	262	5.90	3,865
Total	**59.78**	**9,883**	**60.64**	**21,432**	**56.08**	**26,597**	**41.06**	**26,066**

km = kilometer, Ped = pedestrian, PT = public transport.
Source: Authors.

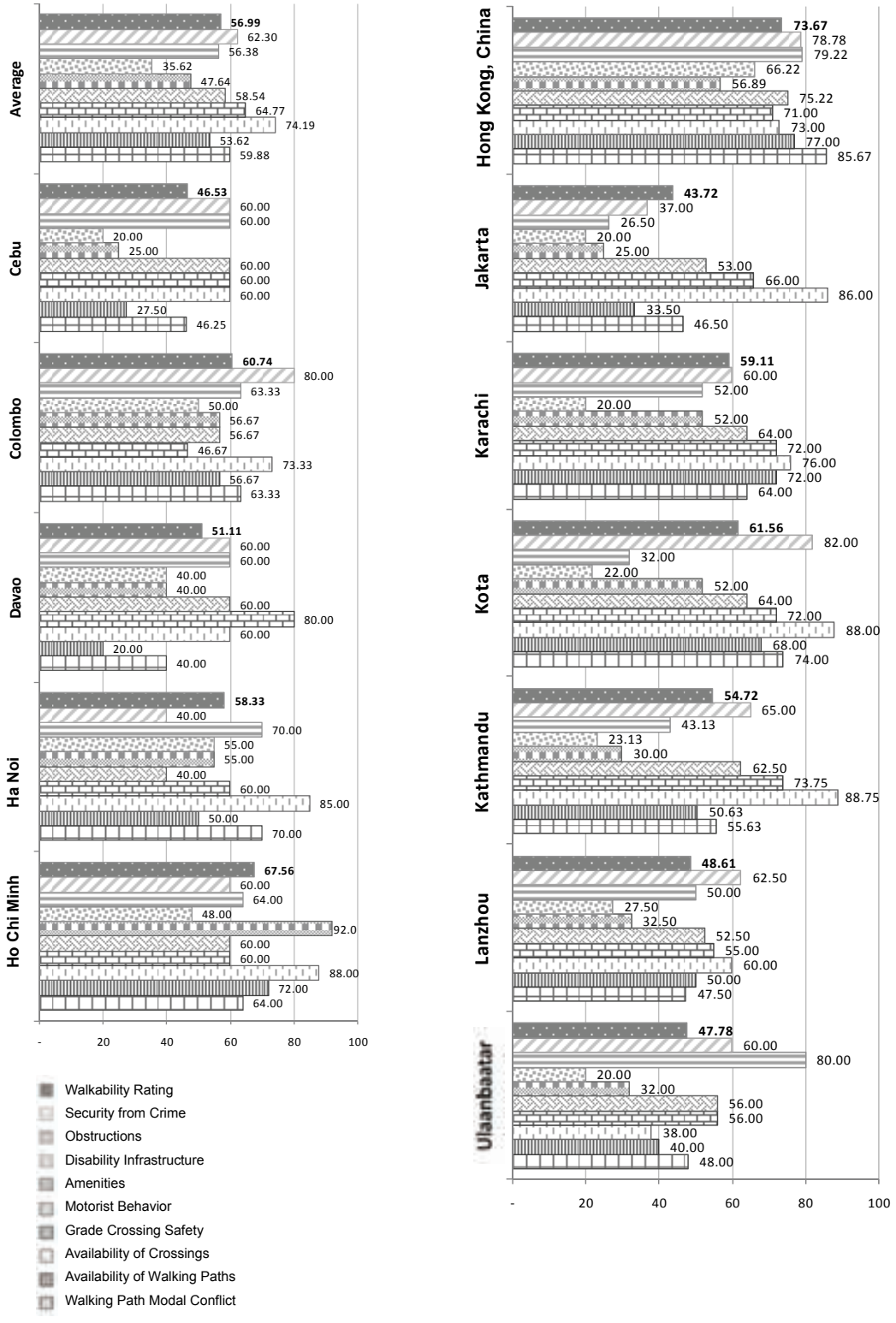
4.2.1 Residential Area Surveys

The average field walkability rating in the residential areas is 56.99 out of 100 (Figure 6). The highest is in Hong Kong, China, where surveyors observed adequate availability of walking paths, positive motorist behavior, fewer obstructions, and security from crime. Jakarta had limited infrastructure with several obstructions, and traffic was not adequately managed with calming devices thus making people feel unsafe near their homes.

Despite its high overall ratings, Davao was identified as having limited pedestrian facilities, and many spaces where sidewalks were constructed had uncovered drainage. Ho Chi Minh City (HCMC) seemed to offer the best amenities, such as shading, for pedestrians. This is encouraging as the city is constructing a metro and other mass transit facilities. If the connectivity between stations and commercial and residential buildings can be improved, the number of motorcycle and car trips can be reduced.

The ratings for individual parameters combining all surveyed cities (Figure 6) suggest that people found that crossings are generally available in the residential areas (74.19). It should be noted that vehicle traffic in residential areas is generally lower and thus pedestrians can easily cross streets. On the other hand, disability infrastructure scored very poorly (35.62) indicating that access to walking infrastructure is a big issue.

Figure 6: Walkability Ratings of Surveyed Residential Areas by Parameter



Source: Authors.

Vehicles parked on the sidewalks in Kebayoran Baru (residential area) in Jakarta, Indonesia.

Sidewalk in one residential area in Cebu, Philippines.

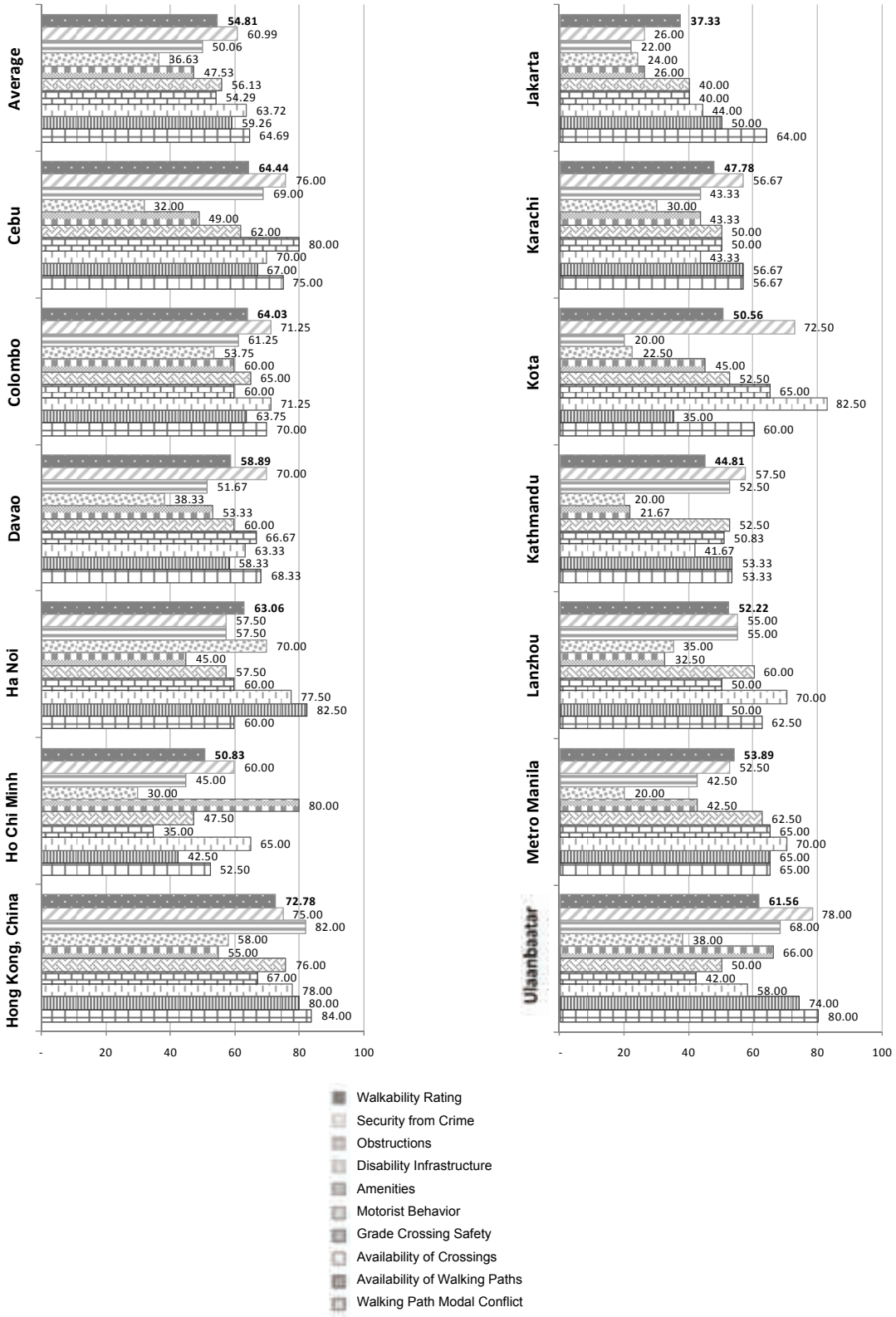
4.2.2 Educational Area Surveys

The average walkability rating in the educational areas is 54.81 out of 100 (Figure 7). This is very significant as accident statistics often show that school children are prone to road accidents. This suggests that schools and colleges may not provide quality sidewalks or convince city authorities to further improve the pedestrian environment in their vicinity.

Walking path modal conflict is the highest rated parameter (64.69), which suggests that people found that there is minimal modal conflict in the streets surveyed, probably due to the traffic-calming facilities in place. Similar to residential areas, disability infrastructure received the lowest rating (36.63). In Davao, many road stretches are unpaved and used as parking areas, thus forcing pedestrians to walk on the road. Where there are sidewalks, these are also either used as parking or used by street vendors, especially near schools where students are their main customers.

Jakarta's ratings suggest that people feel insecure from crime, and that pedestrian infrastructure was very limited, having poor quality, no amenities, and many obstructions. In many cities, the absence of any nearby security or police presence and the proximity to informal settlers were often cited as reasons for feeling unsafe. Hong Kong, China had the best rating (72.78) for educational areas.

Figure 7: Walkability Ratings of Surveyed Educational Areas by Parameter



Source: Authors.

Students at the university belt area in Manila, Philippines.

Sidewalks and streetscape in one educational area in Ho Chi Minh City, Viet Nam.

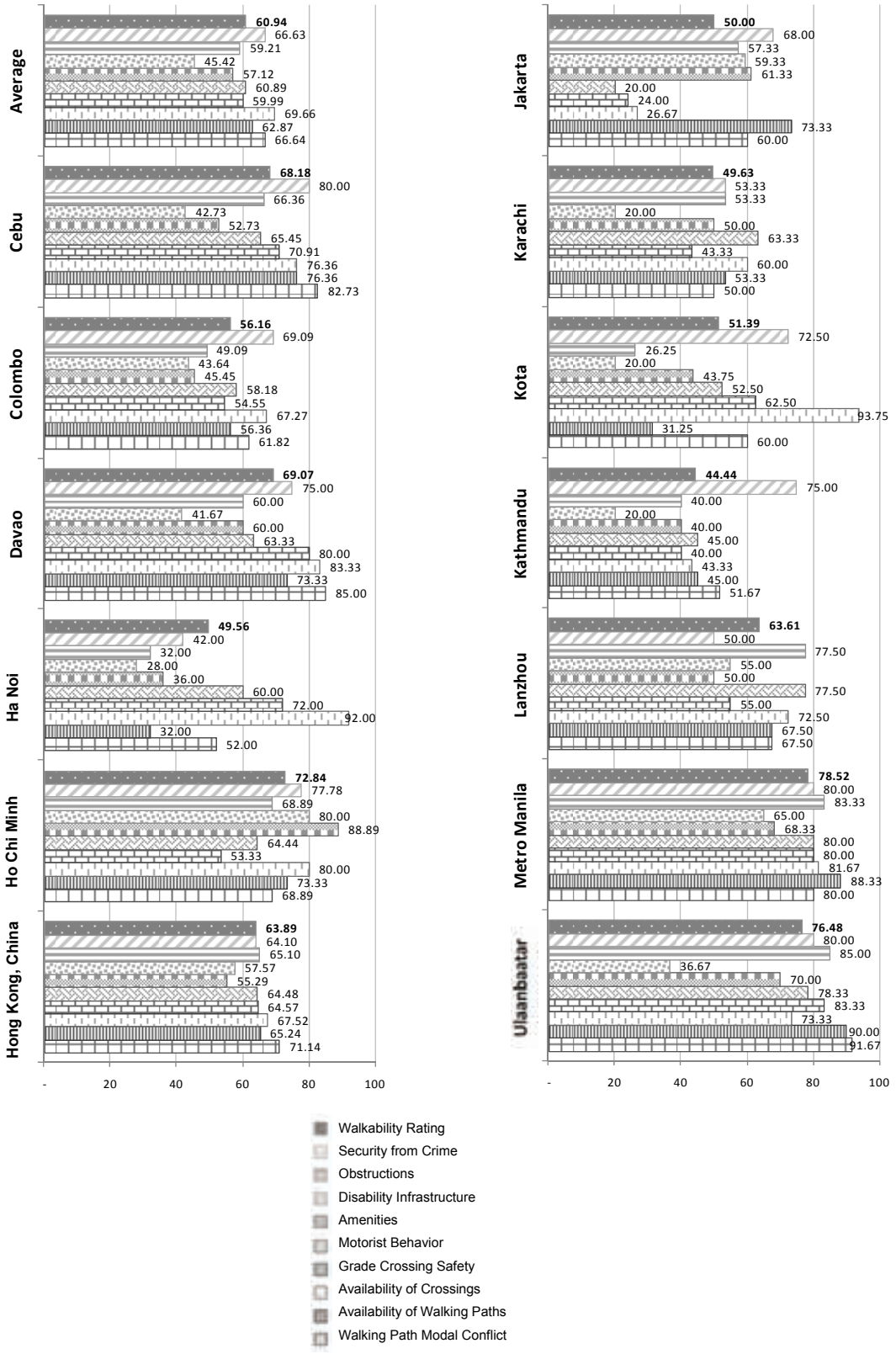
4.2.3 Commercial Area Surveys

The average walkability rating in commercial areas is 60.94 out of 100 (Figure 8), the highest among the four different area types. Almost all of the parameters averaged a score more than or equal to 60, except for the disability infrastructure parameter, which again scored the lowest. This is not unexpected since several studies have shown that a good pedestrian environment positively supports commercial establishments.

