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Walkability and Pedestrian Facilities in Asian Cities: State and Issues

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Contents

ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
BRTS	Bus rapid transit system
CAI-Asia	Clean Air Initiative for Asian Cities
CSE	Centre for Science and Environment
CTTS	Comprehensive Traffic and Transportation Study (for Bangalore)
FHWA	Federal Highway Administration
GOM	Government of Mongolia
GWI	Global Walkability Index
HCMC	Ho Chi Minh City
HEI	Health Effects Institute
HKPSG	Hong Kong Planning Standards and Guidelines
IRC	Indian Road Congress
Km	kilometers
KMC	Kathmandu Metropolitan City
KVMP	Kathmandu Valley Mapping Program
LOS	Level of Service
MMDA	Metropolitan Manila Development Authority
MOUD	Ministry of Urban Development (India)
MRT	Metro Rail Transit
MUTCD	Manual on Uniform Traffic Control Devices
NP	Nepalese Rupee
PM	Particulate matter
PRC	People's Republic of China
Rs	Indian Rupee
SAR	Special Administrative Region
STI	Sustainable Transport Initiative
SUMA	Sustainable Urban Mobility in Asia
TRL	Transport Research Laboratory
UPC	Urban Planning Council (Abu Dhabi)
US DOT	United States Department of Transport
USD	U.S. Dollars
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 rely on walking, cycling and public transport for daily travel. However, the exponential increase in motorization and limited attention to pedestrian and public transport facilities have inadvertently resulted to a decrease in the overall pedestrian mode share.

Growing motorization has led to a dramatic increase in the number of pedestrian fatalities and accidents over the past decades. It has also led to high levels of air pollution, particularly exposing pedestrians and daily commuters 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, namely, Cebu (Philippines), Colombo (Sri Lanka), Davao (Philippines), Hanoi (Viet Nam), Ho Chi Minh City (Viet Nam), Hong Kong SAR (PRC), Jakarta (Indonesia), Karachi (Pakistan), Kathmandu (Nepal), Kota (India), Lanzhou (PRC), Manila (Philippines), Ulaanbaatar (Mongolia); (ii) pedestrian preference interviews in the cities above; 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 the field surveys where 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 areas, educational, with the lowest being public transport terminals. 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 (with 29% shifting to cars and 10% to two-wheelers) if the walking environments in their cities do not improve.

The assessment of the and institutions relating to pedestrians and walking environments in Asia show 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 focusing 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 needed 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. These policies must also have the support of the civil society for successful implementation.

Development agencies should also play a role particularly in establishing and supporting initiatives to improve walking environments in the cities and to prioritize pedestrians in urban transport planning. While the private sector basically 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 improvement of walking in Asian cities and few civil society organizations and non-government organizations. Civil society and non-governmental organizations can play a key role 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 a basis of performance measurement in urban areas, as found in the (U.S. Highway Capacity Manual). This antiquated view emphasizes on improving the speed rather than planning for streets which promote accessibility by all users. In practice, many pedestrian levels of service (LOS) concept are based on vehicle travel, where faster speed indicates efficient flow of foot traffic.

1. INTRODUCTION

1.1 Background to the Study

1. Economic growth and rapid urbanization have resulted in urban transport crises in many Asian cities. The unprecedented growth and use of private vehicles have 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 which temporarily eases traffic flow but also stimulates growth in vehicle numbers and use which will again result to congestion.

2. 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.

3. The Clean Air Initiative for Asian Cities Center (CAI-Asia Center), together with several partners, 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.[1] 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 transportation and non-motorized transportation, particularly cycling, but activities on improving walking and pedestrian facilities were only covered indirectly.

4. The SUMA program contributed to the establishment of ADB's Sustainable Transport Initiative (STI) that aims to align transport sector interventions within the context of ADB's Long-Term Strategic Framework (Strategy 2020). A key component is enhancing ADB's interaction with developing countries on sustainable and low-carbon transport, and urban transport is one of its targeted sub-sectors. This study supports the sustainable transport advocacies of the ADB's STI and CAI-Asia's mission to promote better air quality and livable cities in Asia.

1.2 Objectives and Scope

5. 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 amongst policy makers and city officials and help them to improve walking in cities.

[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

6. The study includes (i) field walkability surveys in 13 Asian cities, namely, Cebu (Philippines), Colombo (Sri Lanka), Davao (Philippines), Hanoi (Viet Nam), Ho Chi Minh City (Viet Nam), Hong Kong SAR (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 the cities, including discussions and interviews with public sector representatives.[2]

7. The field walkability surveys were limited to pre-determined pedestrian routes in commercial, residential, educational areas and as well as around public transport terminals in consultation with local experts. Similarly, the pedestrian interview surveys were conducted in the same areas. 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

8. This report includes the following chapters:

- Chapter 1 provides an introduction to the study
- Chapter 2 presents the transportation 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
- Annexes provide detailed results of the surveys for 13 cities separately

2. WALKING IN ASIAN CITIES

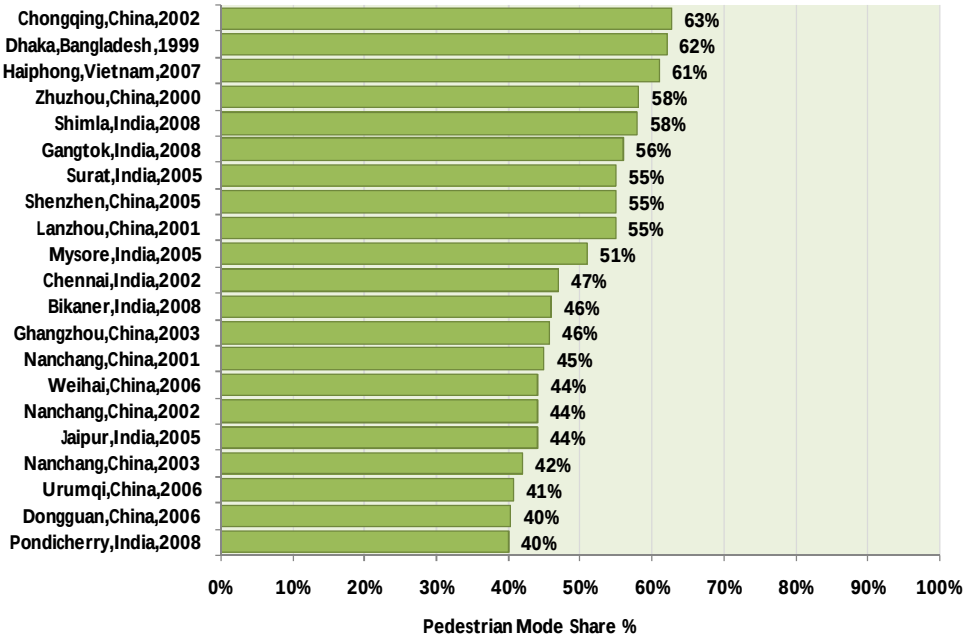
2.1. Significant but Declining Pedestrian Mode Share

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

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

Pondicherry, India to as high as 63% in Chongqing, PRC.

Figure 1: Pedestrian Mode Share in Asian Cities

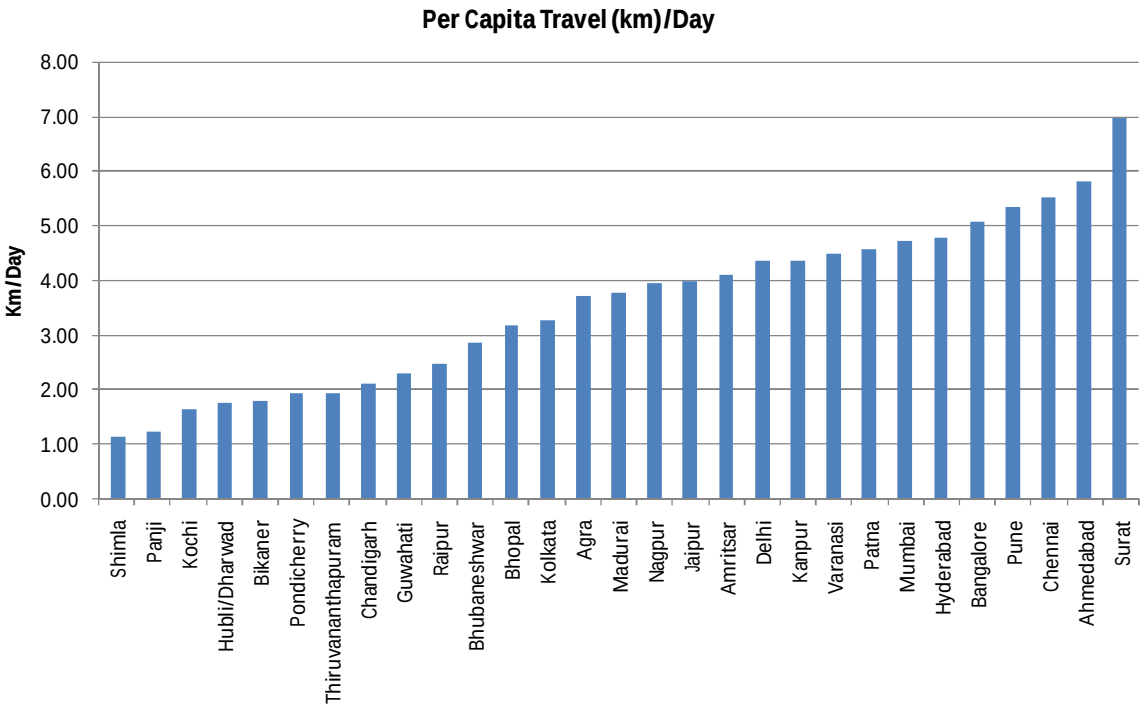


Sources: Asia Pacific Energy Research Center. 2007. Urban Transport Energy Use in the APEC Region; Asian Development Bank. 2001. Urban Indicators for Managing Cities: Cities Data Book; Asian Development Bank. 2007. A Development Framework for Sustainable Urban Transport - Regional Technical Assistance Report.; China Communications Press. 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. 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. 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; 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. Marikina bikeways Study, Detailed Engineering Component, First Progress Report; World Bank. 2008. A Framework for Urban Transport Projects Operational Guidance for World Bank Staff; Yokohama Urban Development Bureau; Zhou, Hongchang. 2001. Transportation in Developing Countries. Greenhouse Gas Scenarios for Shanghai, PRC

10. 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 overall livability of the city, providing accessibility within built areas, and providing an alternative to private vehicles for short distance trips. Short distance trips are common in Asian cities which are characterized by very high population densities and mixed land-use development.

11. 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 one and seven km per day. In Bangalore, over 20% of trips fewer than 2 km are accessed by motorcycles and nearly 26% of total trips are less than 5 km.

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



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

12. While the walking mode share is still high, it is declining across Asian cities. Cities seem to provide more incentives to private motorized modes at the cost of non-motorized transport such as walking, thus reducing walking mode shares as shown in the table below. Majority of the people that shifted modes chose two-wheelers and cars as their main mode of transportation and consequently contributed to deteriorating traffic conditions and the urban environment.