The results for Metro Manila and Kathmandu are contrasting. While Metro Manila (78.52) had high ratings, perhaps due to the general condition of the walking environment in the surveyed pedestrian route in the commercial business districts, Kathmandu (44.44) had relatively lower ratings. Metro Manila had relatively higher ratings for the footpaths and sidewalks around commercial areas, low conflicts with other modes, and excellent crossing facilities, which could be due to strict enforcement by the Metro Manila Development Authority (MMDA) and/or the business district association in some areas. On the other hand, due to this strict enforcement, pedestrians are being corralled into very narrow spaces to ensure that vehicle flow is not affected, thus often creating a “pedestrian traffic jam.” It is also important to note that good walkability around some commercial areas is by no means a reflection of walkability across the city. In almost all of the cities, there are numerous street vendors or hawkers along sidewalks and footpaths in commercial areas.

Kathmandu, on the other hand, had very poor ratings for transport-disadvantaged people and very poor infrastructure with many obstructions. There was no exclusive space offered for hawkers or street vendors. But the ratings for security from crime were high, indicating the presence of traffic or police enforcers in the area.

Figure 8: Walkability Ratings of Surveyed Commercial Areas by Parameter



Source: Authors.

Chundrigar Road in a commercial area in Karachi, Pakistan.

Tourists in a commercial area in Ho Chi Minh City, Viet Nam.

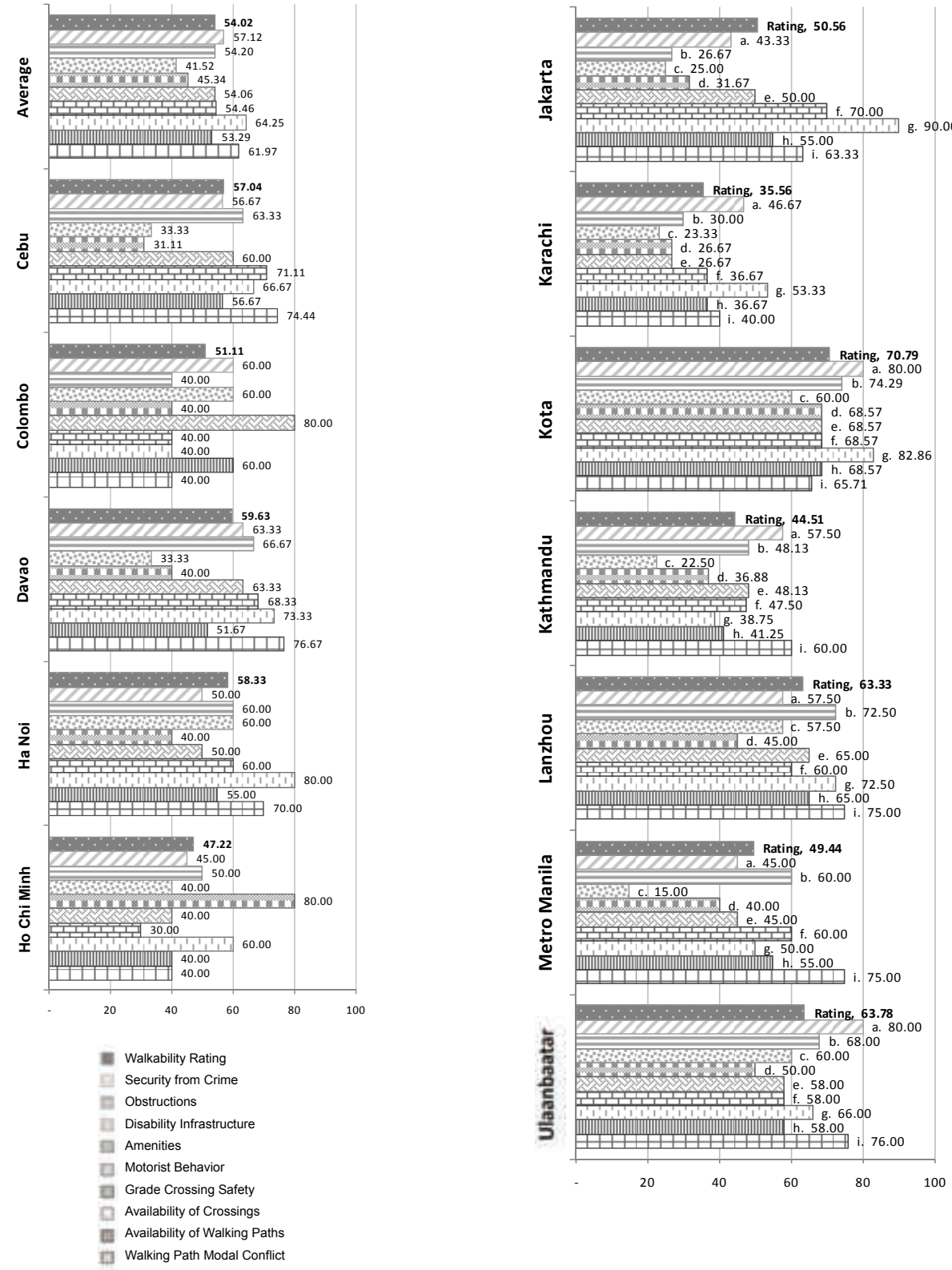
4.2.4 Public Transport Terminals Survey

The average walkability rating in the areas around public transport terminals is 54.02 out of 100 (Figure 9). Similar to the educational areas, walking path modal conflict is the highest rated parameter (61.97). Again, as in the residential and educational areas, the disability infrastructure parameter received the lowest rating (41.52).

Among all the cities surveyed, Kathmandu and HCMC received the lowest ratings. Ha Noi, a city with a similar number of motorcycles to HCMC, was rated much higher, even when compared to the other cities. Kota received the highest rating because the surveyed area went through the *cantonment* area, a military establishment with very good pedestrian facilities.

It was interesting to note that Ulaanbaatar received good ratings, considering that there is no formal public transport terminal in the city. The area surveyed was in a bus terminal near the main junction area for north–south and east–west bus trips. The total ratings in Ulaanbaatar were high due to high ratings for perceived security from crime.

Figure 9: Walkability Rating around Surveyed Public Transport Terminals by Parameter



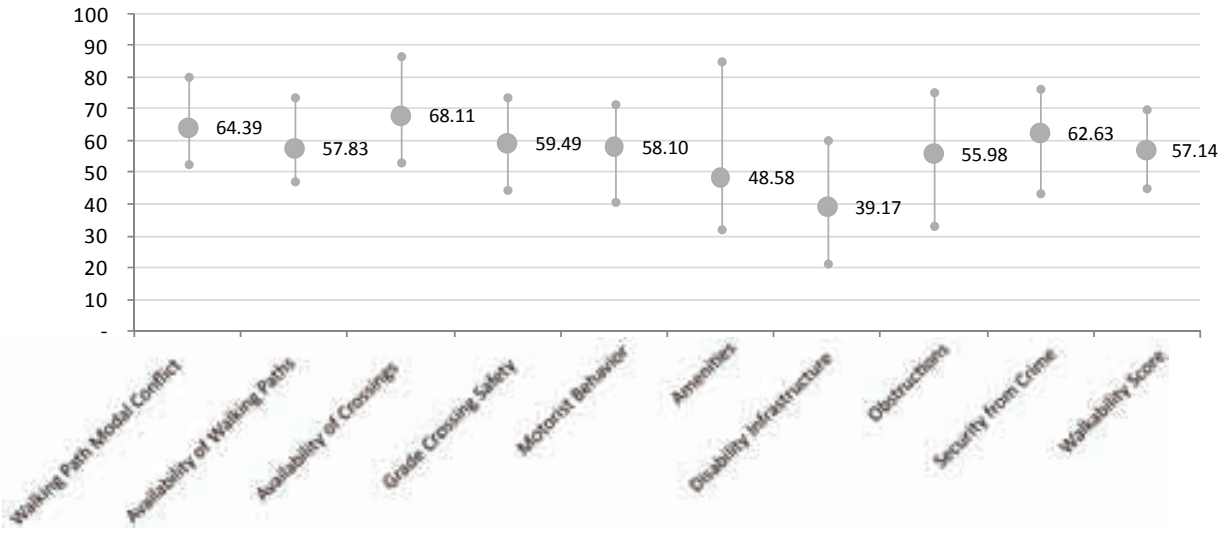
Source: Authors.

Sidewalks near a public transport terminal in Davao, Philippines.

Pedestrians crossing toward a public transport terminal in Lanzhou, PRC.

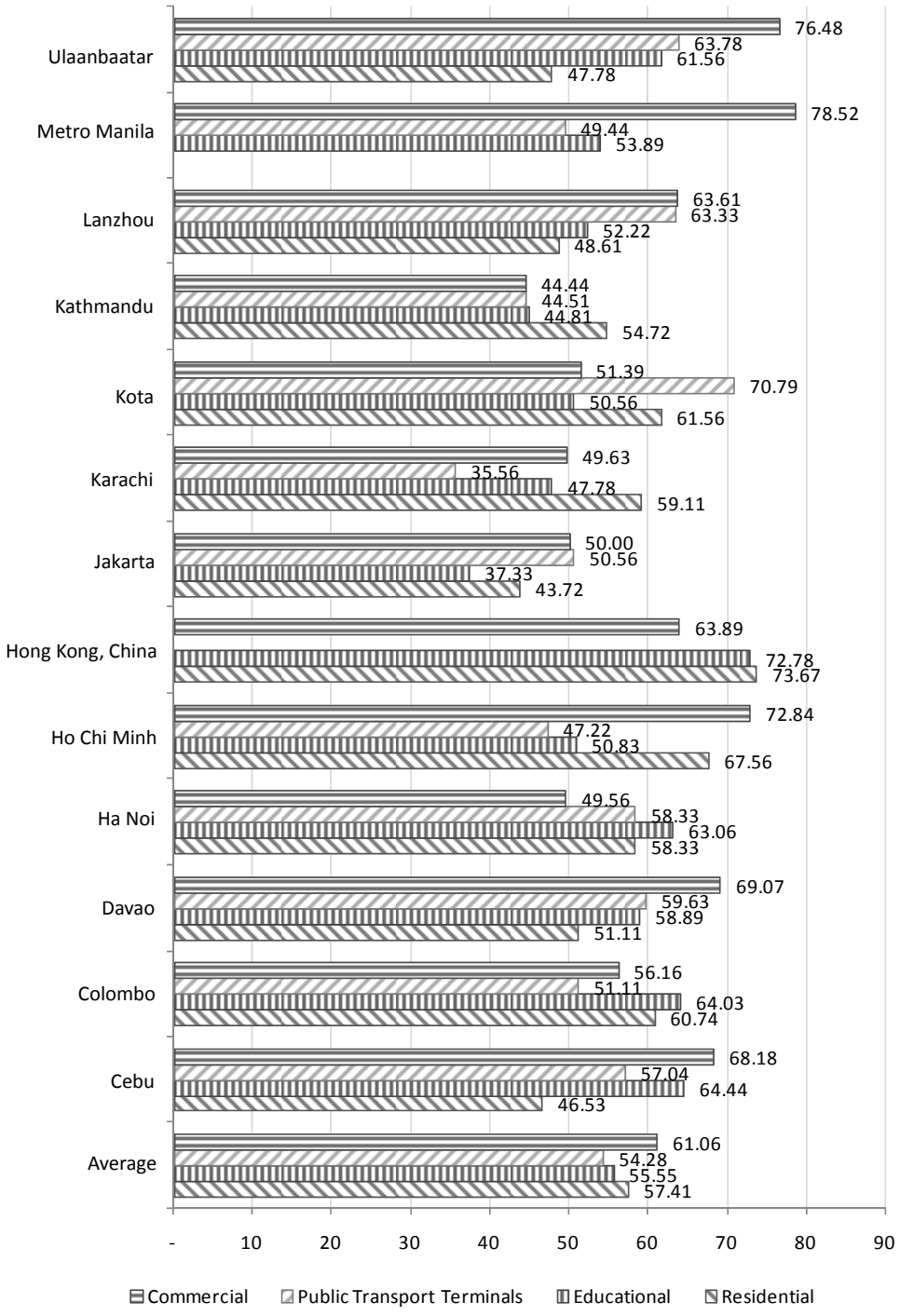
Figure 10 shows the average rating of all surveyed cities by parameter. Interestingly, the availability of disability infrastructure received the lowest average rating while the availability of crossings received the highest average rating in the field surveys. The low ratings for pedestrian amenities and obstructions also show that the surveyed roads and streets are not pedestrian-friendly. While crossings are sufficient, there is relatively less vehicle–pedestrian modal conflict, and there is perceived security from crime, obstructions will discourage pedestrians from maintaining walking as their primary mode of transport.

Figure 10: Average Rating by Parameter for All Cities



Source: Authors.

Figure 11: Overall Rating by Area for All Cities



Source: Authors.

Overall, commercial areas were rated highest, followed by residential areas. In several cases, these areas are relatively richer in terms of available resources for road infrastructure. Most of the residential field surveys leaned on the relatively higher or medium-income residential areas hence the high ratings of pedestrian facilities (Figure 11). Unfortunately, the surveyed residential areas may not necessarily well represent residential areas in the cities, as most of these cities have low or lower income residential areas where pedestrian facilities are limited, or not available at all.

Public transport terminals received the lowest average rating among the different types of areas. This is alarming as several intermodal trips are generated at such terminals and with poor facilities, the chances of linking public transport facilities with feeder modes to promote public transport are reduced. Improving walkability provides an opportunity to maximize pedestrian access to public transport as part of future public transport projects.