Table 1. Walking Mode Share Changes in Selected Asian Cities

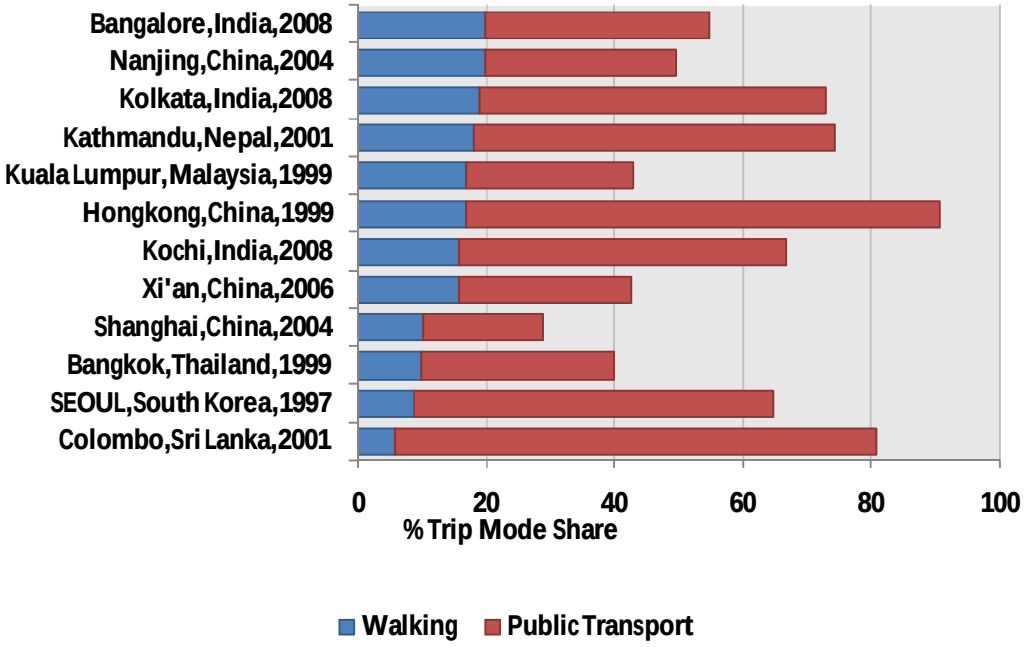
City	Year	Before	Year	After	Biggest Gainer (Motorized)
Bangalore	1984	44.00 %	2007	8.33 %	Two wheeler and Car
Changzhou	1986	38.24 %	2006	21.54 %	Two wheeler and Car
Chennai	2002	47.00 %	2008	22.00 %	Two wheeler
Delhi	2002	39.00 %	2008	21.00 %	Two wheeler and Car
Nanchang	2001	44.99 %	2005	39.11 %	Cars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

Source: See references for Figure 1

2.2. Inadequate Facilities for Public Transport and Pedestrians

13. An important reason for this decline is inadequate facilities for pedestrians and public transport. Figure 3 show that cities with low pedestrian mode shares have surprisingly high public transport shares, such as Colombo, Seoul and Bangkok. This suggests that walking trips are replaced not only by private vehicle trips but also 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 is that trips to and from public transport stations may be excluded from surveys, neglecting an important part of trips people make. Despite the modal and traffic enumeration inconsistencies and including preference for motorized modes for short trips, the data shows that are still high pedestrian mode shares.

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

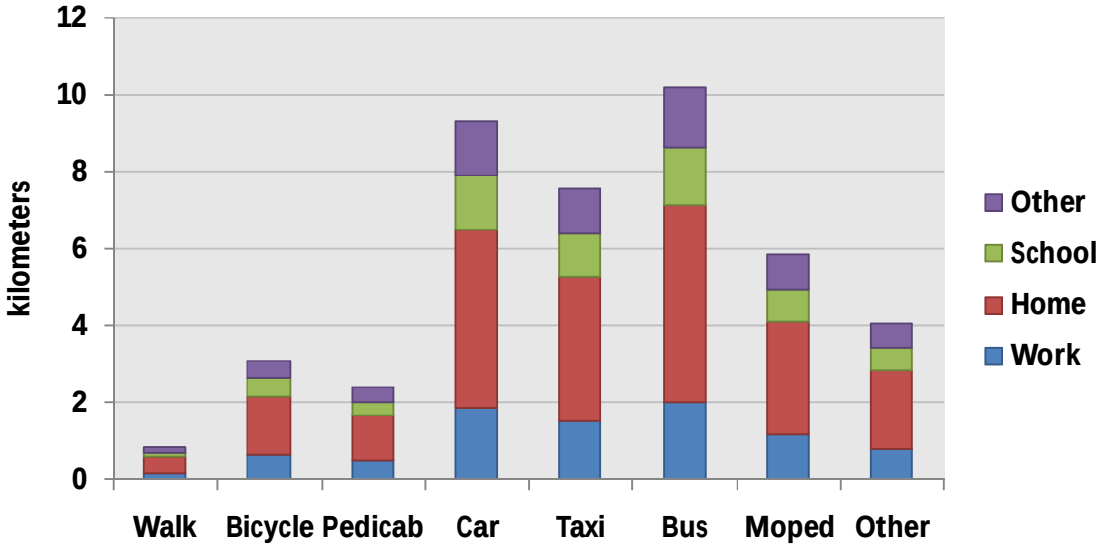


Source: See references for Figure 1

14. Figure 4 shows that in Hanoi, many trips could be made by foot and bicycle because average trip lengths are low. Poor infrastructure forces people to abandon walking and cycling and use motorcycles instead.[3] The situation is similar in Manila where nearly 35% of destinations are within the 15-minute walking or cycling reach, but the majority of short trips are made by para-transit (jeepneys and tricycles) and cars.[4] Surabaya, a city which is only 15 kms from north to south has over 60% of its trips under three kms but are mostly made by motor vehicles like motorcycle mopeds or by para-transit modes (Hook, 2003).

Figure 4. Average Distance Traveled Per Trip by Mode and Purpose in Hanoi (2006)

[3] Schipper, L. et al. 2008.
[4] Metro Manila Urban Transport Integration Study Database



Source: Schipper et al. 2008. Measuring the Invisible: Quantifying Emissions Reductions from Transport Solutions – Hanoi Case Study

Motorcycles in Ho Chi Minh City, Vietnam

15. Even with high motorization rates, Asian cities still have high non-motorized and public transport mode shares. Bangkok, which has one of the highest motorization rates in Asia with 388 cars and 220 motorcycles for 1000 people (World Bank, 2009a), still has a significant portion (40%) of the population relying on walking.[5]

16. Some pedestrians walk by choice because they have the option to take alternative modes but there are many "captive pedestrians" who walk because they cannot afford or access any other transport mode even if they wanted to. This can be best illustrated by predictions that by 2020, 78% of households in PRC and 72% in India will still have no access to private motorized vehicles (Pendakur, 2000).

17. 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*[6]". A recent study conducted by the World Health Organization (WHO, 2009) 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."* The absence of such policies will contribute to the continued decline of pedestrian trips and shifts to private motorized modes.

[5] Though trip mode shares indicate a minority of people use foots to access destinations (14%). The policy implications can be easily understood from the fact that city is beefing up the investment on MRTs with a target to reach 14% mode share by 2015. The footpaths cost only a minor part of investment but still providing similar mobility.

2.3 Pedestrian Accidents and Fatalities

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

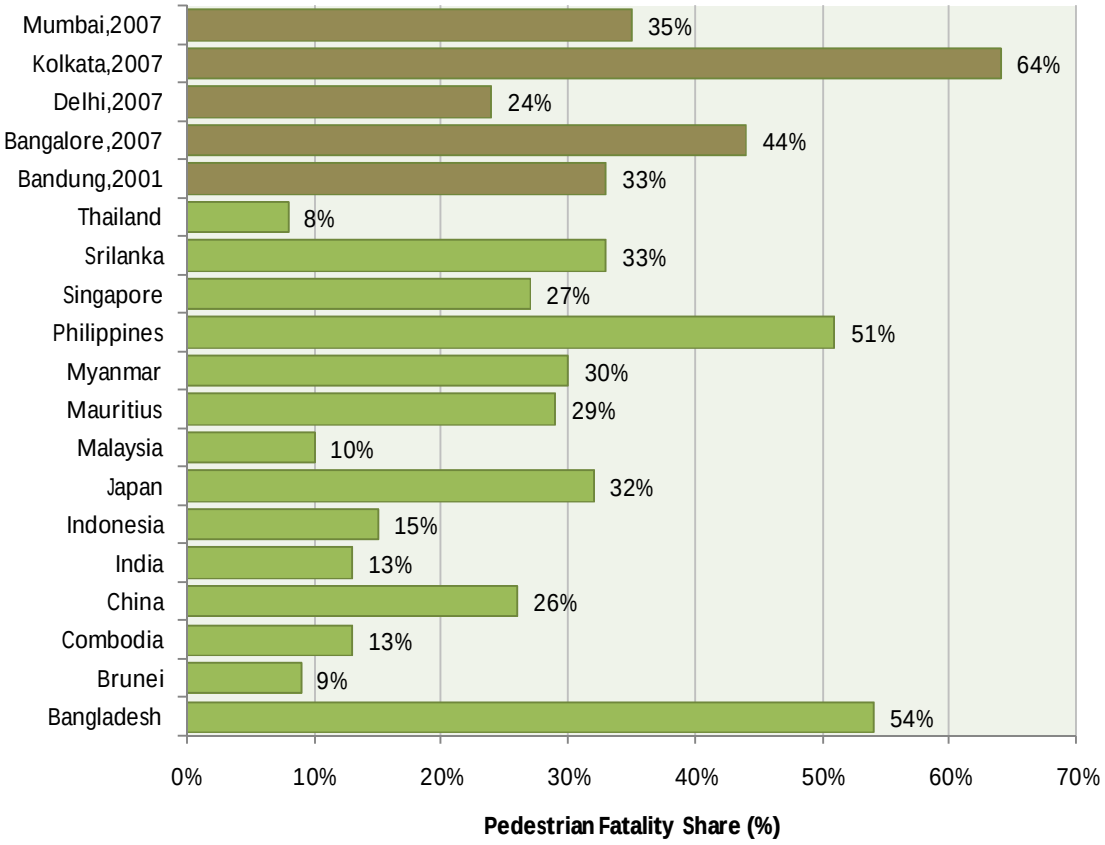
19. The WHO (2009) study which analyzed policies around the world related to road safety suggests that: *"Our roads are particularly unsafe for pedestrians, cyclists and motorcyclists who, without the protective shell of a car around them, are more vulnerable. These road users need to be given increased 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."*

20. 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 represent 40% of all road accident fatalities in the city in 2001 (KVMP, 2001). In Ulaanbaatar, Mongolia, 80% of the reported traffic fatalities are pedestrians (Government of Mongolia, 2007).[7]

21. The problem is even more severe when the impact on 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 ten years old are the most vulnerable pedestrian group in Thailand (Hossein, No date). It is also worth noting that injuries for traffic accidents are typically under reported. The actual values are likely to be higher than the reported ones.

Figure 5. Pedestrian Fatality Share of Road Accidents in Asian Countries and Selected Cities

[7] From 2000 to 2007.



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

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

23. 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 Hanoi, pedestrians were found to be exposed to 495 μg/m^3 of PM_{10}, motorcyclists to 580μg/m^3, car drivers to 408μg/m^3 and bus passengers to 262μg/m^3.

3. ASSESSING THE WALKABILITY OF CITIES

24. ”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.

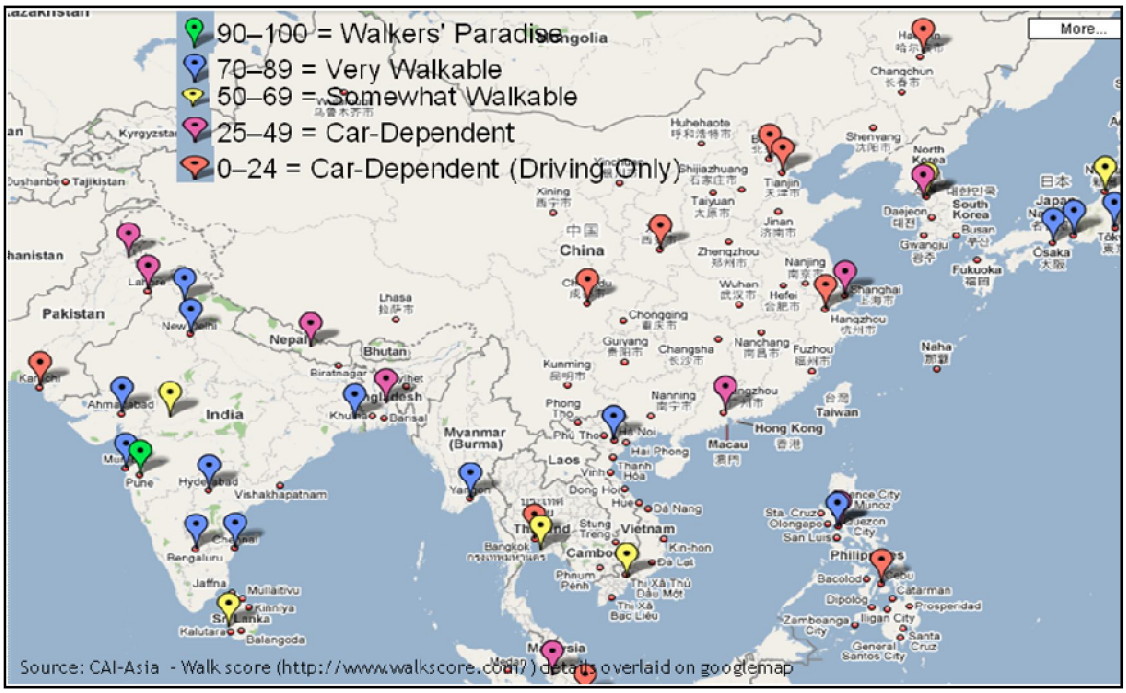
25. Some cities have undertaken comprehensive studies and city plans for improving walkability like the Transport for London (2004), defines walkability as *"the extent to which walking is readily available to the consumer as a safe, connected, accessible and pleasant activity."* For New Zealand, it was defined as the extent to which the built environment is walking friendly (New Zealand Transport Authority, 2009). Abu Dhabi has developed an Urban Street Design Manual which integrates the concept of pedestrian realm to the 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.

26. 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 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 in crossings and other qualitative factors. A low rank indicates inadequate and substandard pedestrian facilities. The national average index in 2008 was 0.52 (CSE, 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)/pedestrian, street lighting (Lux) and % of city covered with footpaths wider than 1.2 m.

27. A popular website, "www.walkscore.com" calculates the walkability based on the distance from your house to nearby amenities.[8] Walk Score measures the ease of a car-free lifestyle, but it does not include an assessment of the quality of pedestrian facilities like street width and block length, street design, safety from crime and crashes, pedestrian-friendly community design, and topography. Many Asian cities can have high scores in Walk Score because of the traditionally mixed-use character of the cities.

[8] See http://www.walkscore.com/

Figure 6. Snapshot of Walk Score and rating of some Asian Cities



28. The Global Walkability Index developed by H. Krambeck of the World Bank provided a qualitative analysis of the walking conditions including safety, security, and convenience of the pedestrian environment. [9] This analysis provides a better understanding of the current situation of the walkability of Asian cities and is able to identify factors for improving pedestrian facilities.

4. FIELD WALKABILITY AND PEDESTRIAN RATINGS

4.1 Methodology

29. The methodology used in this study is based on the Global Walkability Index (GWI) developed by the World Bank. It includes a field walkability survey and a government policy and institutional survey which are based on the GWI. This study also includes pedestrian surveys in order to gather the sentiments of the people regarding their walking environments. The details of the methodology are explained in Annex 1.

4.1.1. Field Walkability Survey

30. In order to provide a holistic approach which links design and execution with user perception and the built environment, the CAI-Asia Center slightly modified the GWI

[9] More information on the Global Walkability Index is available at http://www.cleanairnet.org/caiasia/1412/article-60499.html

methodology to accommodate complete route assessments.

31. 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 pre-selected areas by following the logical pedestrian routes in the specific areas.

32. The areas were surveyed using the parameters in the GWI with slight modifications in the description to make it more applicable with the Asian context as shown in Table 2.

Table 2. Field Walkability Survey Parameters

Parameter	Description
1. Walking Path Modal Conflict	The extent of conflict between pedestrians and other modes, such as bicycles, motorcycles and cars on the road
2. 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.
3. Availability of Crossings	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.
4. 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
5. Motorist Behavior	The behavior of motorists towards pedestrians which may well indicate the kind of pedestrian environment there is in that area.
6. 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.
7. Disability Infrastructure	The availability, positioning and maintenance of infrastructure for the disabled.
8. 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.
9. Security from Crime	The general feeling of security against crime in the street.

33. Field surveyors were asked to rate the road stretches from 1 to 5 for each of the 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.

34. 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/streets were documented and pedestrian counts conducted, but not used in deriving the walkability ratings (see Table 3).

35. One of the limitations of the Field Walkability Surveys is the subjectivity of responses as it greatly depends on the assessment 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

36. 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, there were some cases where 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.

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

4.2. Results of the Field Walkability Surveys

38. 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. residential – 4 km, educational – 4 km, commercial – 5 km, and public transport terminal – 2 km.

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

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
Hanoi	2.00	592	4.25	1,264	4.81	1,408	1.80	221
HCM	2.72	613	4.45	1,319	5.05	1,830	0.54	160
Hong Kong SAR	3.2	654	2.4	517	6.3	6653	-	-
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
Ulaanbataar	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

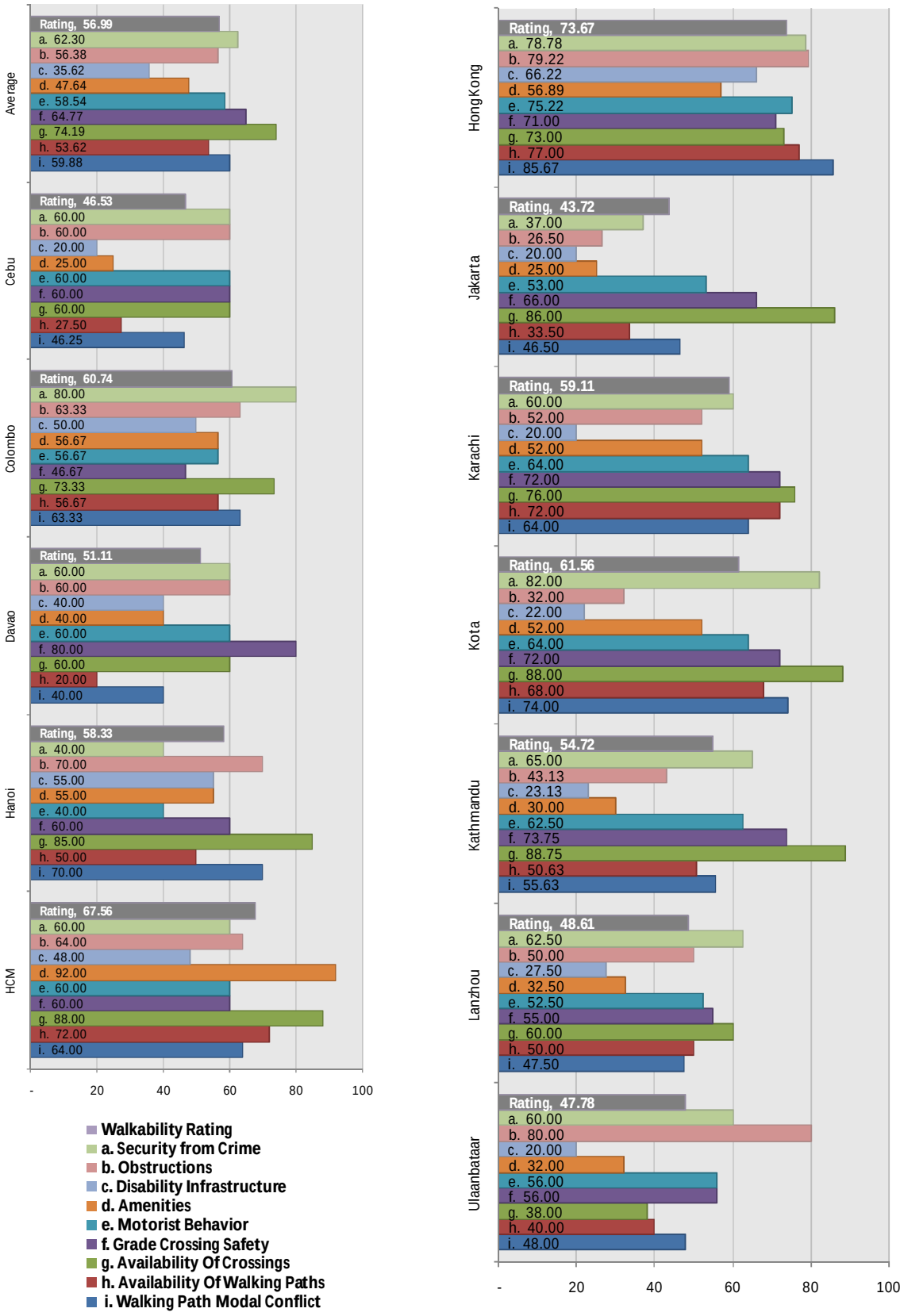
4.2.1 Residential Area Surveys

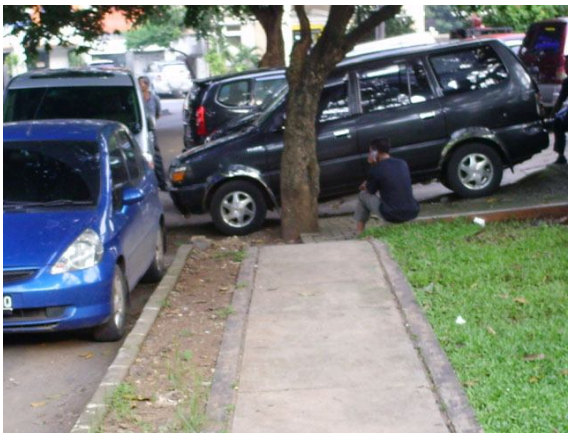
40. The average field walkability rating in the residential areas is 56.99 out of 100. The highest is Hong Kong where surveyors observed adequate availability of walking paths, positive motorist behavior, less obstructions and security from crime. Jakarta had limited infrastructure with several obstructions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

41. In Davao, despite its high overall ratings, was identified as having no pedestrian facilities and that spaces where sidewalks can be constructed frequently had an uncovered drainage. Ho Chi Minh City 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 facility. If the connectivity between stations and commercial and residential buildings can be improved, motorbike and car trips can be reduced.

42. The ratings for individual parameters combining all surveyed cities 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 7. Walkability Ratings of Surveyed Residential Areas by Parameter





Vehicles parked on the sidewalks in Kebayoran Baru (Residential Area) in Jakarta, Indonesia

Sidewalk in one residential area in Cebu, Philippines

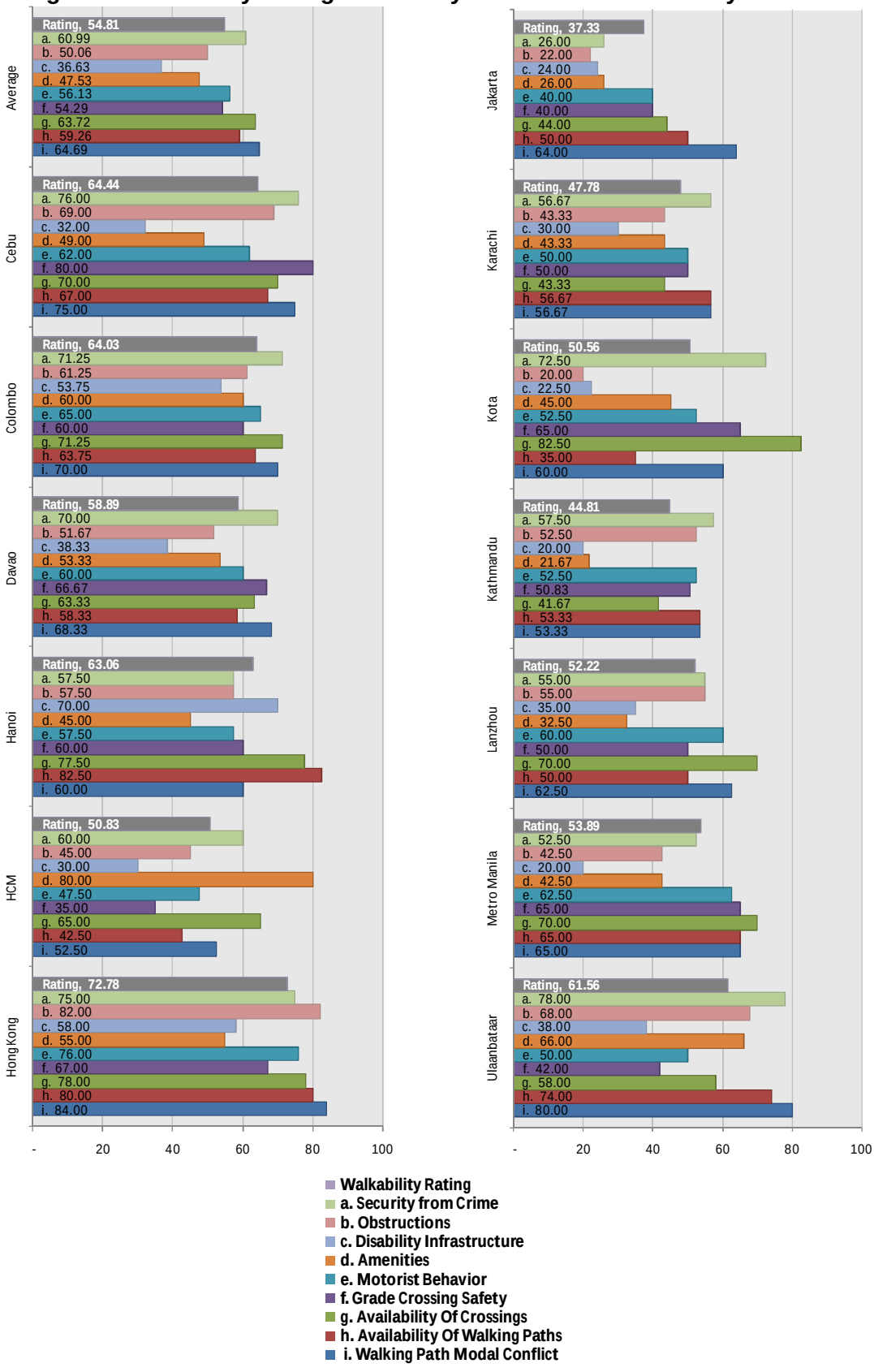
4.2.2 Educational Area Surveys

43. The average walkability rating in the educational areas is 54.81 out of 100. 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 the schools' vicinity.