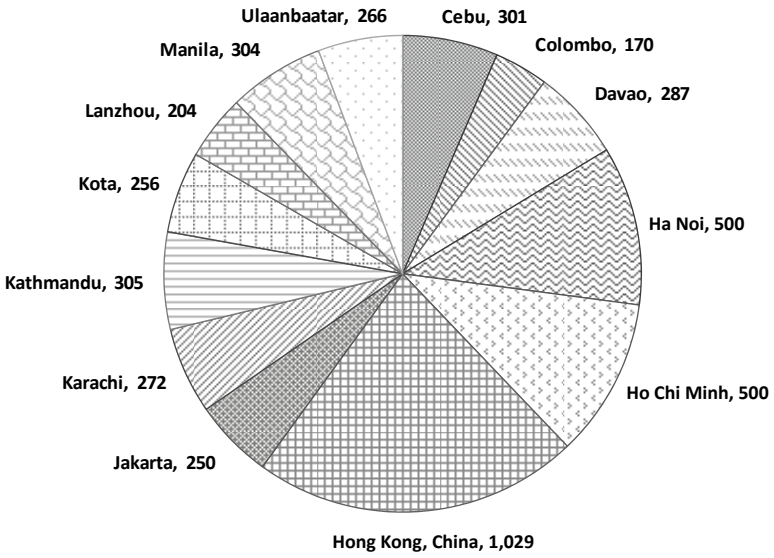
It is of equal concern that educational areas also received low ratings, especially because this affects children and youths in general.

The field walkability survey showed that there are significant opportunities to improve the pedestrian environments across the surveyed cities. However, the surveyed roads and/or streets were less than 1% of the total roads available in the cities, and only captured high pedestrian areas in four major areas. To compile a better profile of the walkability of the city, there is a need to scale up the field walkability surveys across cities, across zones, and across roads.

4.3 Results of the Pedestrian Interview Surveys

Pedestrian interview surveys were conducted in the 13 cities to validate the results of the field surveys and to collect the actual sentiments of the pedestrians themselves. A total of 4,644 pedestrians were interviewed on how they rated the walkability of a specific area and what makes a good pedestrian facility, including specific improvements needed. Figure 12 provides an overview of the number of respondents per city. The minimum number of suggested samples was 50 respondents per area. The resources available, outdoor conditions, and the willingness of the people to be interviewed influenced the number of respondents per area. The questionnaire was designed based on discussions with experts and policy makers. The surveyors used local language in conducting the surveys to facilitate better comprehension of the questions by the interviewees.

Figure 12: Number of Pedestrian Interview Survey Respondents



Source: Authors.

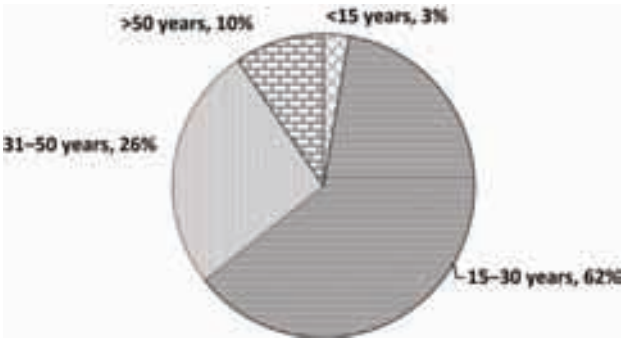
The set of questions included attitudinal, socioeconomic, and hypothetical questions. To capture a balanced sample, an attempt was made to collect similar sample sizes from each city—at least 50 respondents for each area—but total respondents for each city ranged from 250 to 300 on average. People were interviewed mainly on the streets, sometimes at bus stops and in shops, and in some cases they were interviewed inside offices. Interviewers experienced varying degrees of difficulty in obtaining responses, therefore, the number of respondents varied among the different cities.

4.3.1 Profile of Respondents

Survey participants were nearly evenly split between male (55%) and female (45%). The majority of respondents (65%) were in the age group 15–30 years (Figure 13).

Nearly 37% of people interviewed came from households that do not possess motorized vehicles and thus are captive to public NMT modes. Of the households with vehicles, 64% have two-wheelers and 31% have cars.

Figure 13: Age Group of Respondents

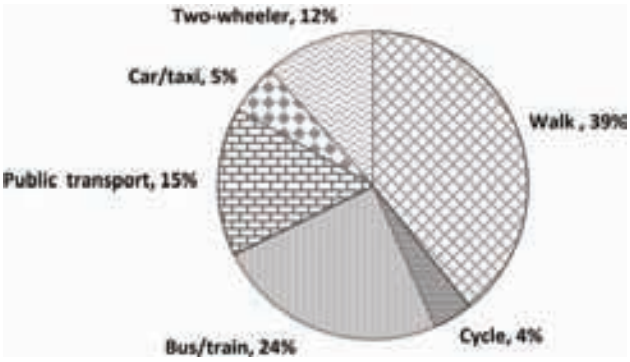


Source: Authors.

4.3.2 Travel Characteristics

Most often, travel entails trip chaining or using multiple transport modes. Walking constitutes 39% of trip mode share. Figure 14 shows the daily modes used by the people interviewed. It is interesting to note that cars and taxis only constituted a small share (5%) and that public transport and intermediate public transport or paratransit had a combined share of 40%.

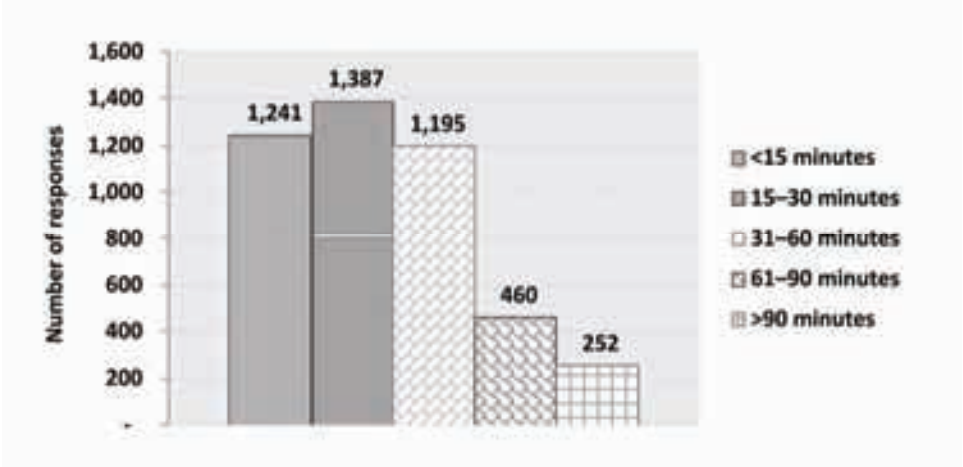
Figure 14: Travel Mode Share of Respondents



Source: Authors.

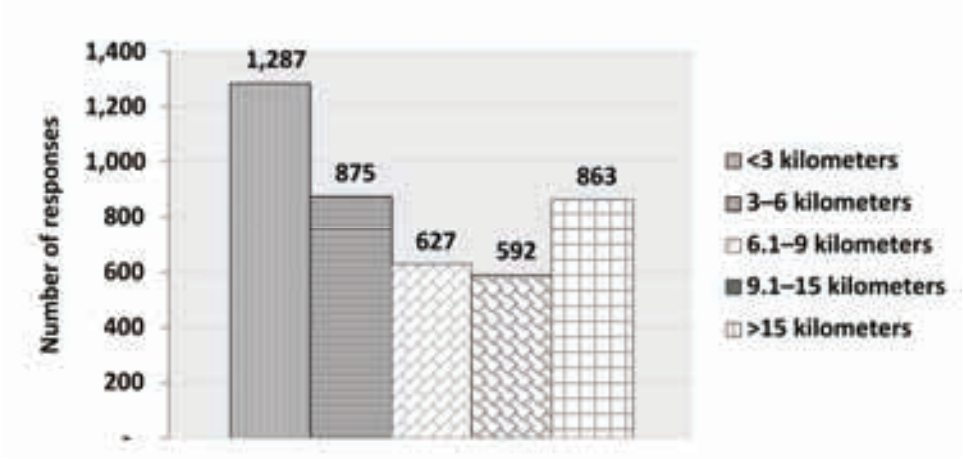
The average travel time (one-way) as estimated by the respondents (Figure 15) shows that the majority of trips are within 15–30 minutes (31%) and below 15 minutes (27%). This corresponds with the estimated trip lengths (Figure 16) of 3–6 km (21%) and below 3 km (30%). These results validate the estimates made in Section 2, where trip lengths from various studies and cities were shown. The mixed-use and high density character of these cities restricts trip lengths, with nearly 60% of all trips having a travel time of less than 30 minutes and trip lengths of less than 6 km.

Figure 15: Average Travel Time of Respondents



Source: Authors.

Figure 16: Average Trip Length of Respondents



Source: Authors.

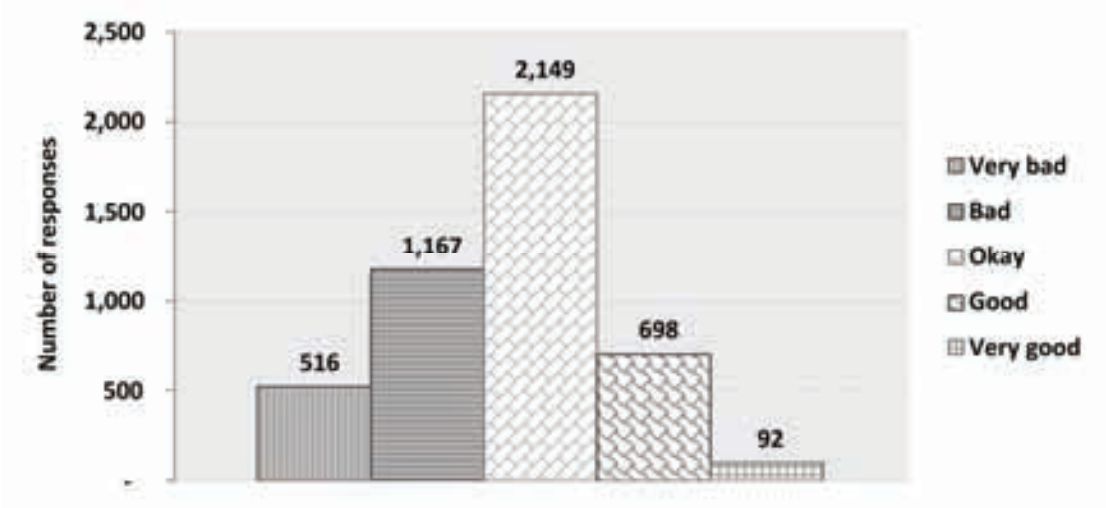
The travel characteristics show that a combination of walking, cycling, and public transport can easily provide access to the majority of destinations within a city.

4.3.3 Pedestrian Preference

The respondents were asked how they would rate the walkability of the area in general terms. Of the total respondents, 36% considered the pedestrian environment to be in the “bad” and “very bad” categories, while 46% considered the facilities to be adequate and 16% considered the facilities to be “good” or “very good.”

While many may argue that pedestrian facilities in Asian cities are worse than shown in the results of both the field walkability and pedestrian preference surveys, or vice-versa, the results show that local citizens of these cities are not complacent and would like to have more improvement in their pedestrian environment.

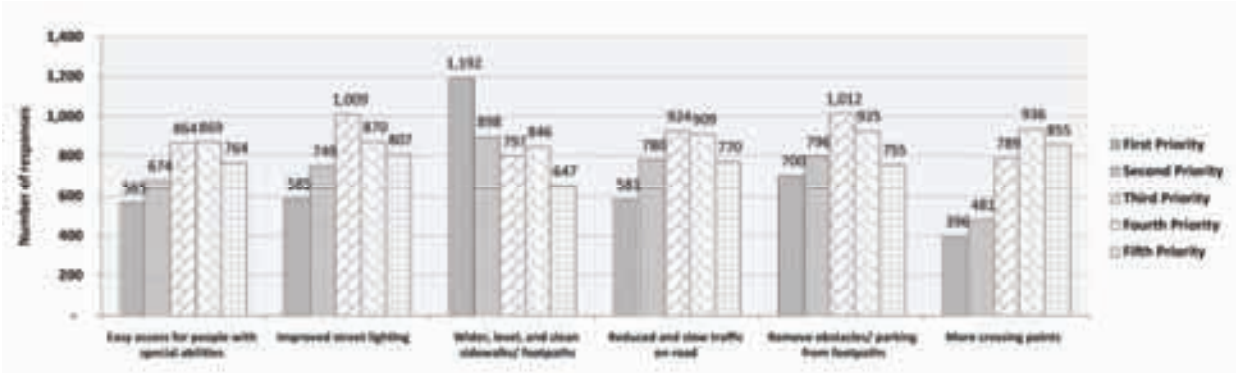
Figure 17: Respondents' Ratings of Pedestrian Facilities



Source: Authors.

To understand the preferences of pedestrians for facility improvements, the respondents were asked to rank the different types of facility improvements on a priority scale. The figure below indicates that the top priority given was to provide wider, level, and clean sidewalks and/or footpaths. This is followed by the removal of obstacles and/or parked cars from footpaths, with the third priority improved street lighting. The findings coincide with the field walkability survey results, in which low ratings were given to pedestrian amenities and obstructions. Surprisingly the "crossings," which are the main conflict locations, were of the least immediate priority, indicating a general sentiment that crossing points were adequate.

Figure 18: Respondents' Priorities for Improving Pedestrian Facilities

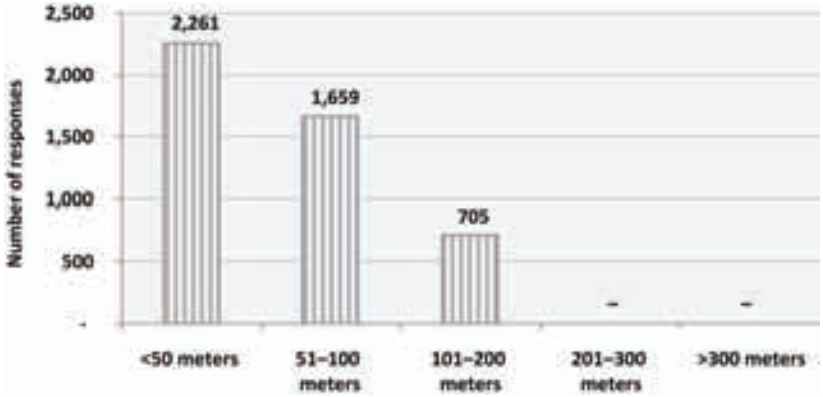


Source: Authors.