44. 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 because of 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 and 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.

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

Figure 8. Walkability Ratings of Surveyed Educational Areas by Parameter



Students at the University Belt Area in Manila, Philippines


Sidewalks and streetscape in one educational area in Ho Chi Min City, Vietnam

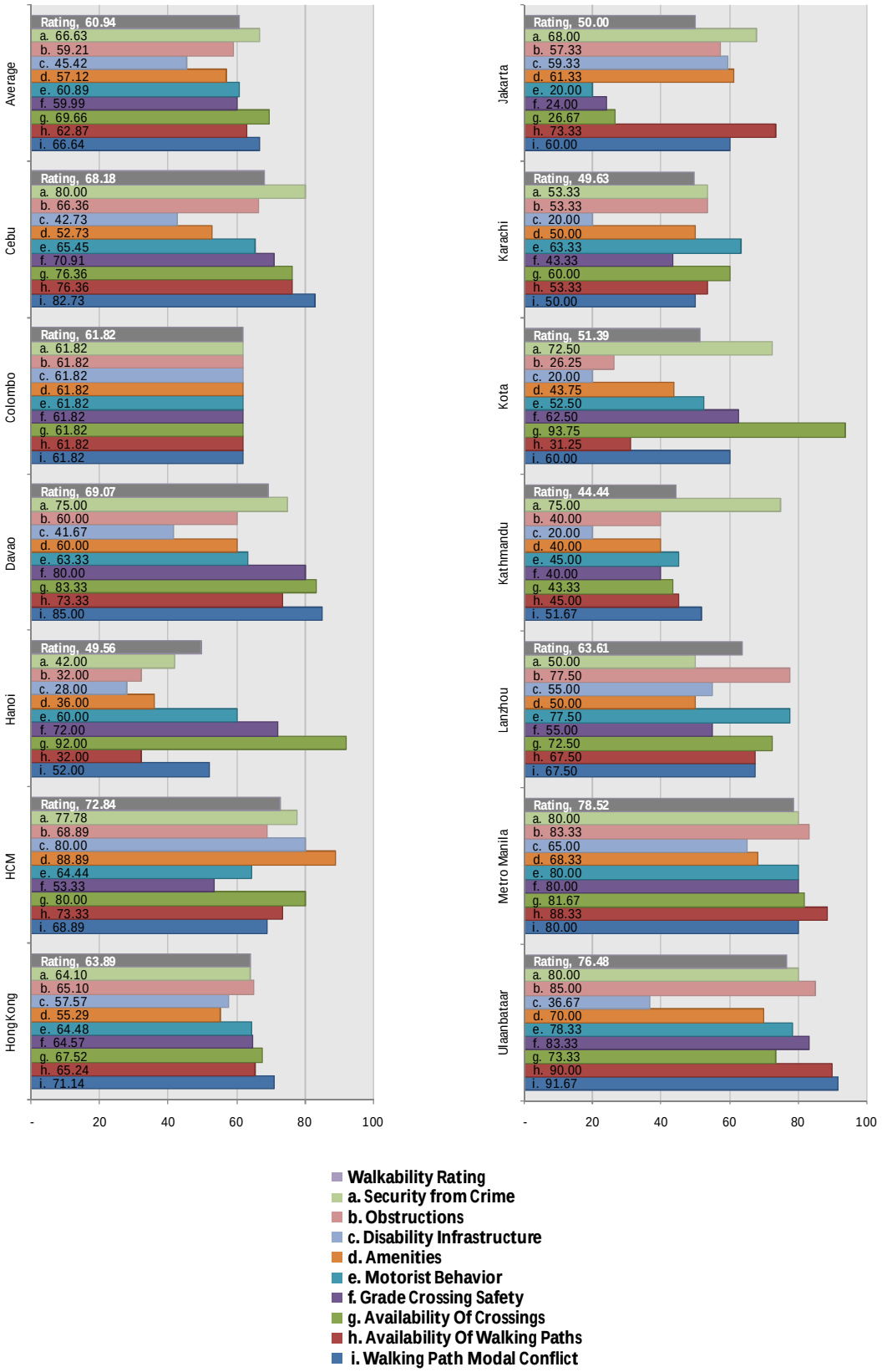
4.2.3 Commercial Area Surveys

46. The average walkability rating in commercial areas is 60.94 out of 100, 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.

47. The results for Metro Manila and Kathmandu are contrasting. While Metro Manila (78.52) had high ratings perhaps because of 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 because of strict enforcement by the Metro Manila Development Authority 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, and 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 several street vendors or hawkers along the sidewalks and footpaths in commercial areas.

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

Figure 9. Walkability Ratings of Surveyed Commercial Areas by Parameter



Chundrigar Road in a commercial area in Karachi, Pakistan

Tourists in a commercial area in Ho Chi Minh City, Vietnam

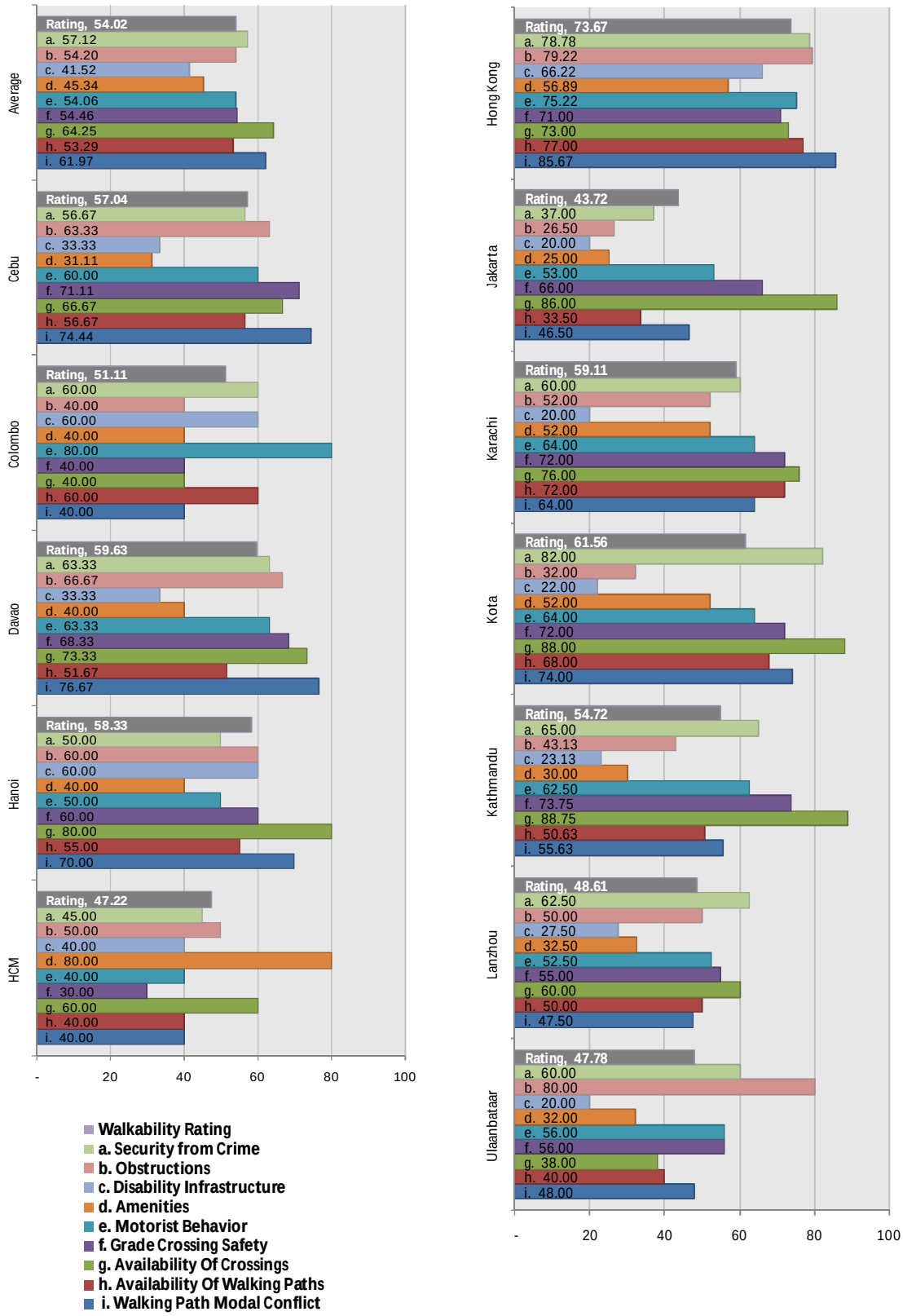
4.2.4. Public Transport Terminals Survey

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

50. Among all the cities surveyed, Kathmandu and Ho Chi Minh City (HCMC) had the lowest ratings. Hanoi, a city with a similar population of motorcycles as HCMC, had a much higher rating, even when compared to the other cities. Kota had the highest rating because the surveyed area went through the *cantonment* area, a military establishment with very good pedestrian facilities.

51. 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, East-West bus trips. The total ratings were high because of high ratings for perceived security from crime in Ulaanbaatar.

Figure 10. Walkability Rating around Surveyed Public Transport Terminals by Parameter



Sidewalks near a public transport terminal in Davao, Philippines

Pedestrians crossing towards a public transport terminal in Lanzhou, PRC

52. Figure 11 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 rating for pedestrian amenities and obstructions also show that the surveyed roads and streets are not pedestrian-friendly. While crossings are sufficient and there is relatively less vehicle-pedestrian modal conflict and perceived security from crime, obstructions will discourage pedestrians to maintain walking as a primary mode of transport.