It is interesting to note that the survey respondents preferred at-grade crossings (49%) and skywalks (36%). Subways were preferred by 15% of the respondents. Ha Noi respondents (52%) were more agreeable to skywalks. The main reasons for this could be the high number of traffic accidents in the cities and the lack of facilities that provide safe opportunities to cross roads.

To get more insights on crossing behavior, the respondents were asked how far they would be willing to walk to access a pedestrian crossing (at grade and/or grade separated). The majority of respondents were willing to walk to access pedestrian crossings less than 50 meters away (49%) and within 50–100 meters (36%), as shown in Figure 19. Only 15% were willing to walk more than 100 meters to access crossings. This provides a challenge to policy makers and planners in planning for pedestrian crossings especially in dense areas with high volumes of pedestrian traffic. There may be a need to revise existing guidelines, which provide controlled crossings at only a few locations mid-block and at junctions that are more often separated by a long distance (greater than 300 meters).

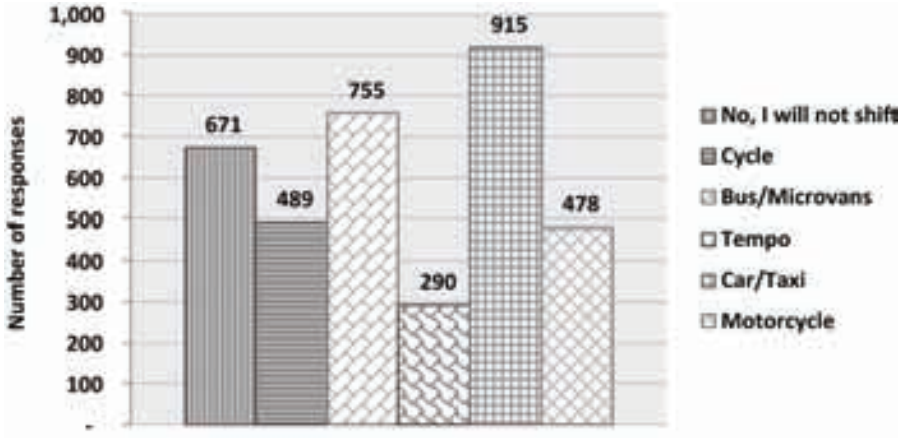
Figure 19: Respondents' Willingness to Walk to Access Pedestrian Crossings



Source: Authors.

Pedestrians are quickly migrating to other modes, encouraged by increasing motorization and inadequate pedestrian facilities. Of the total respondents, 81% indicated that they would shift to other modes if they could afford to—25% to cars and 13% to two-wheelers.

Figure 20: Transport Mode Preference if Pedestrian Facilities Are Not Improved



Source: Authors.

People's willingness to access pedestrian crossings and other destinations can vary depending on the walkability of the streets and the overall pedestrian environment. In hotter and more humid cities, people may tend to walk shorter distances. In such cities, improving the general walking environment and installing overhead canopies or shades can greatly increase the willingness of people to walk. In the Makati Business District, the main business district of Metro Manila, pedestrian improvements were implemented in 2005, such as covered walkways, elevated walkways, and underpasses, which increased pedestrian traffic volume by 200,000 on weekdays and increased the distance covered by pedestrians to 700 meters from 400 meters within the business district (Tan 2005).

5. Policies, Institutions, and Guidelines

This section presents the general findings of the study relating to policies, institutions (and their resources), and guidelines concerning walking environments and pedestrian facilities in Asia, particularly the cities where the surveys have been conducted. It utilizes information from the stakeholder interviews and as well as from the review of available literature on actual guidelines, policies, and plans relating to these subjects.

5.1 Government Policies, Strategies, and Plans

The main weaknesses identified by the public agencies surveyed in this study are the lack of relevant policies and political support that cater to the needs of pedestrians. While many Asian countries are either developing or strengthening their national policies for sustainable transport, particularly for public transport and nonmotorized transport (NMT), it is evident that the challenge lies in making certain that national policies are translated into local policies and that these are ultimately implemented with support from city officials.

Considering that there are a significant number of pedestrians and public transport commuters who rely on walking as a main mode of transport in their daily commute, it is important that civil society advocates for pedestrian improvements as well as a better public transport system. More importantly, poor people are mostly pedestrians and public transport users, and the quality of the urban transport system greatly impacts their quality of life and dictates how much time and money they spend traveling every day. As such, many Asian countries are now looking at strengthening the integration of pedestrians into transport planning.

In Malaysia, the Tenth Malaysia Plan (2011–2015) focuses on a new approach toward building vibrant and livable cities.[11] The historic approach for transport networks is to design them to move vehicles via roads and highways. The new approach focuses on "public transport as the primary spine, supported by a pedestrian-friendly street network." It also states that city planning shall promote a human-scale development approach—"designing cities to reduce the need to travel and to encourage the presence of people-centric activities within the urban landscape by concentrating a wide range of activities and amenities within walking distances." The plan recognizes that in order for such a city planning approach to succeed, it must be coupled with transit-oriented development. It states that "developers should take into account the needs of pedestrians and public transport, allocating sufficient wide roadways for buses and areas for bus stops, ensuring that public transport is easily accessible by foot from home or from work."

[11] Government of Malaysia, Economic Planning Unit of the Prime Minister's Department, 2010.

The draft strategy for the Philippines (created through Presidential Administrative Order No. 254) states that: "Reserving and reclaiming space for pedestrian traffic is as important as providing lanes for cars."[12] It identifies the promotion of effective accessibility and efficient mobility for all as a strategy toward achieving environment and people-friendly infrastructure development. Also, it identifies the provision of pedestrian lanes and bike lanes as a strategy for social equity and gender perspective. It also promotes walking as a utilitarian mode.

Singapore's Land Transport Master Plan is a "people-centered" plan that aims to achieve efficiency through multimodal integration: "As a maturing society, we will foster mutual accommodation and graciousness among the public transport commuters, motorists, cyclists and pedestrians who share our road space." It specifically states that in terms of pedestrian facilities, providing more covered linkways and pedestrian overhead bridges and underpasses are main priorities. The target is to have 384 pedestrian overhead bridges with fitted shelters (192 in 2008) by the end of 2010. Also, it states that pedestrian walkways, access to metro rail transit stations and bus shelters, and all public roads shall be barrier-free by the end of this year and shall cost a total of $60 million.

The specific measures under the program are the following*:*

(i) **Pedestrian walkways**. This includes ensuring a minimum of 1.0 meter to 1.5 meters clearance on walkways by removing obstacles or by widening the path, to provide a clear passageway for wheelchair users.

(ii) **Pedestrian crossings**. This includes
   a) removing the slight drop (25 millimeters) from the footpath to the road and providing tactiles to indicate the edge of the road for the visually impaired;
   b) thickening road crossing lines to guide the visually impaired to walk within the designated crossing;
   c) installing vibrating push button (with audio alert) at traffic signal posts to help the visually impaired; and
   d) providing at-grade i.e., road-level crossings where traffic conditions permit.

(iii) **Traffic signs**. This includes using higher reflectivity materials for traffic signs and street name signs to improve visibility.

(iv) **Interchanges**. This includes providing more ramps connecting bus interchanges and train stations.

Bangladesh's National Land Transport Policy also aims to create a better environment for pedestrians. It states that "more footways will be built in urban areas and a greater emphasis placed on pedestrian crossing facilities, especially the development of safe at-grade crossings." Bhutan's Tenth Five-Year Plan (2008–2013) also states that the government shall "encourage nonmotorized transport such as cycling and walking."[13]

[12] Government of the Philippines, Department of Transportation and Communication. 2009.

[13] Ministry of Communications of the Government of Bangladesh. 2004. National Land Transport Policy. www.moc.gov.bd/Documents/LandTransportPolicy/NLTP-bengali-english.pdf

In Mongolia, the National Transport Strategy states that one of its priorities in urban, suburban, and community areas includes the "provision of a functional transport system that is efficient, cost-effective, and safe for all users, including identification of the road hierarchy within urban areas, clear definition of priorities at intersections and improved facilities for pedestrian traffic." (Government of Mongolia, Ministry of Road, Transport and Tourism 2007)

The National Urban Transport Policy of India encourages integrated land use and transport planning, public transport, and nonmotorized modes by giving them priority in investments. "The Central Government would, therefore, encourage measures that allocate road space on a more equitable basis, with people as its focus. This can be achieved by reserving lanes and corridors exclusively for public transport and nonmotorized modes of travel." The Master Plan of Delhi 2021 specifies that all roads should be made pedestrian, disabled- and bicycle-friendly; that adequate pedestrian facilities should be provided; and that encroachments from sidewalks should be removed (Delhi Development Authority 2001). The National Policy on Urban Street Vendors, which was approved in 2009, legally recognizes street vendors as an "integral and legitimate part of the urban retail trade and distribution system" (Government of India, Ministry of Housing and Urban Poverty Alleviation 2009). It aims to incorporate hawking zones in the development of city or town master plans.

The Indian Central Motor Vehicles Rules 1989, Section 11 of the Rules of the Road Regulations states that "…pedestrians have the right of way at uncontrolled pedestrian crossings. When any road is provided with a footpath or cycle track especially for other traffic, except with permission of a police officer in uniform, a driver shall not drive on such footpath or track." (Government of India, Ministry of Road Transport and Highways 1989). The Indian Penal Code Section 283 states that "by doing any act, or by omitting to take order with any property in his possession or under his charge, causes danger, obstruction or injury to any person in any public way or public line of navigation, shall be punished with fine which may extend to two hundred rupees" (Government of India, Indian Penal Code 1860).

The Indian "Persons with Disabilities Act" gives guidance on how nondiscrimination toward persons with disabilities can be promoted. It states that the appropriate governments and local authorities shall, within the limits of their economic capacity and development, provide for the installation of auditory signals at red lights in the public roads for the benefit of visually-impaired persons; the making of curb cuts and slopes in pavements for the easy access of wheelchair users; engraving the surface of zebra crossings for the blind or visually-impaired; engraving the edges of railway platforms for the blind or for visually-impaired persons; devising appropriate symbols of disability; and warning signals at appropriate places. It also has provisions on nondiscrimination in the built environment and states that governments must provide facilities such as ramps in public buildings, especially hospitals, health centers, and rehabilitation institutions; toilets for wheelchair users; and Braille symbols and auditory signals in elevators (Government of India 1995).

The National Transport Policy of Sri Lanka states that the policy of the government is to "encourage the use of public transport, high occupancy vehicles and non-motorized transport" and to ensure that "the planning and development of infrastructure facilities includes reasonable provision for non-motorized vehicles and pedestrians" (Government of Sri Lanka, Ministry of Transport 2008) Also, the government has mandated that at least one-tenth of the space of all roads within urban areas are provided exclusively for NMT, such as sidewalks and bicycle lanes.

In Indonesia, as per the Traffic and Road Transport Act of Indonesia (Act 22/2009),

(i) motorists must give priority to the safety of pedestrians and bicyclists (Article 106 [2]);
(ii) pedestrians have a right to facilities such as pedestrian pathways, crossings, and other facilities; and pedestrians are given priority when crossing the road at pedestrian crossings (Article 131);
(iii) pedestrians must use the part of the road designated for pedestrians or use the far edge of the road, or use pedestrian crossing (Article 132 [1]);
(iv) if a pedestrian crossing does not exist, pedestrians must take responsibility for their own safety when crossing the road; and
(v) people with disabilities must wear special signs that are visible to motorists (Article 132 [3]).

The First Sustainable Development Strategy of Hong Kong, China, which sets out strategic objectives and targets toward achieving sustainable development, states that more pedestrian-oriented and green spaces should be provided for the enjoyment of residents and visitors alike.

Most of the available official government references on pedestrians and pedestrian facilities in Asia are in the form of plans and strategies. Only a few statutory and regulatory policies, which promote the improvement of pedestrian facilities and protect pedestrians, are in place.

5.2 Pedestrian Facilities, Design Practices, and Guidelines

Aside from the different government policies that are currently available in Asian countries that focus on pedestrians and pedestrian facilities, there is also a need to look into the current practices and guidelines that are being used in developing pedestrian facilities in Asia. The paragraphs below dissect the design considerations that are currently being applied for the different components of pedestrian facilities design in Asian cities.

Many Asian cities often reserve 15%–20% of total space for transport infrastructure. However, many cities also have as many as 10 different modes of transport, traveling at various speeds (e.g., 4–100 km/h). Their competition for road space oftentimes results in chaos, and increased injuries and fatalities of vulnerable users including pedestrians. This chapter provides an initial assessment of the current situation and practice related to providing footpaths and sidewalks in Asia.

The geometric design adopted for roads is based on the segregation of space concept. This concept is biased toward providing road space to vehicles, and leads to a lack of pedestrian facilities, which forces pedestrians to share the road with high speed vehicles, increasing traffic fatalities.

Traffic experts still rely on speed as a basis for performance measurement in urban areas, as found in the US Highway Capacity Manual and thus put more emphasis on improving speed rather than planning for streets that promote accessibility for all users. In practice, many pedestrian infrastructure development guidelines are based on the assumption that the movement of people mimics that of vehicles. These assume that people travel in a linear path, that faster speed indicates efficient flows and that a higher number of people indicates a

"congested" condition.[14] While others advocate for a more qualitative pedestrian level of service that includes elements like safety, security, convenience and comfort, continuity, system coherence, and attractiveness (Sarkar 1993), this is not often the case in Asia.

Worldwide, the opinion on free-flow speed is divided. Many believe that pedestrians travel at 60–80 meters per minute in Asia. Many also argue that this speed is further influenced by gender, age, and trip purpose. The "trip purpose" parameter differentiates the travel behavior of pedestrians from those of vehicles, as a complex movement pattern that involves waiting, shopping, and meeting. Thus, it is incorrect to design a facility that treats people as vehicles traveling at a uniform speed, as envisioned in capacity analysis.

Table 4 below gives the Indian capacity values of footpaths assuming a speed of 1.2 meters per second, which is used by designers to reserve space for pedestrians on roads.

Table 4: Indian Pedestrian Capacity Values

Width of sidewalk (meters)	Capacity in number of persons per hour	
	All in one direction	In both directions
1.50	1,200	800
2.00	2,400	1,600
2.50	3,600	2,400
3.00	4800	3200
4.00	6000	4000

Source: Authors.

According to the Institute of Transport Engineers (2001), mid-block locations may be warranted if:

(i) protected intersections crossings are more than 180 meters apart, or 100 meters apart in high pedestrian volume locations;
(ii) adequate sight distance is available; and
(iii) the combination of traffic and pedestrian volumes justifies the installation. Although simply installing marked crosswalks by themselves cannot solve pedestrian crossing problems, the safety needs of pedestrians must not be ignored. More substantial engineering and roadway treatments need to be considered, as well as enforcement and education programs and possibly new legislation to provide safer and easier crossings for pedestrians at problem locations.

It is clear that spaces, often a premium in urban areas, are not allotted equally to pedestrians and vehicles. Further, crossings that often create competition and conflicts do not provide priority to pedestrians. The Indian Code for Pedestrian Facilities prescribes 300-meter mid-block separation whereas the Institute of Transport Engineers recommends 100–180 meters.

According to the US Manual on Uniform Traffic Control Devices, the length of the pedestrian clearance phase (including the flashing "don't walk" segment) should be based on the

[14] Pedestrian level of service is calculated by counting pedestrians who cross a point over a certain period of time (usually 15 minutes), reducing that figure to pedestrians per minute and then dividing by the effective width of the sidewalk. See the US Highway Capacity Manual for more details.

"normal" pedestrian walking speed of 4.0 feet (1.22 meters) per second (US DOT 2009). The City of San Francisco calculates pedestrian crossing times based on a walking speed of 855 millimeters per second (2.8 feet per second).[15] Many Asian cities suggest 1.2 meters per second for calculating pedestrian speeds in signal design but more often, only a few seconds are provided in actual signal design thereby making people wait and run when crossing streets.[16]

Segregation of road space, especially elevated footbridges, at crossings is often unfriendly, does not coincide with pedestrian preferences, and takes more time and energy thus leading to underutilization. In fact, surveys show that nearly 65% of pedestrian over bridges were underutilized in Jakarta.[17] But if the design can be made context-specific and comfortable, the usage can also increase (Tan 2008).

Dissecting current design considerations shows a clear need to urgently overhaul pedestrian facility design practices for Asian cities.

The concept of "shared space" is instrumental in transforming the current paradigm. Shared space refers to a street or place accessible to both pedestrians and vehicles that is designed to enable pedestrians to move more freely by reducing vehicle traffic and introducing demand management features that tend to encourage users of vehicles to assume priority for pedestrians.[18] It works on the principle of accommodating various users and making street space not just for vehicular traffic. A recent evaluation of such schemes suggests that

> There is sufficient evidence to suggest that well-designed schemes in appropriate settings can bring benefits in terms of visual amenity, economic performance and perceptions of personal safety.

It further suggests that

> The full benefits of shared space are likely to be achieved when vehicle flows are relatively low, vehicle speeds are effectively controlled and there are features in the space that encourage pedestrian activity. Not all pedestrians are comfortable mingling with vehicles and the provision of clearly defined space in which they can be confident that they will not encounter a vehicle is likely to be beneficial.

To enforce such shared streets, speeds need to be brought down to less than 20 kilometers per hour. Currently, Asian streets do not have this kind of speed limit enforced due to legal frameworks.[19]

As seen from the evidence above, not many Asian countries have design guidelines that are specific to pedestrian facilities, consider the local context, and that are integrated to the overall transport design. Most current practices for designing the different components are borrowed directly from available guidelines, mostly from Western countries, which have not been modified to fit the local context and needs of the Asian cities.

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[15] Alta Planning and Design 2005.
[16] For example, in Fushun, in one of the intersections, a walking speed of 2.95 meters per second has been provided. (Tao 2007).
[17] See www.thejakartapost.com/news/2010/02/04/pedestrian-bridges-don't-work-jaywalkers-research.html
[18] Government of the United Kingdom, Department for Transport. 2009. Shared Space Project. Stage 1: Appraisal of Shared Space.
[19] The current laws suggest a minimum speed of only 30 km per hour in several cities.

The Indian Roads Congress (IRC) formulated the “Guidelines for Pedestrian Facilities” in 1989. It was formulated as a supplement to the earlier IRC standards that have covered some of the requirements for pedestrian facilities such as the “Guidelines on Regulation and Control of Mixed Traffic in Urban Areas” (IRC 1977) and the “Geometric Design Standards for Urban Roads and Plains” (IRC 1983).

The basic aim of the IRC Guidelines for Pedestrian Facilities is to reduce pedestrian conflicts with vehicular traffic to a minimum, and is based on the principle that pedestrian facilities should be planned in an integrated manner so as to ensure a continuous pedestrian flow. It recognizes that it is useful to look at pedestrian needs for an area as a whole and prepare an overall strategic plan. However, it does not give guidance on how this process should be carried out. While it gives guidance on the design of footpaths, pedestrian guard-rails, pedestrian crossings (at-grade and grade separated), it does not provide guidance on how the pedestrian facilities should be planned in an integrated manner.

“Pedestrian Design Guidelines” for Delhi, India were approved by the Unified Traffic and Transportation Infrastructure (Planning and Engineering) Center of the Delhi Development Authority in November 2009. These guidelines lay down three main goals for “integrated” streets in Delhi, as follows:

(i) **Mobility and accessibility.** A maximum number of people should be able to move quickly, safely, and conveniently through the city.
(ii) **Safety and comfort.** Make streets safe, clean, and walkable, and create climate-sensitive designs.
(iii) **Ecology.** Reduce impact on the natural environment, and reduce pressure on built infrastructure.

Its goal of improving mobility and accessibility ties up pedestrian facilities with the use of public transport. The guidelines state that streets should be retrofitted toward giving equal or higher priority to public transport and pedestrians and that transit-oriented mixed land-use patterns and densification of the city should be promoted. To ensure safety and comfort, the guidelines emphasize the importance of transparent (30%) commercial facades, the removal of boundary walks, and the provision of street lighting. It also recognizes the importance of commercial hawking zones in encouraging people to walk, through increased street activity and safety. The guidelines also recommend that universal accessibility design standards be applied to make public streets and crosswalks fully navigable by the physically-challenged. In terms of the ecological goals, the guidelines also target a reduction in the urban heat island effect and improving storm water management. The use of permeable paving and tree-planting zones is encouraged to increase ground water infiltration and prevent seasonal flooding. The integration of natural storm water filtration and absorption into street design is also encouraged.

The Delhi guidelines give suggestions on the distribution of road space for the different types of roads and how components such as the clear walking zones, frontage zones, plant spaces, segregated cycling paths, pedestrian crossings, pedestrian lighting, underground facilities, and public transport stops, as well as vehicle lanes that can be integrated within the available space. It provides specific guidance and best practices for the design of the different components, as well as on additional components such as traffic calming measures, “green” construction materials, and public art.

In early 2010, the Abu Dhabi Urban Planning Council unveiled the Abu Dhabi Urban Street Design Manual. The council developed this manual in cooperation with the relevant agencies such as the Department of Transport, Department of Municipal Affairs, and the Traffic Police, among others, and shall apply to all the streets in Abu Dhabi as well as those that are scheduled to be urbanized by 2030. It was developed within the context of the Abu Dhabi 2030 Urban Structure Framework Plan, which is the general blueprint for the Emirate to achieve sustainability. According to the plan, "streets and buildings should be human-scaled and oriented to the pedestrian." In accordance with the plan, the Urban Street Design Manual states that the street design process "shall start not with automobile throughput, but with the pedestrians, making walkability and livability of foremost importance." (Abu Dhabi Urban Planning Council 2010). The manual guides the transition toward more multimodal and more walkable streets.

It is worth mentioning some of the key design principles that underlie the concepts in the Urban Street Design Manual, such as

- the best transport plan is a good land-use plan,
- good street designs start with pedestrians,
- a well-designed street network provides safety for all modes of transport, and
- street connectivity enhances connectivity and allows smooth traffic flow.

The Abu Dhabi manual includes a combination of mandatory standards guidelines and optional components, in order to uphold design flexibility in different situations. It emphasizes the use of the context-sensitive solutions approach that employs a collaborative approach with all stakeholders to balance needs between vehicular and pedestrian levels of service, environmental considerations, historic preservation, economic development, and similar community objectives. It creates a hierarchy of road users in terms of priority in the design process (1st priority for pedestrians, 2nd priority for transit users, 3rd priority for bicyclists, and 4th priority for motor vehicles) and focuses on strengthening the interconnectivity of the street networks and providing universally accessible pedestrian community facilities and amenities, as well as open spaces to encourage walking.

The Abu Dhabi manual gives a step-by-step guide on how the design process shall be undertaken and more importantly, it integrates the current processes, available plans, and studies to the whole design process.

It also gives context-based guidance on the dimensions of the different street components (pedestrian realm, transit facilities, bicycle tracks, motor vehicle space, and median) for different streets (boulevards, avenues, streets, access lanes, and other street types). Different design considerations are given depending on the context of the streets—city, town, commercial, residential, industrial, or no active frontage.[20]

It gives detailed guidance on the design specifications for facilities for pedestrians, transit users, bicyclists, and vehicle users. Specifications for facilities for traffic calming measures are also given. It also gives special attention to streetscape design and discusses universal design, surface materials, cohesive design with building frontage, shade and climate attenuation, landscaping and water use, lighting, furnishings, and signage. It also gives

[20] Places where no buildings or land uses front onto the street, such as a perimeter wall around a palace or residential neighborhood.

guidance on how the performance of the transport system can be measured, as well as the connectivity of the street network.

In Hong Kong, China, the provision of pedestrian facilities and the prioritization of pedestrians have both been integrated in the determination of the scale, location, and site requirements of various land uses and facilities as stated in the Hong Kong Planning Standards and Guidelines.

The Hong Kong Planning Standards and Guidelines provide guidance on how pedestrians and pedestrian facilities should be integrated in planning structures, such as industrial estates, science parks, shopping areas, public transport facilities and interchanges, ferry terminals, and even roads and highways. They also provide specific guidelines on how to determine streets for pedestrianization. Guidelines for cycling, vehicle parking, and also for general urban design are centered on pedestrians.

Clearly there is a need for a comprehensive and integrated approach in pedestrian planning for many Asian cities in order to move toward having complete streets or streets that provide mobility, safety, and accessibility for all people regardless of age or ability.[21]

5.3 Institutions and Resources

Dedicated institutions with legal and financial resources that support pedestrian needs are not often found in Asian cities. Improvements for pedestrian facilities are often subsumed in city planning agencies. However, there are usually no separate plans for improving the walkability of cities. Oftentimes, when pedestrian plans are present, these are provided to make sure that vehicle traffic flow is improved and to ensure that pedestrians are out of the way.

In India, as part of a “Right to Information Query” submitted in Hyderabad in 2008, the Right to Walk Foundation questioned who is ultimately responsible for the city’s footpaths. The response of the Roads and Bridges Department*:* “Footpaths are not our concern; please approach the Greater Hyderabad Municipal Corporation.” The Greater Hyderabad Municipal Corporation replied as follows: “Footpaths are under the R&B [Roads and Bridges] department’s jurisdiction.”[22]

The lack of clear mandates and coordination, coupled with the hesitation of institutions to take ownership of the responsibility to improve pedestrian facilities hinders progress toward improving overall walkability in Asian cities.

The public agency survey conducted as part of this study made it clear that improving walkability is a local issue, and therefore local governments should take this responsibility (Table 5). However, it was unclear to several public agencies whether this issue is being sufficiently addressed. In Ha Noi, the City Development Planning Office, City Administration Office, the Air Quality Agency, and the Auto Department could not say who is primarily responsible for sidewalks and footpaths in the city. This situation is similar in other cities as various functions are handled by various departments and/or agencies.

[21] The road space is judiciously divided among pedestrians, cyclists, motorists, and public transport users rather than the traditional way of the fast user dominating the slow user.
[22] The discussion is accessible at http://right2walk.com/?page_id=17

Another issue identified in the public agency survey is the involvement of civil society and the private sector in improving the quality of footpaths and sidewalks in cities. Private owners of land and buildings in urban areas are also required to provide adequate and effective sidewalks in building frontages. However, there are cases in which sidewalks are not provided at all as the space is used entirely for private and/or commercial purposes. When sidewalks are provided, they do not always sufficiently cater to the needs of pedestrians and are oftentimes used as parking areas for vehicles.

Table 5: Overview of Institutions Responsible for Improving Walkability in Asian Cities

Country	Institutions Responsible	
	National	**Local (Primary)**
People's Republic of China	• Ministry of Transport	• Municipal Government o Planning and Engineering Administration Offices o Environmental Sanitation Department
India	• Ministry of Urban Development	• Municipal Corporation and Government
Indonesia	• Ministry of Transport	• City or Municipal Government
Mongolia		• City Development Policy Department
Nepal	• Department of Roads o Road Board Nepal	• Metropolitan City Government o Environment Department
Philippines	• Department of Transportation and Communications • Department of Public Works and Highways	• City or Municipal Government o Planning and Engineering Offices • Metro Manila Development Authority (only for Metro Manila)
Sri Lanka	• Ministry of Transport	• City or Municipal Government
Viet Nam	• Ministry of Transport • Road Management Agency	• People's Committee • Ha Noi Department of Transport • Department of Construction • Department of Traffic and Transport • Urban Environment Company

Source: Authors.

Private vehicles parked on sidewalks in Manila.

Improvements of walkability and pedestrian facilities are not expensive compared to those of other transport infrastructure. However, the state of walking in several Asian cities shows that there are not enough resources being allocated to improve the pedestrian environment, particularly in dense areas.[23] The budget is not only insufficient but can also be considered as unjust. "Richer" neighborhoods with less pedestrian movement are being provided with the best walking conditions and facilities for pedestrians, as highlighted in a report by the Center for Science and Environment (CSE) as quoted below.[24]

> To understand the contrast between poor neighborhoods and the elite localities in Lutyen's Delhi a trip was made to Aurangzeb Road. The irony hits hard. In Govindpuri where about 100 persons walk per five minutes during peak hour has poorly built sidewalks. But in Aurangzeb Road lined with ministerial bungalows, where only 3 persons were seen walking in ten minutes during the morning peak hour, has well designed and spacious footpaths (CSE 2009).