Figure 11. Average Rating by Parameter for all Cities

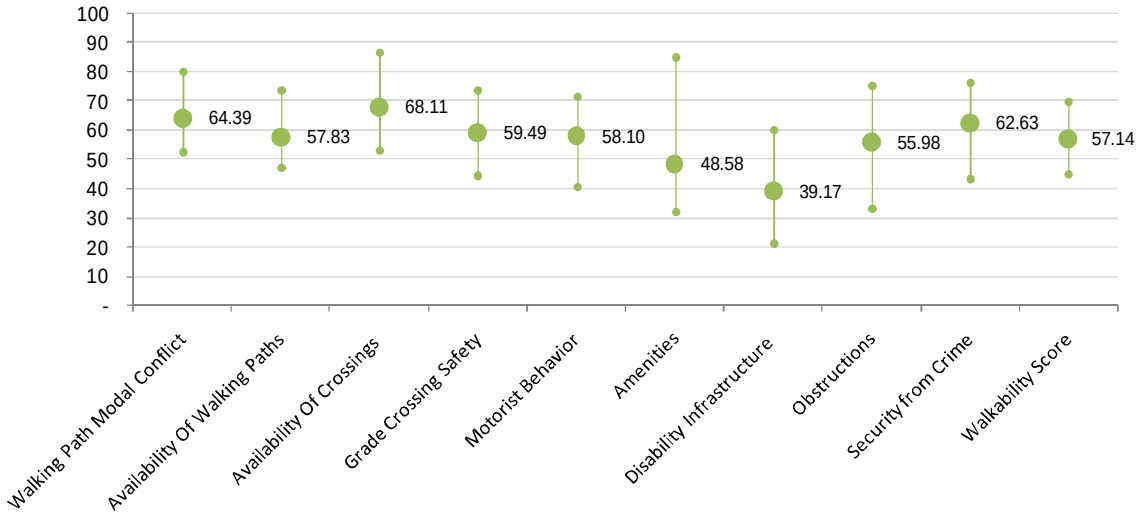
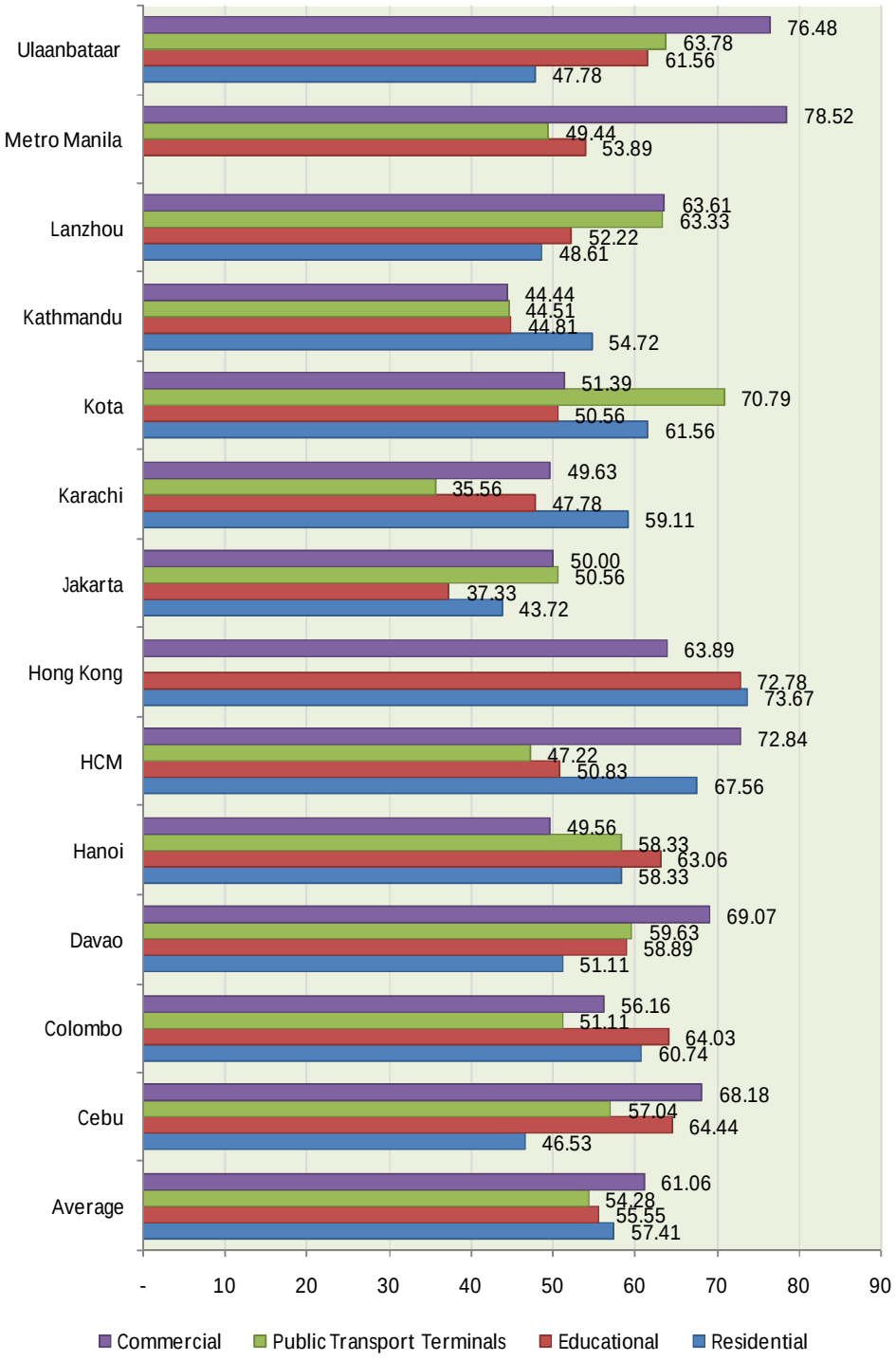


Figure 12. Over-all Rating by Area for all Cities



53. 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 (see

Figure 12). Unfortunately, the surveyed residential areas may not necessarily be good representatives of the residential areas in the cities as most of these cities have low or lower income residential areas where pedestrian facilities are limited, if available at all.

54. 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 transportation becomes a barrier. Improving walkability provides an opportunity to maximize pedestrian access to public transport as part of future public transport projects.

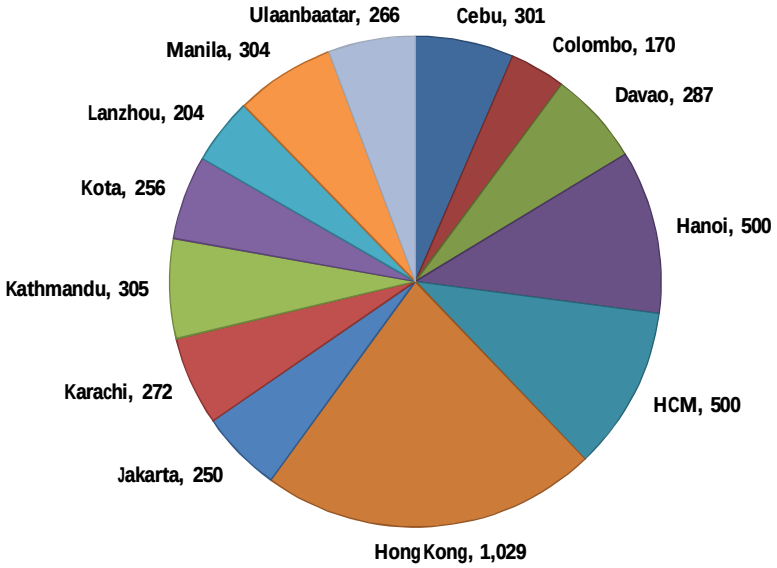
55. It is of equal concern that educational areas also received low ratings, especially because it affects children and the youth in general.

56. 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 was only less than 1% of total roads available in the cities and only captures high pedestrian areas in four major areas. In order to get 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

57. Pedestrian interview surveys were conducted in the 13 cities in order to validate the results of the field surveys as well as to collect the actual sentiments of the pedestrians themselves. 4,644 pedestrians were interviewed on how they rate the walkability of a specific area and what makes a good pedestrian facility including specific improvements needed. Figure 13 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 policymakers. The surveyors used local language in conducting the surveys to facilitate better comprehension of the questions by the interviewees.

Figure 13. Number of Pedestrian Interview Survey Respondents

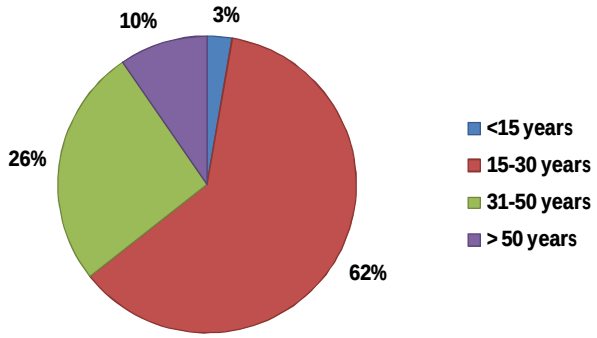


58. The set of questions included attitudinal, socio-economic and hypothetical questions. In order to capture a balanced sample, an attempt was made to collect similar sample sizes from each city, at least 50 respondents for each area, but total respondents for each city ranged from 250-300 on average. People were interviewed mainly on the streets, sometimes on bus stops, shops and in some cases, surveyors interviewed people inside offices as well. Surveyors experienced different degrees of difficulty in getting respondents, therefore, the number of respondents varied for the different cities.

4.3.1 Profile of Respondents

59. Survey participants were nearly evenly split between male (55%) and female (45%). The majority of people (65%) were in the age group 15-30 years as shown in Figure 14.

Figure 14. Age Group of Respondents

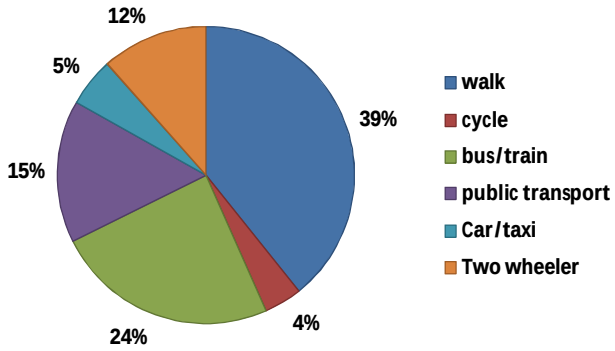


60. Nearly 37% of people interviewed came from households which do not possess motorized vehicles and thus are captive to non-motorized and public transport modes. Of the households with vehicles, 64% have two wheelers and 31% have cars.

4.3.2 Travel Characteristics

61. Most often travel entails trip chaining or using multiple transport modes. Walking constitutes 39% of trip mode share. Figure 15 shows the daily modes used of the people interviewed. It was interesting to note that the cars and taxis only constituted a small share (5%) and public transport and intermediate public transport or para-transit had a combined share of 40%.

Figure 15. Travel Mode Share of Respondents



62. The average travel time (one-way) as estimated by the respondents showed that a majority of trips are within 15-30 minutes (31%) and below 15 minutes (27%). This corresponds with the estimated trip lengths within 3-6 kms (21%) and below 3 kms (30%). These results validate the estimates 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 travel time less than 30 minutes and having trip lengths less than 6 km.

Figure 16. Average Travel Time of Respondents

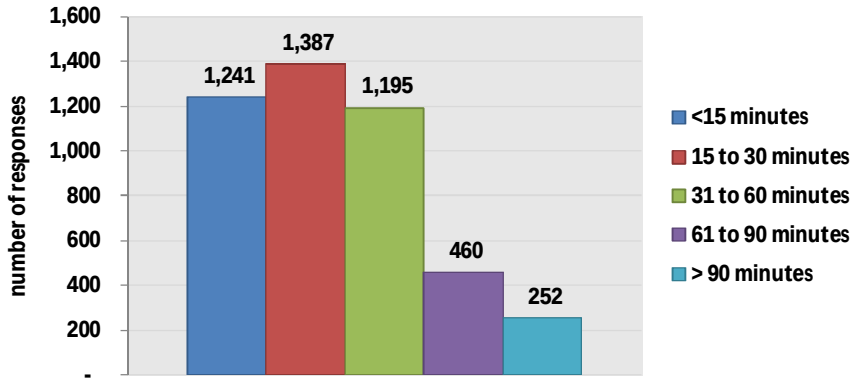
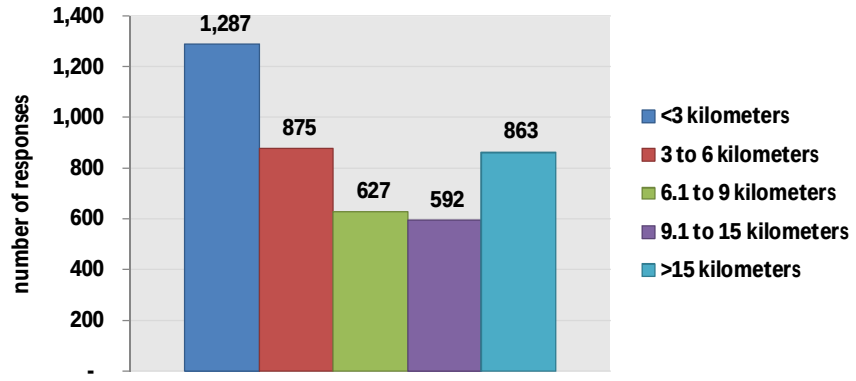


Figure 17. Average Trip Length of Respondents



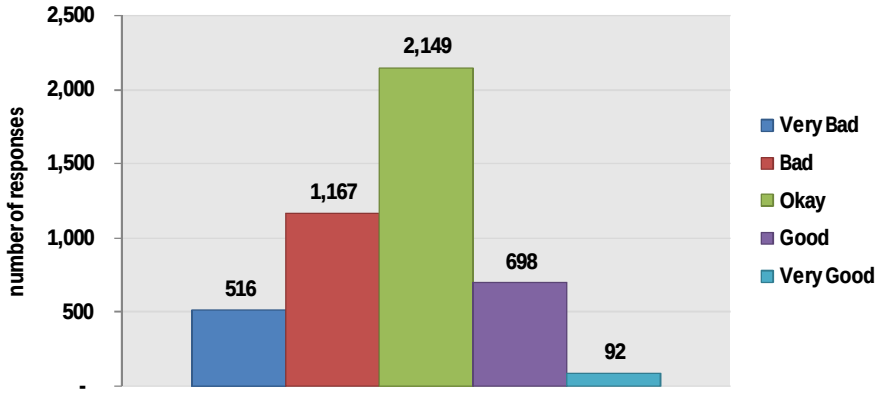
63. The travel characteristics show that a combination of walking, cycling and public transport can easily provide access to majority of destinations within a city.

4.3.3 Pedestrian Preference

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

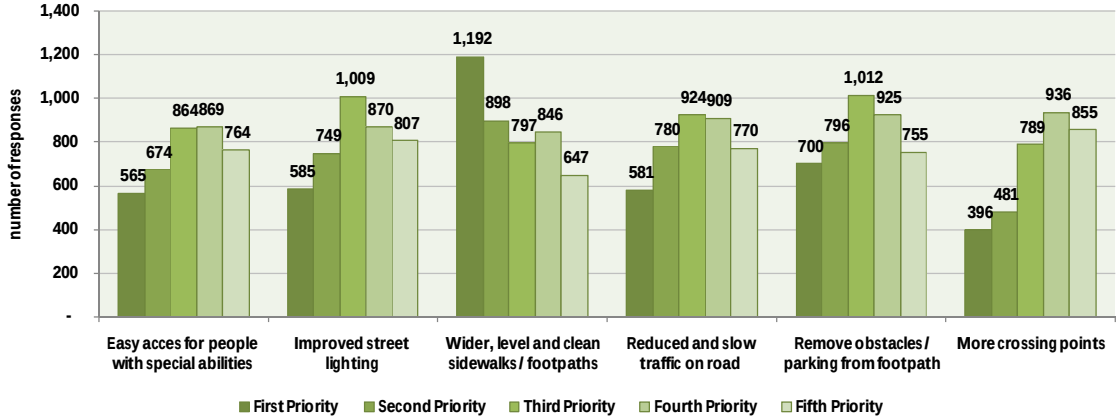
65. While many may argue that pedestrian facilities in Asian cities are worse than the results of both the field walkability and pedestrian preference survey or vice-versa, the results show that local citizens of these cities are not complacent and would like to have more improvement in their pedestrian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

Figure 18. Respondent's Rating of Pedestrian Facilities



66. In order to understand the preferences of pedestrians on facility improvements, the respondents were asked to rank the different types of facility improvements based on a priority scale. The figure below indicates that the top priority is to provide wider, level and clean sidewalks/ footpaths followed by the removal of obstacles/ parked cars from footpaths and the third is improved street lighting. The findings coincide with the field walkability survey results where 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 19. Respondents' Priority for Improving Pedestrian Facilities

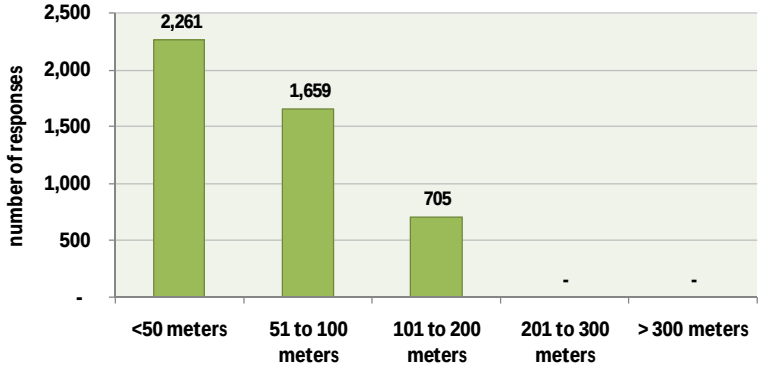


67. It is interesting to note that the survey respondents prefer at-grade crossings (49%) and skywalks (36%). Subways are preferred by 15% of the respondents. Hanoi respondents (52%) were more agreeable to skywalks. The main reasons for this can be the high traffic accidents prevailing in our cities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

68. In order 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/grade separated). The majority of respondents are willing to walk to access pedestrian crossings less than 50 meters (49%) and within 50-100 meters (36%) as shown in the

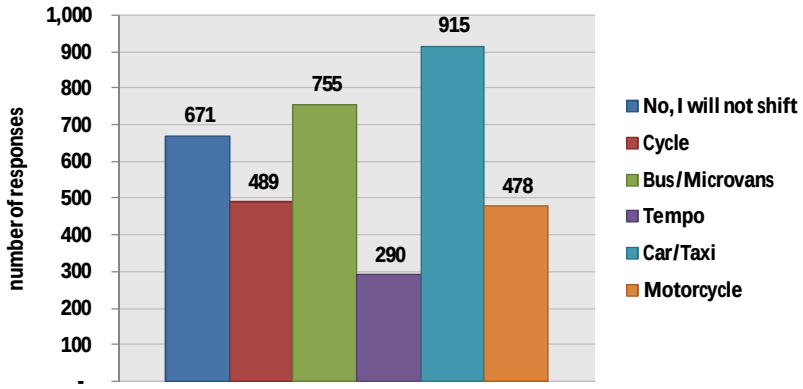
Figure below. Only 15% are willing to walk more than 100 meters to access crossings. This provides a challenge to policymakers and planners in planning for pedestrian crossings especially at dense area with high volumes of pedestrian traffic. There may be a need to revise existing guidelines that provide controlled crossings only at few locations in mid-blocks and at junctions which are more often separated by a long distance (>300m).

Figure 20. Respondents' Willingness to Walk to Access Pedestrian Crossings



69. Pedestrians are quickly migrating to other modes encouraged by increasing motorization and inadequate pedestrian facilities. Of respondents, 81% indicated that they will shift to other modes if they can afford to: 25% to cars and 13% to two-wheelers.

Figure 21. Transport Mode Preference if Pedestrian Facilities are not Improved



70. People's willingness to access pedestrian crossings and other destinations can vary depending on the walkability of the streets and the over-all pedestrian environment. In hotter and more humid cities, people may tend to walk fewer kilometers. 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 700m from 400m within the business district.[10]

[10] Tan, Salvador. 2005.

5. POLICIES, INSTITUTIONS, AND GUIDELINES

71. 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

72. The main reasons 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 transportation, particularly for public transportation and non-motorized transportation, 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.

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

74. In Malaysia, the Tenth Malaysia Plan (2011-2015) focuses on a new approach towards building vibrant and livable cities. The current approach for transportation 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."

75. 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."* [11] It identifies the promotion of effective accessibility and efficient mobility for all as a strategy towards achieving environment and people-friendly infrastructure development. Also, it identifies the provision of

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

pedestrian and bike lanes as a strategy for social equity and gender perspective. It also promotes walking as a utilitarian mode.

76. Singapore's Land Transport Master Plan is a "people-centered" plan which aims at achieving efficiency through multi-modal 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 MRT stations and bus shelters and all public roads shall be barrier-free by the end of this year and shall cost a total of US$60 million.

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

- *Pedestrian walkways*
  - *Ensuring a minimum of 1.0m to 1.5m clearance on walkways by removing obstacles or by widening the path, to provide a clear passageway for wh eelchair users.*
- *Pedestrian crossings*
  - *Removing the slight drop (25mm) from the footpath to the road and provid ing tactiles to indicate the edge of the road for the visually impaired*
  - *Thickening road crossing lines to guide the visually impaired to walk withi n the designated crossing*
  - *Installing vibrating push button (with audio alert) at traffic signal posts to h elp the visually impaired*
  - *Providing at-grade i.e. road-level crossings where traffic conditions permit*
- *Traffic signs*
  - *Using higher reflectivity materials for traffic signs and street name signs to improve visibility.*
- *Interchanges*
  - *Providing more ramps connecting bus interchanges and train stations.*

78. Bangladesh's National Land Transport Policy also aims at creating 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 non-motorized transport such as cycling and walking."*

79. In Mongolia, their National Transport Strategy states that one of its priorities in urban, suburban and community areas include the "*provision 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."*

80. The National Urban Transport Policy of India encourages integrated land use and transport planning, public transport and non-motorized 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 non-*

motorized modes of travel." The Master Plan of Delhi 2021 specifies that all roads should be made pedestrian, disabled and bicycle-friendly; adequate pedestrian facilities should be provided and that encroachments from sidewalks should be removed. 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."* It aims at incorporating hawking zones in the development of city or town master plans.

81. 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.*[12]*"*

82. The Indian "Persons with Disabilities Act" gives guidance on how non-discrimination towards persons with disabilities can be promoted. It states that the appropriate Governments and the local authorities shall, within the limits of their economy capacity and development, provide for the installation of auditory signals at red lights in the public roads for the benefit of persons with visually handicap; causing curb cuts and slopes to be made in pavements for the easy access of wheel chairs users; engraving on the surface of the zebra crossing for the blind or for persons with low vision; engraving on the edges of railway platforms for the blind or for persons with low vision; devising appropriate symbols of disability; warning signals at appropriate places. It also has provisions on non-discrimination in the built environment and states that governments provide facilities such as ramps in public buildings, especially hospitals, health centers and rehabilitation institutions, toilets for wheel chair users, Braille symbols and auditory signals in elevators (Government of India, 1995).[13]

83. 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."* Also, the government has mandated that at least 1/10th of space of all roads within urban areas provided exclusively for non-motorized transport such as for sidewalks for walking and bicycle lanes.

84. In Indonesia as per the Traffic and Road Transport Act of Indonesia (Act 22/2009):
- Motorists must give a priority to safety of pedestrians and bicyclists (Article 106 (2))
- Pedestrians have a right to facilities such as pedestrian pathway, crossing and other facilities. Pedestrian is given a priority when crossing the road at pedestrian crossing (Article 131)
- Pedestrians must use the part of the road which is dedicated for pedestrians or use the far edge of the road, use pedestrian crossing (Article 132 (1))

[12] Taken from the Indian Penal Code

- o If a pedestrian crossing does not exist, pedestrians must take care of their own safety when crossing the road
- o People with disabilities must wear special signs that are visible to motorists (Article 132 (3))

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

86. Most of the available official government reference 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 the pedestrians are in place.

5.2 Pedestrian Facilities Design Practices and Guidelines

87. 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 cites.

88. 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 transportation travelling at various speeds (e.g. 4 to 100 kph). Their competition for road space often times result in chaos and increased injury and deaths of vulnerable users, including pedestrians. This chapter provides an initial assessment of the current state and practice related to providing footpaths and sidewalks in Asia.

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

90. Traffic experts still rely on speed as a basis for performance measurement in urban areas, as found in the (U.S. Highway Capacity Manual) and thus put more emphasis on improving the speed rather than planning for streets which promote accessibility by all users. In practice, many pedestrian infrastructure development guidelines are based on the assumption that the movement of people mimics that of the vehicles. These assume that people travel in a linear path, that faster speed indicates efficient flows and that more people indicate a “congested” condition.[14] While others advocate for a more qualitative pedestrian LOS that includes elements like safety, security, convenience and comfort, continuity, system coherence, and attractiveness

[14] Pedestrian LOS 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 U.S. Highway Capacity Manual for more details.

(Sarkar, 1993), this is not often the case in Asia.

91. Worldwide, the opinion on free flow speed is divided. Many believe that pedestrians travel at 60-80m/min in Asia. Many also argue that this speed is further influenced by gender, age and trip purpose. The last parameter "trip purpose" differentiates the travel behavior of pedestrians with vehicles making it a complex movement pattern which involves waiting, shopping and meeting. Thus, it is wrong to design a facility which assumes people as vehicles travelling at a uniform speed as envisioned in capacity analysis.

92. The table below gives the Indian capacity values of footpaths assuming a speed of 1.2 m/sec which is used by designers to reserve space for pedestrians on roads.

Table 4. Indian Pedestrian Capacity Values

Width of side walk (meter)	Capacity in number of persons per hour	
	All in one direction	In both directions.
1.50	1200	800
2.00	2400	1600
2.50	3600	2400
3.00	4800	3200
4.00	6000	4000

Capacity of Sidewalks – does it capture the pedestrian behavior?

93. According to Institute of Transport Engineer's Alternative Treatments for At-Grade Pedestrian Crossings (2001), mid-block locations may be warranted if:

- Protected intersections crossings are more than 180 meters apart, 100 meters in high pedestrian volume locations.
- Adequate sight distance is available
- 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.

94. It is clear that spaces, often a premium in urban areas, are not equally allotted to pedestrians as allotted to vehicles. Further, crossings which often create competition and conflicts do not provide priority to pedestrians. The Indian Code for Pedestrian Facilities prescribes 300m mid block separation whereas ITE recommends 100/180m.