In Asia, the budget allocation for pedestrian facilities is often in the range of 0.2%–5% of the total transport budget. The following examples provide insights on the general levels of funding and other resources allocated for pedestrians in Asian countries and cities:

(i) **Dhaka, Bangladesh.** The Strategic Transport Plan[25] advocates a "PEDESTRIAN FIRST" philosophy in its plan for the next 20 years but it only allocates 0.24% of the budget to pedestrian facilities.

[23] Information and data have been provided by various individuals through the Sustran listserv and CAI-Asia Portal.
[24] Internationally, many researchers have estimated that improving walkability increases land value. But contrary to developing cities, it can be argued that the best facilities are often provided only in locations having high land value.
[25] Rahman 2008.

(ii) **Bangalore, India.** The Comprehensive Traffic and Transportation Study envisages an investment of about $12 billion over the 15-year time frame. The study emphasizes increasing the share of mass transport to over 70%. On the other hand, the share allocated to pedestrian projects is only 0.6% of the total.

(iii) **Kathmandu, Nepal.** The Kathmandu Metropolitan City budget for the fiscal year 2005–2006 totaled NRs1,879 million, 7% of this budget was allocated to transport and only 3.5% (approximately $70,000) of the transport budget was allotted to pedestrian facilities.

(iv) **Taipei,China.** The city government budget for 2010 is $5,246.06 million and the budget for pedestrians is $8.07 million for sidewalk improvements; $9.71 million for pedestrian access facilities to the waterfront; $0.1 million for pedestrian signals and related devices; and approximately $2.0 million for other purposes such as access facilities connecting public transport, and maintenance.

(v) **Ahmadabad, India.** The revenue expenditure on items named “footpaths” increased from Rs2.1 million (2006–2007) to Rs3.8 million (2008–2009) and was estimated to be Rs5.7 million in the 2009–2010 budget. However, the total revenue expenditure under “roads, streets, footpath” increased from Rs133.1 million (2006–2007) to Rs154.2 million (2008–2009), and to Rs194.6 million in the 2009–2010 budget. Based on the figures above, the percentage of investment allotted to pedestrians when compared with that allocated to roads is around 3%.

(vi) **Metro Manila, Philippines.** The MMDA has allocated resources for clearing and fixing sidewalks and building footbridges in major traffic junctions. According to the MMDA, there are now 59 steel pedestrian footbridges in critical intersections and major thoroughfares in Metro Manila, which help an average of 2.4 million pedestrians every day.[26] These steel footbridges can cost about P15 million–P30 million depending on their length and coverage.

These experiences are not distinct to Asia. In the United States (US), a research study conducted by Litman (2011) indicates that US Federal Roadway Expenditures (based on FHWA 2000, FHWA 2004) may have only allocated 0.6% to pedestrian projects.[27] However, the US has instituted a number of progressive policies promoting sustainable transportation in 2010. Box 1 shows a policy statement from the US Department of Transportation prioritizing NMT as well as public transport. More funds coming from federal and local sources are expected to be allocated for improving walking and pedestrian facilities in the US.

[26] Villas 2010.

[27] Litman, T. 2011.

Box 1: United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations—Signed on 11 March 2010

Launched in a heavily motorized society, this new policy calls for full inclusion of pedestrians and bicyclists in transport projects, with particular attention paid to transit riders and people of all ages and abilities—essentially, a Complete Streets policy. It recommends that transport programs and facilities should accommodate people of all ages and abilities, including people too young to drive, people who cannot drive, and people who choose not to drive.

Some of the actions include the following:

- Considering walking and bicycling as equals with other transport modes;
- Ensuring that there are transport choices for people of all ages and abilities, especially children;
- Pedestrian and bicycle facilities should meet accessibility requirements and provide safe, convenient, and interconnected transport networks;
- Going beyond minimum design standards;
- Integrating bicycle and pedestrian accommodation on new, rehabilitated, and limited-access bridges;
- Collecting data on walking and biking trips;
- Setting mode share targets for walking and bicycling and tracking them over time; and
- Improving nonmotorized facilities during maintenance projects.

Source: US DOT Federal Highway Authority.
Available at: www.fhwa.dot.gov/environment/bikeped/policy_accom.htm

The problem of insufficient funding is further exacerbated when this limited funding for pedestrian facilities is allocated to ineffective, improperly located, and/or extravagant projects that are not required by pedestrians. The photo below shows a pedestrian overpass across a two-lane road with minimal traffic in Cebu City, Philippines.

Pedestrian overpass in a low-vehicle traffic area in Cebu City, Philippines.

In Bangalore City, out of the total 15-year budget of $12 billion, the city plans to provide 0.6% to pedestrians. The city government plans to improve 350 km of one-way footpaths and construct 68 grade-separated crossings. An interesting note here is that Bangalore has approximately 5,900 km of roads as of 2007.[28]

Many developing cities have invested or are planning to invest major portions of their limited funds available for pedestrian facilities on subways and overpasses, particularly at major traffic junctions. Beijing alone has over 400 sky bridges (Li 2006). However, observations reveal that relatively few people are using these sky bridges, as people prefer to cross at the surface despite the barriers and risks. In Metro Manila, a substantial budget has been allocated for building overhead crossings at major junctions all over the metropolis. It is not certain how much will be allocated for the improvement of footpaths or sidewalks in areas where there are a lot of users.

Such projects do not cater to the needs of transport-disadvantaged people because they are inaccessible. The latest reports from London indicate that the benefit–cost ratio of replacing underground crossings with surface crossings is 7.6:1, and as such the city is undertaking a project to replace underground crossings with surface crossings.[29]

Footpaths can be highly cost-effective. A study conducted by the Transport Research Laboratory on the safety impacts of constructing 10 km of footpath alongside the Highlands (Okuk) Highway in Papua New Guinea found that where no footpaths were constructed, pedestrian casualties of all types increased, but for the sections where a footpath was constructed, casualties were reduced significantly. The footpaths also showed very high first year rates-of-return (up to 1,000%).[30]

Box 2 provides insights on the cost-effectiveness of the various transport facilities considering the number of people they can carry and the associated costs.

[28] www.cleanairnet.org/caiasia/1412/articles-72580_resource_1.pdf
[29] Transport for London. 2009. Meeting on Surface Transport. Available at: www.tfl.gov.uk/assets/downloads/corporate/Item10-Subways.pdf
[30] Cost and Safety Efficient Design. TRL and DFID. Available at: www.transport-links.org/transport_links/filearea/publications/1_811_103_CaSE%203.pdf

Box 2: Cost-Effectiveness of Various Transport Facilities

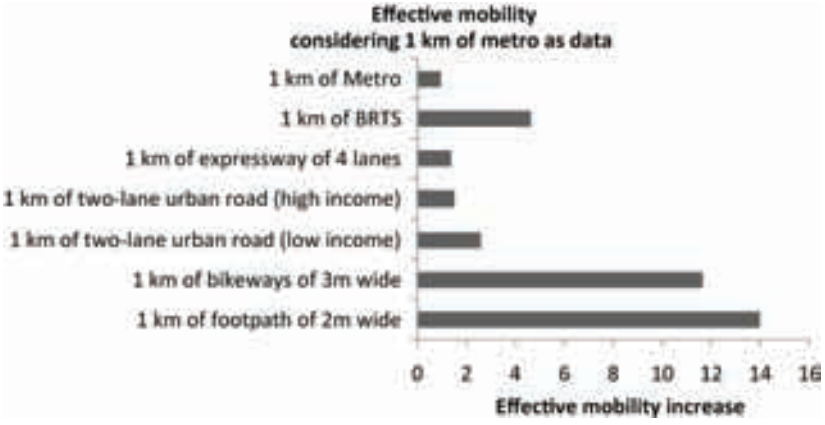
In order to show the modal efficiency and cost-effectiveness of various transport projects, an analysis was carried out on different projects considering the average construction cost and its average capacity. The following table and graph indicate the efficiency of different transport projects and modes.

Assumed Capacity and Costs	Capacity (average people per hour)	Cost ($ million)
1 km of footpath, 2m wide	2,400	0.10
1 km of bikeways, 3m wide	3,000	0.15
1 km of two-lane urban road (low income)	4,500	1.00
1 km of two-lane urban road (high income)	2,600	1.00
1 km of expressway, 4 lanes	8,500	3.50
1 km of BRTS	16,000	2.00
1 km of Metro	60,000	35.00

Using the same money as required for constructing 1 km of metro, one can construct:

(i) 18 km of BRTS,
(ii) 10 km of four-lane expressway,
(iii) 35 km of two-lane urban road,
(iv) 235 km of bikeways, or
(v) 350 km of footpaths.

Considering this analysis, it is clear that the construction of footpaths provides the most effective mobility when the construction cost and capacity are considered.



BRTS = bus rapid transit system, km = kilometer, m = meter.

Note: 1km of Metro data is a conservative estimate based on the Delhi Metro.

Source: Authors.

6. Walking Forward

Pedestrian accessibility plays a fundamental role in sustainable urban transport policies, along with quality public transport, rational pricing of motor vehicle use, and land use–transport integration. These policies can minimize and curb the inefficient use of motor vehicles, which in turn reduces emissions of air pollutants and greenhouse gases from the transport sector. Greater pedestrian access and mobility would also enhance the effectiveness of mass transit, reduce fossil fuel consumption, and promote social justice on the roads (Badami 2009).

6.1 Policies and Institutions for Improving Walkability

Based on the findings of this study, a number of recommendations have been identified involving various stakeholders who should play a role in developing policies, projects, and/or initiatives focusing on improving walkability and pedestrian facilities in Asian cities.

The study has pointed to the reality of the need to improve the walking environments in many Asian cities. The results show that walking is still one of the main modes of transport in the cities but facilities have not adequately met the needs of pedestrians. The study points to several important aspects of pedestrian facilities in Asia that need more attention, such as the provision of facilities for the disabled and the provision of walking paths and pedestrian amenities. Many Asian countries need to rethink how they are developing their transport systems and how they can move toward having complete streets. Policies and institutions that focus on pedestrian-related matters are needed in most of the Asian countries. Improving walking environments and facilities is important in ensuring equitable transport access as well as in ensuring sustainable transport systems in the future.

The study recommends specific actions (Table 6) that can be undertaken by different stakeholders in improving the walkability in Asian cities in the following categories:

(i) pedestrian-focused policies and guidelines,
(ii) institutions and resources clearly allocated for walking and pedestrian facilities, and
(iii) urban and transport plans and projects that integrate and link the needs of pedestrians and the quality of facilities with pedestrian levels of service analysis.

The national government, city government, civil society, development agencies, and the private sector were identified as the key stakeholders needed to support the development and implementation of these actions. Overall, the city governments were identified as the key stakeholders that should support the development and implementation of these actions. The next stakeholder group that should play a substantial role is the national government, especially in relation to development of national standards for pedestrian facilities and in supporting local governments in developing local action plans for improving walking environments. The governments, whether national or local, must ensure that pedestrian plans are integrated with other transport development plans. It is also important for civil society to be involved in developing and monitoring the implementation of these policies and activities.

Development agencies should play active roles in establishing and supporting initiatives for improving walking environments such as supporting the development of pedestrian-related polices, reviewing design guidelines for urban transport and pedestrian facilities, and pushing

for the integration of walkability assessment as an integral part of the planning of transport projects. While the private sector generally complies with the recommendations and policies set by government, there should be a conscious effort from the private sector in making certain that adequate facilities are provided for pedestrians. Also traffic impact assessment studies undertaken by private land developers should consider and prioritize pedestrian access and movement for future land developments.

Table 6: Overview of Actions and Relevance for Various Stakeholders

	National Government	City Government	Civil Society	Development Agency	Private Sector
Pedestrian Policies and Guidelines					
Develop comprehensive policies prioritizing the improvement of walking and pedestrian facilities	**XX**	**XXX**		**XXX**	
Develop policies incorporating pedestrianized streets and open spaces	**X**	**XXX**			
Include stringent pedestrian fatality reduction targets	**X**	**XX**	**XXX**	**XX**	
Conduct regular walkability surveys and promote improvement starting at the community level		**XXX**	**XX**	**X**	**X**
Develop monitoring system to check whether policies and guidelines are being followed and necessary penalties are implemented	**X**	**XXX**	**XX**		**X**
Institutions and Resources					
Institutionalize nonmotorized transport units and/or cells in city governments	**XX**	**XXX**	**X**		**X**
Increase investments on relevant pedestrian facilities	**X**	**X**			
Urban and Transport Plans and Projects					
Mandate inclusion of pedestrian plans in new establishments and transport projects, using the pedestrian levels of service analysis	**XX**	**XXX**		**X**	**XX**
Set high pedestrian mode share targets in city master plans	**X**	**XXX**		**X**	**X**
Review design guidelines for urban transport and pedestrian facilities	**XXX**	**XX**		**XX**	
Use walkability surveys and assessments as a basis for evaluation of transport projects	**XXX**	**XX**	**X**	**XX**	**X**
Prioritize walking and cycling in traffic management and design	**XX**	**XXX**		**XX**	
Provide exclusive space for vendors, utilities, and parking		**XX**			**X**
Make traveling and streets more accessible to transport-disadvantaged people	**XXX**	**XXX**		**XX**	

X = Level of involvement and participation of stakeholders.

Source: Authors.

6.2 Assessing Walkability

Future assessments of walking environments and infrastructure in Asian cities must be conducted. The objective is not only to assess more cities and more areas within the cities but also to assess cities through time so as to monitor how they are progressing. The conduct

of this study resulted in specific recommendations on how the walkability assessment methodology can be improved and thus produce more accurate ratings. The specific recommendations are

(i) Results that better reflect the overall status of walkability in the cities may be achieved if area subclassifications are utilized in the survey area selection process. The subclassification may be based on economic characteristics of the areas such as income levels and other such parameters. For example, residential areas may be further classified into high-income residential, middle-income residential, and low-income residential areas, but the definitions of these subcategories need to be clearly defined. Future studies can survey at least one area for each subcategory in each city to lessen the bias created by selecting areas that are already perceived to have good walking environments.