95. According to the U.S. Manual on Uniform Traffic Control Devices (MUTCD), the length of the pedestrian clearance phase (including the flashing "don't walk" segment) should be based on the "normal" pedestrian walking speed of 4.0 feet (1.22 meters) per second (US DOT 2003). The City of San Francisco calculates pedestrian crossing times based on a walking speed of 855 mm/s (2.8 ft/s).[15] Many Asian cities suggest 1.2m/sec

[15] Alta Planning + Design. 2005.

for calculating pedestrian speeds in signal design but more often only few seconds are provided in actual signal design thereby making people wait and run when crossing streets. [16]

96. Segregation done in road space, especially elevated footbridges, at crossings are often unfriendly and do not coincide with pedestrian preferences and takes more time and energy thus leading to underutilization. In fact surveys shows 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).

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

98. The concept of "shared space" is instrumental in transforming the current paradigm. Shared space refers 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:

99. *"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."*

100. To enforce such shared streets, speeds needs to be brought down to less than 20kmph and currently Asian streets do not have that kind of speed limits enforced because of current legal frameworks.[19]

101. Experience from the Netherlands on impact on fatality shows that: *"One of the conclusions is that the new approach can be applied for traffic volumes of up to 6,600 motor vehicles per 24 hours without causing a noticeable difference in the number of accidents. Objective statistics show that there is no difference in road safety between the new planning approach and a traditional road layout. The study has shown, however, that applying the new approach to volumes of 13,700 vehicles per 24 hours will have an adverse effect on the number of accidents. There is a grey area for traffic volumes of between 6,600 and 13,700 vehicles per day."*[20]

102. As seen from the evidence above, not many Asian countries have design guidelines that are specific to pedestrian facilities and consider the local context and

[16] For example, in Fushun, in one of the intersections, walking speed of 2.95m/sec has been provided. (Tao, 2007)
[17] http://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.
[19] The current laws suggest a minimum speed of only 30kmph in several cities.
[20] Ibid (see footnote 31)

which are integrated to the overall transport design. Most of the 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.

103. The Indian Roads Congress formulated the “Guidelines for Pedestrian Facilities (IRC 103-1988) back in 1989. It was formulated as a supplement to the earlier IRC Standards which have covered some of the requirements for pedestrian facilities such as the “Guidelines on Regulation and Control of Mixed traffic in Urban Areas” (IRC 70-1977) and the “Geometric Design Standards for Urban Roads and Plains (IRC 86-1983).

104. The basic aim of IRC 103-1988 is to reduce pedestrian conflicts with vehicular traffic to the 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 doesn’t 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, grade separated), it doesn’t give guidance on how the pedestrian facilities should be planned in an integrated manner as well.

105. “Pedestrian Design Guidelines” for Delhi, India were approved by the Unified Traffic and Transportation Infrastructure (Planning and Engineering) Center (UTTIPEC) of the Delhi Development Authority last November 2009. The guidelines lays down three main goals for “integrated” streets in Delhi: a) mobility and accessibility – maximum number of people should be able to move fast, safely and conveniently through the city; b) safety and comfort – make streets safe, clean and walkable, create climate sensitive design; c) ecology – reduce impact on the natural environment; and reduce pressure on built infrastructure.

106. Its goal on improving mobility and accessibility ties up pedestrian facilities with the use of public transport. The guidelines state that streets should be retrofitted towards 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. In order to ensure safety and comfort, the guidelines emphasizes the importance of transparent (30%) commercial facades, removal of boundary walks and 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 y the physically-challenged. In terms of the ecological goals, the guidelines also target at reducing the urban heat island effect and aid storm water management. The use of permeable paving, 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.

107. The Delhi guidelines give suggestions in term of the distribution of road space for the different types of roads and how components such as the clear walking zone, frontage zone, plant space, segregated cycling paths, pedestrian crossings, pedestrian lighting, underground facilities, public transport stops, as well as the vehicle lanes can be integrated within the available space. It gives specific guidance as well as best practices on the design of the different components, as well as on additional components such as

traffic calming measures, “green” construction materials and public art.

108. In early 2010, the Abu Dhabi Urban Planning Council (UPC) unveiled the Abu Dhabi Urban Street Design Manual. The UPC developed the said 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 which 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 to the said 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.”* The manual guides the transition towards more multi-modal and more walkable streets.

109. It is worth mentioning some of the key design principles which are the bases of the concepts in the said 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; d) street connectivity enhances connectivity and allows smooth traffic flow.

110. The Abu Dhabi manual is a combination of mandatory standards as well as guidelines and optional components so as to uphold design flexibility in different situations. It emphasizes the use of the context-sensitive solutions approach which uses a collaborative approach that includes 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 – pedestrians; 2nd priority – transit users; 3rd priority – bicyclists; 4th priority – motor vehicles) and focuses on strengthening the inter-connectivity of the street networks and providing universally-accessible pedestrian community facilities, amenities as well as open spaces to encourage walking.

111. 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.

112. 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 additional street types). Different design considerations are given depending on the context of the streets – city, town, commercial, residential, industrial and no active frontage.[21]

113. 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

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

frontage, shade and climate attenuation, landscaping and water use, lighting, furnishings and signages. It also gives guidance on how the performance of the transport system can be measured as well as the connectivity of the street network.

114. In Hong Kong, the provision for pedestrian facilities and the priority for pedestrians have 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 (HKPSG).

115. The HKPSG gives 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. It also gives specific guidelines on how to determine streets for pedestrianization. Guidelines for cycling, vehicle parking and also for general urban design are centered on pedestrians.

116. Clearly there is a need for a comprehensive and integrated approach in pedestrian planning for many Asian cities in order to move towards having complete streets or streets that provide mobility, safety and accessibility to all people regardless of age and ability. [22]

4.2 Institutions and Resources

117. Dedicated institutions having legal and financial resources that support pedestrian needs are not often found in Asian cities. The improvements of pedestrian facilities are often subsumed in city planning agencies. However, there are usually no separate plans for improving the walkability of cities. Often times, 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.

118. In India, as part of their "Right to Information Query" in Hyderabad, the Right to Walk Foundation submitted a query in 2008 on 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 (GHMC)*." And the GHMC replied as follows: *"Footpaths are under the R &B department's jurisdiction."*[23]

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

120. The public agency survey conducted as part of this study made it clear that improving walkability is a local issue and therefore, the local governments should take this responsibility (see Table 5). However, it was unclear to several public agencies whether this issue is sufficiently being addressed. In Hanoi, the surveyor went the City Development Planning Office, City Administration Office, the Air Quality Agency, and the Auto Department, but no one can say who is primarily responsible for sidewalks and

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

footpaths in the city. This situation is similar to other cities as various functions are handled by various departments/ agencies.

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

	Institutions Responsible	
Country	**National**	**Local (Primary)**
PRC	• 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 • Hanoi Department of Transport • Department of Construction • Department of Traffic and Transport • Urban Environment Company

121. Another issue identified in the public agency survey is the involvement of the 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 where sidewalks are not provided at all as the space is used entirely for private and/or commercial purposes. In instances when these are provided, these do not always sufficiently cater to the needs of pedestrians and are often times used as parking areas for vehicles.

Private vehicles parked on sidewalks in Manila

122. Improving walkability and pedestrian facilities are not expensive compared to other transport infrastructure. However, the state of walking in several Asian cities show that there are not enough resources being allocated to improve the pedestrian environment, particularly in dense areas. [24] The budget is not only insufficient but can also be considered as unjust. "Richer" neighborhoods having less pedestrian movement

[24] Information and data have been provided by various individuals through the Sustran listserv and CAI-Asia Portal.

are being provided with the best walking conditions and facilities for pedestrians, as highlighted in a report by CSE (2009) as quoted below.[25]

123. *"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."*

124. In Asia, the budget allocation for pedestrian facilities is often in the range of 0.2% to 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.

- Dhaka, Bangladesh – The Strategic Transport Plan [26]advocates a "PEDESTRIAN FIRST" philosophy and its plan for next 20 years but it only allocates 0.24% of the budget to pedestrian facilities.

- Bangalore, India – The Comprehensive Traffic and Transportation Study (CTTS) envisage an investment of about 12 billion USD over the 15 years time frame. The CTTS emphasizes on increasing the share of mass transportation to over 70% share. On the other hand, the percentage share allocated to pedestrian projects is only 0.6% of total.

- Kathmandu, Nepal – The Kathmandu Metropolitan City (KMC) budget for the fiscal year 2005-2006 totaled to 1,879 Million NRs. 7% of this budget was allocated to transport and only 3.5% (approx 70,000 USD) of the transport budget was allotted to pedestrian facilities.

- Taipei,PRC– The City Government Budget for 2010 is 5,246.06 million USD and the budget for pedestrians are:
  (1) Side walk improvement: 8.07 million USD
  (2) Pedestrian access facilities to waterfront: 9.71 million USD
  (3) Pedestrian signal and related devices: 0.1 million USD
  (4) Others (e.g., access facilities connecting public transport, maintenance, ...): 2.0 million USD approximated)

- Ahmadabad, India – The revenue expenditure on items named 'footpaths' increased from Rs 2.1 millions (2006-07) to Rs 3.8 millions (2008-09) and estimated to be Rs 5.7 millions in 2009-10 budget. However, the total revenue expenditure under 'Roads, streets, footpath' increased from Rs 133.1 million (2006-07) to Rs 154.2 million (2008-09) to Rs 194.6 million in the 2009-10 budget.

[25] Internationally many researchers have estimated that improving walkability increases land value. But contrary to developing cities it can be argued that best facilities are often provided only in locations having high land value.
[26] Rahman. 2008.

Based on the figures above, the percentage of investment allotted to pedestrians when compared with roads is around 3%.

- In Metro Manila, the Metro Manila Development Authority 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.[27] These steel footbridges can cost about 15-30 million pesos depending on the length and coverage.

125. These experiences are not only distinct to Asia. In the U.S., a research study done by Litman (2010) indicates that the U.S. Federal Roadway Expenditures (Based on FHWA 2000; FHWA 2004) may have only allocated 0.6% to pedestrian projects.[28] However, the U.S. has instituted a number of progressive policies promoting sustainable transportation in the past months. Box 1 shows a policy statement from the U.S. Department of Transportation prioritizing non-motorized transportation as well as public transportation. More funds coming from the federal and local sources are expected to be allocated more for improving walking and pedestrian facilities in the U.S.

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

Launched in a heavily motorized society, this new policy calls for full inclusion of pedestrians and bicyclists in transportation projects, with particular attention paid to transit riders and people of all ages and abilities – essentially, a Complete Streets policy. It recommends that transportation 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:

- Considering walking and bicycling as equals with other transportation modes
- Ensuring that there are transportation choices for people of all ages and abilities, especially children
- Pedestrian and bicycle facilities should meet accessibility requirements and provide safe, convenient, and interconnected transportation 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
- Improving nonmotorized facilities during maintenance projects

Source: U.S. DOT Federal Highway Authority Available: http://www.fhwa.dot.gov/environment/bikeped/policy_accom.htm

[27] Villas, 2010.
[28] Litman, T. 2010.

126. The problem of insufficient funding is further exacerbated when the small funding for pedestrian facilities is allocated to ineffective, improperly located and/or for 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

127. In Bangalore City, out of the total 15-year budget of 12 billion $ s, the city plans to provide 0.6% to pedestrians. The city government plans to improve 350 km of one-way footpath and construct 68 grade-separated crossings. An interesting note here is that Bangalore approximately has 5,900 km of roads as of 2007.[29]

128. Many developing cities have invested or are planning to invest major portions of their limited funds available for pedestrian facilities to subways and overpasses, particularly in 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.

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

[29] http://www.cleanairnet.org/caiasia/1412/articles-72580_resource_1.pdf

crossings. [30]

130. Footpaths can be highly cost effective. A study done by the Transport Research Laboratory (TRL) on the safety impacts of constructing 10 kms 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 1000%).[31]

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

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 indicates the efficiency of different transport projects/modes.