(ii) A more detailed assessment approach may utilize the application of different sets of parameters and rating criteria in assessing different street subclassifications in different area types. This allows for more context-sensitive assessments and analyses. For example, a commercial boulevard and a residential street differ immensely in terms of their characteristics as well as in their functions, and therefore different sets of criteria must be used in assessing the walkability of these two types of streets.[31] The challenge lies in identifying the proper parameters and criteria for rating these parameters for the different street subclassifications in each area type.

(iii) The inclusion of additional quantitative parameters in future studies such as the effective width of footpaths, walking time, and detour factors would be ideal.[32] The effective width is a ratio of the actual width of the footpaths compared with the usable width within the footpaths. The volume of pedestrians, combined with the data on effective width, can be used in determining the level of service of the footpaths. The walking time refers to the actual amount of time it takes a pedestrian to get from one point to another and should take into account crossing times, directness, and other factors. The “detour” factor is the ratio of the walking distance to the straight-line distance in a major origin–destination route, and indicates the additional effort being exerted by pedestrians in going from the origin to the destination. These factors are seen to be useful in terms of providing data that are more comparable for different cities.

(iv) However, it should be noted that qualitative descriptors should be taken into account when analyzing the quantitative factors. For example, a lower effective width may not necessary be undesirable, as a footpath’s width may be reduced by pedestrian facilities and/or amenities such as benches; the importance of walking times depends on the purpose of the pedestrians, as people also walk to spend time, not only to save time; a higher detour factor would not necessarily be negative, as walking the additional distance may be pleasant for the pedestrians, especially in areas that are conducive to walking. Again, putting these factors into context is very important.

[31] The Abu Dhabi Urban Street Manual defines a boulevard to be a high-vehicle priority street with three lanes in each direction, while a street is a low-vehicle priority street with one lane in each direction.

[32] Existing pedestrian guidelines can be used in applying a more quantitative approach in assessing walkability by benchmarking the different quantitative parameters against what is recommended by these guidelines.

(v) The range of the ratings for the parameters in the walkability surveys (currently 1–5) must be expanded (for example, to 1–10) to accentuate the differences between the walking environments of the cities. This would also allow the general public to better visualize the walking areas based on their ratings.

(vi) For the pedestrian interviews, a general guide on the sampling method should be developed for the researchers. Also, the pedestrian interview form should be reviewed to include important details such as “trip purpose” in the travel characteristics section.

(vii) Overall, the field survey methodology needs to be refined to achieve better comparability of results across the different cities and to lessen the subjectivity of the assessment. A more detailed assessment of the pedestrian facilities based on available guidelines that are applicable to the developing Asian context is also needed. The pedestrian preference interviews must be improved as well, to capture more information. Also, making this survey available online would be a good way to gather more information from people across Asia.

References

Abu Dhabi Urban Planning Council. 2007. Plan Abu Dhabi 2030—Urban Structure Framework Plan. www.upc.gov.ae/template/upc/pdf/Capital-2030-en.pdf

———.2010. Urban Street Design Manual. www.upc.gov.ae/template/upc/pdf/Street%20Design%20Manual%20English%20(small)%20FINAL.pdf

Alta Planning and Design. 2005. Pedestrian and Bicycle Facilities in California—A Technical Reference and Technology Transfer Synthesis for Caltrans Planners and Engineers. California.

Badami, M. 2009. Restoring Pedestrian Accessibility in Indian Cities. ADB Knowledge Showcase. www.adb.org/Documents/Information/Knowledge-Showcase/Restoring-Pedestrian-Accessibility-in-India.asp?p=kmlshow

Bangalore Metropolitan and Land Transport Authority, Transport Planning Unit. 2007. Comprehensive Traffic and Transportation Plan for Bangalore. www.praja.in/en/bangalore-cttp

Centre for Science and Environment (CSE). 2009. Footfalls: Obstacle Course to Livable Cities. New Delhi, India. July. www.indiaenvironmentportal.org.in/content/footfalls-obstacle-course-livable-cities

Deccan Chronicle. 2009. City pedestrians face grave danger. 6 August 2009. www.deccanchronicle.com/bengaluru/city-pedestrians-face-grave-danger-354

Delhi Development Authority, Unified Traffic and Transportation Infrastructure Center. 2009. Pedestrian Design Guidelines “Don’t Drive…Walk!” New Delhi.

Delhi Development Authority. 2001. Master Plan for Delhi 2021. http://delhi-masterplan.com/

East-West Center. 2007. Commuters’ Exposure to Particulate Matter and Carbon Monoxide in Hanoi, Vietnam: A Pilot Study. Honolulu, Hawaii.

Galingan, Z. Pedestrian Friendly Streetscape in a Tropical Business District. *MUHON: A Journal of Architecture, Landscape Architecture and the Designed Environment*. University of the Philippines College of Architecture. Issue No. 3. http://journals.upd.edu.ph/index.php/muhon/article/viewFile/1315/1283

Government of India, Ministry of Housing and Urban Poverty Alleviation. 2009. National Policy on Urban Street Vendors. http://nceuis.nic.in/Street%20Vendors%20policy.pdf

Government of India, Ministry of Road Transport and Highways. 1989. Indian Central Motor Vehicles Rules 1989, Section 11 of the Rules of the Road Regulations. www.morth.nic.in/index2.asp?langid=2&sublinkid=193

Government of India, Ministry of Urban Development. 2006a. Comprehensive Traffic and Transportation Study for Vijuyawada City. www.ourvmc.org/jnnurm/chapter-4.pdf

———. 2006b. National Urban Transport Policy of India. www.urbanindia.nic.in/policies/TransportPolicy.pdf

———. 2008. Study on Traffic and Transportation Policies and Strategies in Urban Areas in India. www.urbanindia.nic.in/programme/ut/final_Report.pdf

Government of India. 1995. The Persons with Disability (Equal Opportunities, Protection of Rights and Full Participation) Act. http://patientcare.lvpei.org/vision-rehabilitation/images/disabilities-act1995.pdf

Government of India. Indian Penal Code. 1860. www.vakilno1.com/bareacts/IndianPenalCode/S283.htm

Government of Indonesia. 2009. Traffic and Road Transport Act of Indonesia (Act 22/2009).

Government of Malaysia, Economic Planning Unit of the Prime Minister's Department. 2010. Tenth Malaysia Plan 2011–2015. www.epu.gov.my/html/themes/epu/html/.../rmke10_english.html

Government of Mongolia, Ministry of Road, Transport and Tourism. 2007. National Transport Strategy for Mongolia. www.adb.org/Documents/Produced-Under.../38091-01-MON-DPTA.pdf

Government of Singapore, Ministry of Transport. Singapore's Land Transport Master Plan. www.lta.gov.sg/ltmp/pdf/LTMP_Report.pdf

Government of Sri Lanka, Ministry of Transport. 2008. National Transport Policy of Sri Lanka.

Government of the Hong Kong Special Administrative Region, Planning Department. 2010. Hong Kong Planning Standards and Guidelines. www.pland.gov.hk/pland_en/tech_doc/hkpsg/index.html

Government of the Hong Kong Special Administrative Region, Sustainable Development Unit of the Office of the Chief Secretary for Administration. 2005. A First Sustainable Development Strategy of Hong Kong. www.susdev.org.hk/susdevorg/archive2004/en/pdf/1stSDStrategyE.pdf

Government of the People's Republic of Bangladesh, Ministry of Communications. 2004. National Land Transport Policy.

Government of the Philippines, Department of Transportation and Communication. 2009. Formulation of a National Environmentally Sustainable Transport Strategy for the Philippines.

Government of the United Kingdom, Department for Transport. 2009. DfT Shared Space Project Stage 1: Appraisal of Shared Space. www.dft.gov.uk/pgr/sustainable/sharedspace/stage1/pdf/stage1.pdf

Government of the United States, Department of Transportation – Federal Highway Administration. 2009. Manual on Uniform Traffic Control Devices, 2009 Edition. http://mutcd.fhwa.dot.gov/

Health Effects Institute (HEI). 2010. Special Report 17, Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. http://pubs.healtheffects.org/view.php?id=334

Hook, W. 2003. Preserving and Expanding the Role of Non-Motorised Transport. GTZ Sourcebook for Policy-makers in Developing Cities. Module 3d. www.itdp.org/documents/NMTmodule.pdf

Hossain, M. 2010. Application of Data Mining in Road Safety. Thesis. Asian Institute of Technology Library. www.library.ait.ac.th/ThesisSearch/summary/Moinul%20Hossain.pdf

Indian Roads Congress. 1977. *Guidelines on Regulation and Control of Mixed Traffic in Urban Areas*. New Delhi.

———. 1983. *Geometric Design Standards for Urban Roads and Plains*. New Delhi.

———. 1988. *Guidelines for Pedestrian Facilities*. New Delhi.

Institute of Transport Engineers. 2001. Alternative Treatments for At-Grade Pedestrian Crossings. Washington, D.C.

Jakarta Post. 2010. Pedestrian bridges don't work for jaywalkers: Research. 4 February 2010. www.thejakartapost.com/news/2010/02/04/pedestrian-bridges-don't-work-jaywalkers-research.html

Japan International Cooperation Agency. 1999. Metro Manila Urban Transport Integration Study Database. Metro Manila.

Kathmandu Valley Mapping Program. 2002. European Union Grant Aid Project. http://ec.europa.eu/europeaid/where/asia/country-cooperation/nepal/nepal_en.htm

Krambeck. H. 2006. Global Walkability Index. http://dspace.mit.edu/handle/1721.1/34409

Kumar, Sameera and Sudhir. 2009. Pedestrians at Crossroads: A Case Study of Bangalore. www.cleanairnet.org/caiasia/1412/articles-72580_resource_1.pdf

Li, Y. 2006. Urban Administrative Bureau: Entire City, Hundreds of Skybridges and Underground Tunnels Must Be Renovated. *Beijing Daily*. http://beijing.qianlong.com/3825/2006/04/18/134@3125086.htm on 12/9/2006.

Litman, T. 2011. Economic Value of Walkability. Victoria Transport Policy Institute. www.vtpi.org/walkability.pdf

Mayor of London. 2004. Making London a Walkable City: The Walking Plan for London (February 2004). www.tfl.gov.uk/assets/downloads/corporate/walking-plan-2004.pdf

Ministry of Communications of the Government of Bangladesh. 2004. National Land Transport Policy. www.moc.gov.bd/Documents/LandTransportPolicy/NLTP-bengali-english.pdf

New Zealand Transport Authority. 2007. *Pedestrian and Planning Guide.* Wellington, New Zealand. www.nzta.govt.nz/resources/pedestrian-planning-guide/docs/pedestrian-planning-guide.pdf

Pendakur. 2000. World Bank Urban Transport Strategy. http://siteresources.worldbank.org/INTURBANTRANSPORT/Resources/pendakur.pdf

Rahman, Ziaur. 2008. A pro-people transport plan for Dhaka. 5 June 2008. *The New Nation* online edition. http://nation.ittefaq.com/issues/2008/06/05/news0514.htm

Right to Walk Foundation. http://right2walk.com/?page_id=17

San Francisco Municipal Transportation Agency. 2006. Better Streets Policy—Ordinance No. 33-06. San Francisco.

Sarkar, S. 1993. Determination of service levels for pedestrians, with European examples. Transportation Research Record 1405, TRB, National Research Council. Washington, D.C., pp. 35–42.

Schipper, L. et al. 2008. Measuring the Invisible: Quantifying Emissions Reductions from Transport Solutions—Ha Noi Case Study. http://pdf.wri.org/measuringtheinvisible_Ha Noi-508c_eng.pdf

Tan, Salvador. 2005. Makati Central Business District Pedestrianization and Traffic Segregation Projects. Forum on Improving Pedestrian Facilities and Bikeways in Metro Manila. 6 September 2005. Manila: Asian Development Bank. www.cleanairnet.org/caiasia/1412/articles-69376_ayala.pdf

———. 2008. Incorporating Sustainable Practices in Private Developments: Experiences and Lessons from the Philippines. Presentation delivered at the Better Air Quality (BAQ) Conference 2008 in Bangkok, Thailand. www.baq2008.org/system/files/sw33_Tan+presentation.pdf

Tao, Wendt et al. 2007. Drivability vs. Walkability: Assessing Shorter- and Longer-Term Transportation Planning Tradeoffs in a Chinese Context. Presented at the 11th World Conference on Transport Research. http://tris.trb.org/view.aspx?id=890008

Transport for London. 2004. Making London a Walkable City—The Walking Plan for London. London. www.tfl.gov.uk/assets/downloads/corporate/walking-plan-2004.pdf

Transport Research Laboratory and the Department for International Development. 2001. Cost and Safety Efficient Design. www.transport-links.org/transport_links/filearea/publications/1_811_103_CaSE%203.pdf

Transportation Research Board. *US Highway Capacity Manual 2000*. 2000. Washington, D.C. www.trb.org/Main/Blubrs/Highway_Capacity_Manual_2000_152169.aspx

United States (US) Department of Transportation, Federal Highway Administration. 2009. “Appendix III, Spending on Bicycle and Pedestrian Facilities and Programs,” National Bicycling and Walking Study: Ten-Year Status Report, Federal Highway Administration. www.fhwa.dot.gov/environment/bikeped/study/index.htm#nbwftn5

Villas, Anna Liza. 2010. 4 new pedestrian footbridges on Commonwealth Ave. open Tuesday. 26 April 2010. *Manila Bulletin*. www.mb.com.ph/articles/254672/4-new-pedestrian-footbridges-commonwealth-ave-open-tuesday

Walk Score. www.walkscore.com/

World Bank. 2009. Thailand: Making Transport More Energy Efficient. http://siteresources.worldbank.org/THAILANDEXTN/Resources/333295-1253072771677/TH_MakingTransportMoreEnergyEfficient_fullreport.pdf

World Health Organization (WHO). 2009. Global Status Report on Road Safety: Time for Action. www.who.int/violence_injury_prevention/road_safety_status/2009/en/

Annex 1

Field Walkability Methodology

This is a brief explanation of the field walkability survey methodology that was handed out to the surveyors. The methodology is adapted from the Global Walkability Index developed by Holly Krambeck of the World Bank with slight modifications.

1. **Time of Survey**—Since the objective of walkability surveys is to compare streets and cities, it is recommended that the surveys be conducted during peak hours (morning or evening). In some cities where security is not a major issue, surveys carried out at evening peak hours (3 p.m.–8 p.m.) may provide the best results as these times tend to be busier than morning peak hours.

2. **Route Selection**—For each city, the surveys are to be carried out in the following areas:

    a. **Commercial area**—Select a prime commercial area in the city. Using open-source mapping programs (e.g., Google Maps or wikimapia), data from reconnaissance surveys and consultation with stakeholders, select approximately 5 kilometers (km) of interconnected road within a radius of 1 km from the main commercial area or central business district (CBD). It is to be noted that the roads to be surveyed must have high pedestrian volumes and be interconnected. In cases where the central area is circular, it may be logical to select the same origin and destination point that people use to enter and disembark from the CBD.
    b. **Public transport terminal**—Select a major public transport terminal in the city. Most often, these major public transport facilities may entail trip interchanges between modes. In such a case, the survey area should encompass such interchanges. It is proposed to survey at least 2 km of pedestrian facilities within a 1 km radius from the terminal.
    c. **Educational area**—Select an area where schools and/or universities are found. In cases where the city has an educational zone, the survey roads should capture major education centers with ingress and egress (for example, if people use public transport for school and/or college, link the areas with bus and/or train stops and school). It is proposed to survey at least 4 km within a 1 km radius from the school (the time can be school and/or college starting or closing time).
    d. **Residential Area**—Survey areas should be major residential zones (preferably both high-income and low-income areas). In this survey, the intention is to investigate the route taken by the majority of people (particularly public transport users) from their homes to access the public transport facility. Surveying 2 km for both high-income and low-income neighborhoods is recommended. The best possible way of doing is to locate the centroid (location where maximum people would initiate their journey) and use this as a basis for determining the survey areas.

3. Field Survey Parameters

The parameters to be assessed in the field walkability survey are discussed on pages 54–64, together with specific guidance on how to rate the roads for each of the parameters. Rate the parameters in the field walkability survey forms (see page 65).

Parameter : Walking Path Modal Conflict
Parameter Number: 1
Description : The extent of conflict between pedestrians and other modes, such as bicycles, motorcycles, and cars on the road.
Rating Guide :

Rating	Description	Example
1	Significant conflict that makes walking impossible	
2	Significant conflict that makes walking possible, but dangerous and inconvenient.	
3	Some conflict—walking is possible, but not convenient	
4	Minimal conflict, mostly between pedestrians and nonmotorized vehicles	

5	No conflict between pedestrians and other modes	

Parameter : Availability of Walking Paths (with maintenance and cleanliness)
Parameter Number: 2
Description : It reflects the need for, availability, and condition of walking paths.
Rating Guide :

Rating	Description	Example
1	Pedestrian walkways required but not available	
2	Pedestrian walkways available but highly congested, badly maintained, and not clean	
3	Pedestrian walkways available but congested, need better maintenance, and cleanliness maintained	

4	Pedestrian walkways available, which are sometimes congested but clean and well maintained	
5	Pedestrian walkways not required as people can safely walk on roads	

Parameter : Availability of Crossings (count the number of crossings available per stretch)
Parameter Number: 3
Description : The availability and distances of crossings to describe whether pedestrians tend to jaywalk when there are no crossings or when crossings are too far in between.
Rating Guide :

Rating	Description	Example
1	Average distance of controlled crossings is greater than 500 meters (m) and average speed is high	
2	Average distance of controlled crossings is between 500 m and 300 m and average speed is around 40 kilometers per hour (kmph)	

3	Average distance of controlled crossings is between 200 m and 300 m and average speed is 20–40 kmph	
4	Average distance of controlled crossings is between 100 m and 200 m and average speed is 20–40 kmph	
5	There is no need for controlled crossings as pedestrians are safe to cross wherever they like and vehicles and pedestrians coexist	

Parameter : Grade Crossing Safety
Parameter Number: 4
Description : This refers to the exposure of pedestrians to other modes while crossing, the time spent waiting and crossing the street, and the sufficiency of time given to pedestrians to cross signalized intersections.
Rating Guide :

Rating	Description	Example
1	Very high probability of accident with very high crossing time	

2	Dangerous—Pedestrian faces some risk of being hurt by other modes and crossing time is high	
3	Difficult to ascertain dangers posed to pedestrians but the time available for crossing is less and people have to hurry	
4	Safe—Pedestrian is mostly safe from accident with other modes and exposure time is less and more time available for crossing	
5	Very safe—Other modes present no danger to pedestrians	

Parameter : Motorist Behavior
Parameter Number: 5
Description : The behavior of motorists toward pedestrians, which may well indicate the kind of pedestrian environment there is in that area.
Rating Guide :

Rating	Description	Example
1	High traffic disrespect to pedestrians	
2	Traffic disrespect and pedestrians rarely get priority	
3	Motorists sometimes yield	
4	Motorists usually obey traffic laws and sometimes yield to pedestrians	

5	Motorists obey traffic laws and almost always yield to pedestrians	

Parameter : Amenities
Parameter Number: 6
Description : The availability of pedestrian amenities such as benches, street lights, public toilets, and trees. These amenities greatly enhance the attractiveness and convenience of the pedestrian environment and in turn, the city itself.
Rating Guide :

Rating	Description	Example
1	No amenities	
2	Little amenities at some locations	
3	Limited amenities for pedestrians	

4	Pedestrians are provided with some amenities for major length	
5	Pedestrians have excellent amenities such as lighting, and cover from sun and rain making walking a pleasant experience	

Parameter : Disability Infrastructure
Parameter Number: 7
Description : The availability, positioning, and maintenance of infrastructure for the disabled.
Rating Guide :

Rating	Description	Example
1	Infrastructure for disabled persons is not available	
2	Limited infrastructure for disabled persons is available, but not in usable condition	

3	Infrastructure for disabled persons is present but in poor condition and not well placed	
4	Infrastructure for disabled persons is present, in good condition, but poorly placed	
5	Infrastructure for disabled persons is present, in good condition, and well placed.	

Parameter : Obstructions
Parameter Number: 8
Description : The presence of permanent and temporary obstructions on the pedestrian pathways. These ultimately affect the effective width of the pedestrian pathway and may cause inconvenience to the pedestrians.
Rating Guide :

Rating	Description	Example
1	Pedestrian infrastructure is completely blocked by permanent obstructions	

2	Pedestrians are significantly inconvenienced. Effective width is <1m	
3	Pedestrian traffic is mildly inconvenienced; effective width is < or = 1 meter	
4	Obstacle presents minor inconvenience; effective width is > 1m	
5	There are no obstructions	

Parameter : Security from Crime
Parameter Number: 9
Description : The general feeling of security against crime in the street.
Rating Guide :

Rating	Subjective Description
1	Environment feels very dangerous—pedestrians are highly susceptible to crime
2	Environment feels dangerous—pedestrians are at some risk of crime
3	Difficult to ascertain perceived degree of security for pedestrians
4	Environment feels secure—pedestrians at minimal crime risk
5	Environment feels very secure—pedestrians at virtually no risk of crime

4. Other Parameters

The other important data that need to be collected are discussed below:

a. Pedestrian count

We need to assess the demand of the facility. For this reason, we need to count the total number of people walking in the street/footpath on your side/direction for the duration of 15 minutes. The methodology is to count the number of people that passes by you during the 15 minutes time allotment. Indicate the number in the field walkability survey form (number 10).

b. Length of surveyed stretch

Please indicate the length of survey stretch in each box of the respective road stretch. This can initially be measured using online maps such as Google maps and Wikimapia. Indicate the number in the field walkability survey form (number 11).

c. General Description of Area

Please write down important observations that might not necessarily be reflected by the rating system such as the width of road, motorized traffic characteristics, and other characteristics or specific issues that are visible on road and needs attention. Also be generous with photos and take as many as you can with location identification.

d. Direction

The survey needs to be done on both sides of the road. Hence, describe the side surveyed and draw a small sketch with direction indicating the survey area in the space provided at the bottom. Indicate this and draw a rough sketch of the survey area in the field walkability survey form.

Annex 2

FIELD WALKABILITY SURVEY FORM

WALKABILITY IN ASIAN CITIES
FIELD SURVEY FORM

City: _____ **Survey Area Name** _____

Direction (L/R) _____ **Area Type** _____ **Peak Hour** **Yes** ○ **No** ○

Survey Team Names _____

Road Stretch Number	1	2	3	4	5	6	7	8	9	10
1. Walking Path Modal Conflict										
2. Availability of Walking Paths										
3. Availability of Crossings										
4. Grade Crossing Safety										
5. Motorist Behavior										
6. Amenities										
7. Disability Infrastructure										
8. Obstructions										
9. Security from Crime										
10. Pedestrian Count										
11. Length of Surveyed Stretch (km)										

General Description of Area

Rough Sketch

Annex 3

WALKABILITY IN ASIAN CITIES

PEDESTRIAN PREFERENCE SURVEY

Instructions

Please be courteous and explain the reason for this survey before asking the questions. This survey is a project of the Clean Air Initiative for Asian Cities (CAI-Asia Center) and the Asian Development Bank and is being conducted in many Asian cities in order to determine the problems faced by pedestrians, to know the pedestrians' preferences, and their requirements. Please ensure that all the questions are answered.

1. Travel Behavior

How much time they spend in each mode, how much is the average travel time in one direction for a major trip say to office or school? Analysis of this would help in understanding the trip preference. It is also important to understand if they are captive or choice riders and for this reason we need to ask for availability of vehicle ownership.

Mode of transport commonly **used per day** and average travel time spent on each mode (please tick) – **estimates for one way can be considered**

Mode	<=15 minutes	15–30 minutes	30–60 minutes	60–90 minutes	> 90 minutes
Walk					
Cycle					
Bus and/or Train					
Intermediate Public Transport (3w, Jeepney etc.)					
Car/Taxi					
Two-Wheeler					

Average travel time (**one way**) from residence to main destination (please tick)

<=15 minutes	15–30 minutes	31–60 minutes	61–90 minutes	> 90 minutes

Average travel distance (**one way**) from residence to main destination (please tick)

<=3 km	3–6 km	6.1–9 km	9.1–15 km	> 15 km

What type of vehicle(s) does your family own? (please tick)

Bicycle	Car	Two-Wheeler	No Vehicle

2. Pedestrian Preference

Pedestrian preference survey is mainly to understand pedestrian needs and desires. It is also intended to understand their concerns on air pollution and other issues such as subways and skywalks. Also we need to determine if they would migrate to other modes if improvements are not made.

How do you rate the pedestrian facilities in the city? (1 = Worst, 2 = Bad, 3 = OK, 4 = Good, 5 = Best)

If given an opportunity, what improvement would you like to have in pedestrian facilities? (Rank the top five options)

	Top 5 Priority (1 is top most and 5 is lowest)
Easy access for people with special abilities	
Improved street lighting	
Wider, level, and clean sidewalks and/or footpaths	
Reduced and slow traffic on road	
Remove obstacles and/or parking from footpaths	
More crossing points	
No/other remarks	

If you have to cross the road, what do you prefer?
(please tick)

Ground Crossing (at-grade)	
Skywalks (overhead crossings)	
Subways (underground)	

How far are you willing to walk to access crossings, skywalks and/or subways (please tick)

<50 meters	50–100 meters	100–200 meters	200–300 meters	> 300 meters

When do you think are you most exposed to air pollution?

Walking	Cycle	Bus/Train	3-Wheeler/Jeepney	Car/Taxi	Two-Wheeler	Waiting for bus

Do you plan to shift from walking to other modes in future if no improvement is done? If so, which mode?
(please tick)

Walking	Cycle	Bus/Train	3-Wheeler/ Jeepney	Car	Two-Wheeler

3. Socioeconomic Profile (please tick)

Sex

Male	Female

Age

0–15 Years	15–30 Years	30–50 Years	>50 Years

	<=$120	$120–$230	$230–$340	$340–$570	>$570
Household income/month					

Annex 4

WALKABILITY IN ASIAN CITIES

STAKEHOLDER SURVEY

Name				
Organization/Agency				
In general terms, what do you think of the pedestrian facilities in the city/country? Bad, Fair, Good, Excellent? Why?				
Can you provide an estimate (or %) as to how much investment is made for pedestrian infrastructure/sidewalk improvements? Can you share with us the data?				
What are the various agencies involved in improving and maintaining pedestrian infrastructure (e.g., sidewalks, crosswalks, etc.)?				
What is the proportion of pedestrian fatalities in the city when compared to total accident fatality? Can you share with us the data? (%)				
What is the pedestrian trip mode share in total trips in city (%)				
Are there any pedestrian facilities-related design/guidelines available? If yes, how are these implemented?				
		Enforcement		
Are there any law/regulation for the following? (Yes/No)		**Regularly**	**Sometimes**	**Rarely**
Jaywalking				
Road side vendors				
Parking on sidewalks				
Encroachment of public space—parks, playgrounds, etc.				
Driving on sidewalks				
Traffic calming				
Roadside advertisement				
Driving under the influence of alcohol				
What are the main barriers in improving pedestrian facilities?				

Walkability and Pedestrian Facilities in Asian Cities
State and Issues

Asian cities, traditionally cities of walkers, are now experiencing exponential increase in motorization, which has limited the attention given to pedestrian and public transport facilities. A change in focus that will allow people, not vehicles, to reclaim the urban environment is required.

The study provides information on the current pedestrian infrastructure in selected cities that can be used to develop and propose pedestrian-focused solutions for Asian cities. It includes results of field walkability surveys and pedestrian interviews, as well as an assessment of the current policies and institutions relating to pedestrians and walking environments in 13 Asian cities. It also recommends solutions involving various stakeholders who should play a role in developing policies and projects that are focused on improving the walkability of Asian cities.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.8 billion people who live on less than $2 a day, with 903 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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