Assumed Capacity and Costs	Capacity (average person/hour)	Cost (million $)
1 km of Footpath of 2m wide	2400	0.1
1 km of Bikeways of 3m wide	3000	0.15
1km of two lane urban (low income)	4500	1
1km of two lane urban (high income)	2600	1
1 km of Expressway of 4 lane	8500	3.5
1 km of BRTS	16000	2
1 km of Metro	60000	35

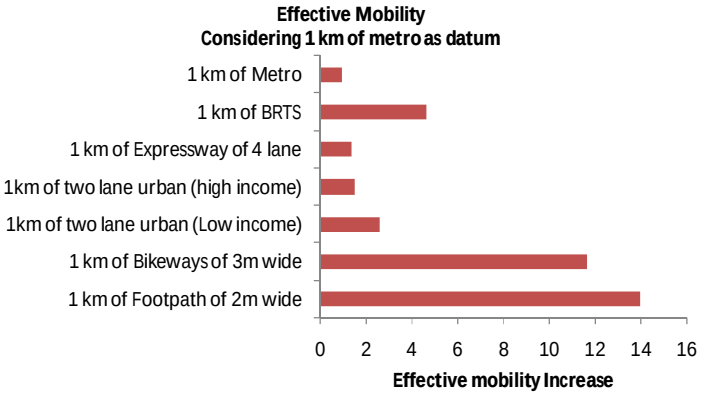
Using the same money as required for constructing 1 km of metro, one can construct:

1. 18 km of BRTS
2. 10 km of four lane Expressway
3. 35 km of two lane urban road
4. 235 km of Bikeways
5. 350 km of footpaths

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

[30] Transport for London. 2009. Meeting on Surface Transport. Available: http://www.tfl.gov.uk/assets/downloads/corporate/Item10-Subways.pdf

[31] Cost and Safety Efficient Design. TRL and DFID. Available: http://www.transport-links.org/transport_links/filearea/publications/1_811_103_CaSE%203.pdf



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

6. WALKING FORWARD

132. Pedestrian accessibility plays a fundamental role in sustainable urban transport policies, along with quality public transportation, rationale 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 would reduce 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

133. 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.

134. 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 our 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 disable and the provision of walking paths and pedestrian amenities. Many Asian countries need to re-think how they are developing their transport systems and how they can move towards 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 transportation access as well as in ensuring sustainable transport systems in the future.

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

- Pedestrian-focused policies and guidelines
- Institutions and resources clearly allocated for walking and pedestrian facilities
- Urban/ transport plans and projects that integrate and links pedestrian's needs and quality of facilities with pedestrian levels of service analysis.

136. 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 are 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 the development and monitoring the implementation of these policies and activities.

137. 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, pushing for the integration of walkability assessment as an integral part of the planning of transport projects. While the private sector basically 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	**X**	**XXX**	**XX**		**X**
Institutions and Resources					
Institutionalize non-motorized transport units/ 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 transportation projects, using the pedestrian levels of service analysis (LOS)	**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**	

Note: X = Level of involvement and participation of stakeholders

6.2 Assessing Walkability

138. Future assessments of walking environments and infrastructure in Asian cities must be done. 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 to be able to have more accurate ratings. The specific recommendations are:

- Results that better reflect the overall status of walkability in the cities may be achieved if area sub-classifications are utilized in the survey area selection process. The sub-classification may be based on economic characteristics of the areas such as income levels as well as 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 sub-categories need to be clearly defined. Future studies can survey at least one area for each sub-category in each city in order to lessen the bias created by selecting areas which are already perceived to have good walking environments.

- A more detailed assessment approach may utilize the application of different sets of parameters and rating criteria in assessing different street sub-classifications in different area types. This allows for a 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 in these two types of streets.[32] The challenge lies in identifying the proper parameters and criteria for rating these parameters for the different street sub-classifications in each area type.

- The inclusion of additional quantitative parameters in future studies such as the effective width of footpaths, walking time and de-tour factors are ideal.[33] 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

[32] 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.
[33] 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.

times, directness and other factors. The “de-tour” factor, which 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.

- 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 lowered down by pedestrian facilities/amenities such as benches; the importance of walking times depend on the purpose of the pedestrians, as people also walk to spend time, not to save time; a higher de-tour factor would not necessarily mean negative, as walking the additional distance may be pleasant for the pedestrians, especially in areas that are conducive for walking. Again, putting these factors into context is very important.

- The range of the ratings for the parameters in the walkability surveys (currently 1-5) must be expanded (e.g.1-10) in order 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.

- 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.

- Overall, the field survey methodology needs to be refined in order to achieve better comparability of results across the different cities and to lessen the subjectivity of the assessment. Coming up with 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 so as to capture more information. Also, making this survey available on-line is a good way to gather more information from people across Asia.

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Annexes

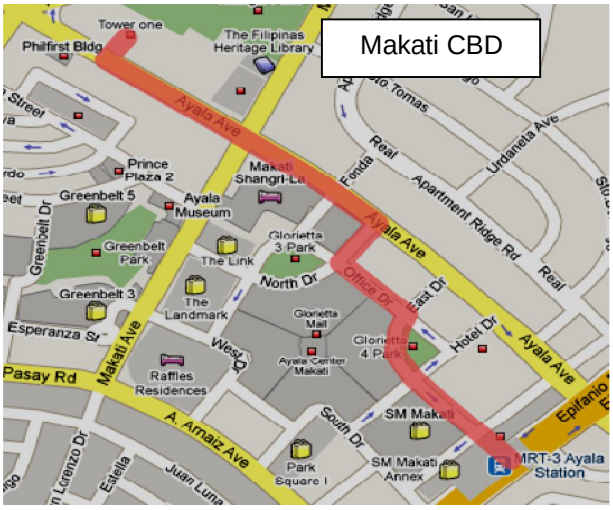
Annex 1: Field Walkability Methodology

This is a brief explanation of the field walkability survey methodology that were handed down to the surveyors. The methodology is an adaptation of the Global Walkability Index developed by Holly Krambeck of the World Bank with slight modifications.

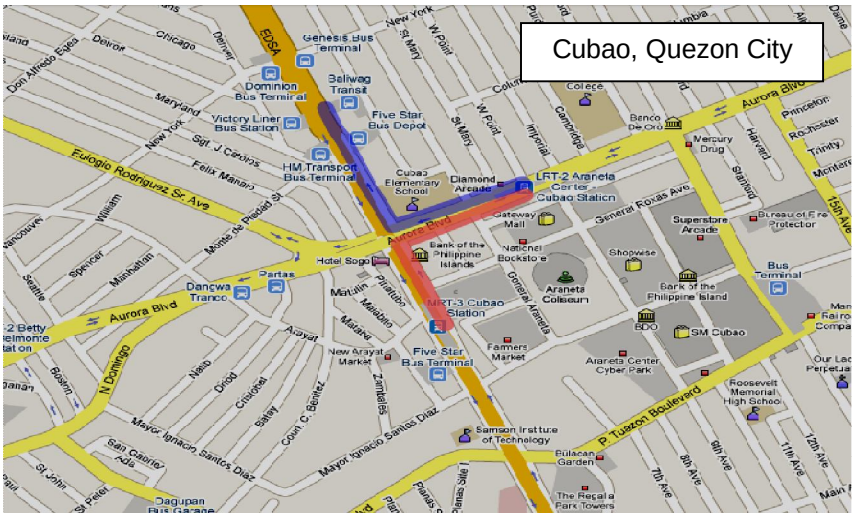
1. **Time of Survey** – Since the objective of walkability surveys is to compare streets and cities, it is recommended that the surveys be done during peak hours (morning or evening). In some cities where security is not a major issue, survey done at evening peak hours (3-8 PM) may provide best results as they tend to be busier than morning peak hours.

2. **Route Selection –** For each city, the surveys are to be carried out in 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 five (5) kilometers of interconnected road within a radius of one (1) km from main commercial area or central business district (CBD). As an illustration, a possible route network has been indicated in the following figure for Metro-Manila city. It is to be noted that the roads to be surveyed must have high pedestrian volumes and are interconnected. In cases where the central area are circular, it may be logical to select the same origin and destination point which 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 two (2) km of pedestrian facilities within a one (1) km radius from terminal.



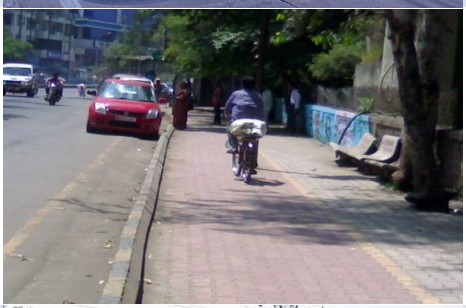
c. Educational area – Select an area where schools/universities are found. In cases where the city has an educational zone, the survey roads should capture major education centers with ingress and egress (for example, if people use public transportation for school/college, link the areas with bus/train stops and school). It is proposed to survey at least four (4) km within a one (1) km radius from the school (the time can be school/college starting or closing time).

d. **Residential Area –** Survey areas should be major residential zones (preferably both high income and low income). In this survey, the intention is to investigate the route taken by majority of people (particularly public transport users) from their homes to access the public transportation facility. Surveying two (2) kms for both high income and low income neighborhoods are 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 below, together with specific guidance on how to rate the roads for each of the parameters. Rate the parameters in the field walkability survey forms as attached to the end of this document.

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 non-motorized 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	Pedestrians Walkways available but highly congested , badly maintained and not clean	
3	Pedestrians Walkways available but congested , needs better maintenance and cleanliness	
4	Pedestrians Walkways available which are sometimes congested and are 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 500m and average speed is high	
2	Average distance of controlled crossings is between 500-300m and average speed is around 40 Kmph	
3	Average distance of controlled crossings is between 200-300m and average speed is 20-40 Kmph	
4	Average distance of controlled crossings is between 100-200m and average speed is 20-40 Kmph	
5	There is no need of controlled crossings as pedestrians are safe to cross wherever they like and vehicles and pedestrians co-exist	

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 time available for crossing more.	
5	Very safe – other modes present no danger to pedestrians	

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

Rating	Description	
1	High Traffic disrespect to pedestrians	
2	Traffic Disrespect and rarely Pedestrians 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	

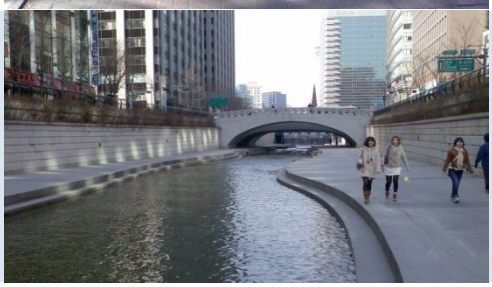
Parameter: Amenities
Parameter Number: 6
Description: The availability of pedestrian amenities such as benches, street lights, public toilets and trees. These amenities greatly enhance the attractiveness and convenience of the pedestrian environment and in turn, the city itself.
Rating Guide:

Rating	Description	Example
1	No Amenities	
2	Little Amenities at some locations	
3	Limited number of provisions for pedestrians	
4	Pedestrians provided some good amenities for major length	
5	Pedestrians have excellent amenities such as lighting, 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	No infrastructure for disabled people is available	
2	Limited infrastructure for disabled persons is available, but is 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 pathway s. These ultimately affect the effective width of the pedestrian pathway and may cause inconvenie nce to the pedestrians.
Rating Guide:

Rating	Description	Example
1	Pedestrian infrastructure is completely blocked by permanent obstructions	
2	Pedestrians are significantly inconvenienced. Effective width <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
Paremeter 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 needs to be collected are discussed below:

a. Pedestrian count

We need to access 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 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 on-line 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 which 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 road. Hence describe the side surveyed and draw a small sketch with direction indicating the survey area in the space provided at 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: Pedestrian Preference Survey Form

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

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

Average Travel Time (**one Way**) from residence to main destination (please tick)

<=15 min	15-30 min	31-60 min	61-90 min	> 90 min

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 desire. 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 you would like to have in pedestrian facilities (rank the top five options)

	Top 5 Priority (1 is top most and 5 lowest)
Easy access for people with special abilities	
Improved street lighting	
Wider, Level and clean sidewalks/ footpaths	
Reduced and slow traffic on road	
Remove obstacles/parking from footpath	

More crossing points	
No/other remark	

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/subways (please tick)

<50m	**50-100 m**	**100-200 m**	**200-300m**	**> 300m**

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 mode in future if no improvement is done? If so which mode? (please tick)

Walking	**Cycle**	**Bus/Train**	**3 Wheel/ Jeepney**	**Car**	**Two Wheeler**

5 **Socio-Economic Profile**(please tick)

Sex

Male	**Female**

Age

0-15 Years	**15-30 Years**	**30-50 Years**	**>50 Years**

	<=120USD	**120-230USD**	**230-340USD**	**340-570USD**	**>570USD**
Household Income/ month					

Annex 4: Stakeholder Survey Form

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 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?				