


**Title:** Pedestrian Facilities in Low and Middle Income Countries

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# Assignment 1

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# Pedestrian Facilities in Low and Middle Income Countries

# Abstract

Pedestrian safety is one of the major concerns in road safety, since walking has been part of the daily trips, but pedestrian fatalities and injuries have shared very high proportion among overall road traffic deaths and injuries. This paper aims to illustrate the contexts of pedestrian collisions, road infrastructures and challenges in low and middle income countries. The findings highlight the need for proper interventions and urgent action in improving pedestrian facilities, such as footpaths, in order to contribute to the overall 50% fatality reduction, as targeted in the 2011-2020 UN decade of action framework.

# Introduction

Walking is an important part of the trips in high, middle and low income communities, in addition to other modes of transport, such as bus, motorcycles and private cars. Ferrière et al. (2012) gave examples that 52% of trips in Europe and 62% in Japan, Hong-Kong and Singapore were shared by walking, cycling and public transport. Walking also plays a significant role in daily trips in less developing cities. Table below illustrates modal split, which included walking, cycles, public transport, two wheelers and cars, in 8 cities in Asian countries (Tiwari, 2005, p. 150). The proportion of walking varies from one city to another, but at least it still can be considered as a high percentage, compared to other modes of transport, such as in Ahmedabad and Dhaka. It is crucial to prioritize pedestrian safety in order to promote safer trips in daily life of the population.

**Table 1: Split of daily trips by mode of transport (percentage of daily trips) - (Tiwari, 2005, p. 150)**

| City (population in million) | Walking | Cycles | Public Transport | Two Wheelers | Car |
|---|---|---|---|---|---|
| Delhi (13) | 14% | 24% | 33% | 13% | 11% |
| Mumbai (14) | - | -% | 88% | - | 7% |
| Kanpur (3) | 34% | 18% | 12% | 23% | 0% |
| Ahmedabad (5) | 40% | 14% | 16% | 24% | 0% |
| Beijing (12) | 14% | 54% | 24% | 3% | 5% |
| Shanghai (13) | 31% | 33% | 25% | 6% | 5% |
| Dhaka (14) | 62% | 1% | 10% | 4% | 4% |
| Bangkok (7) | 16% | 8% | 30% | - | 46% |

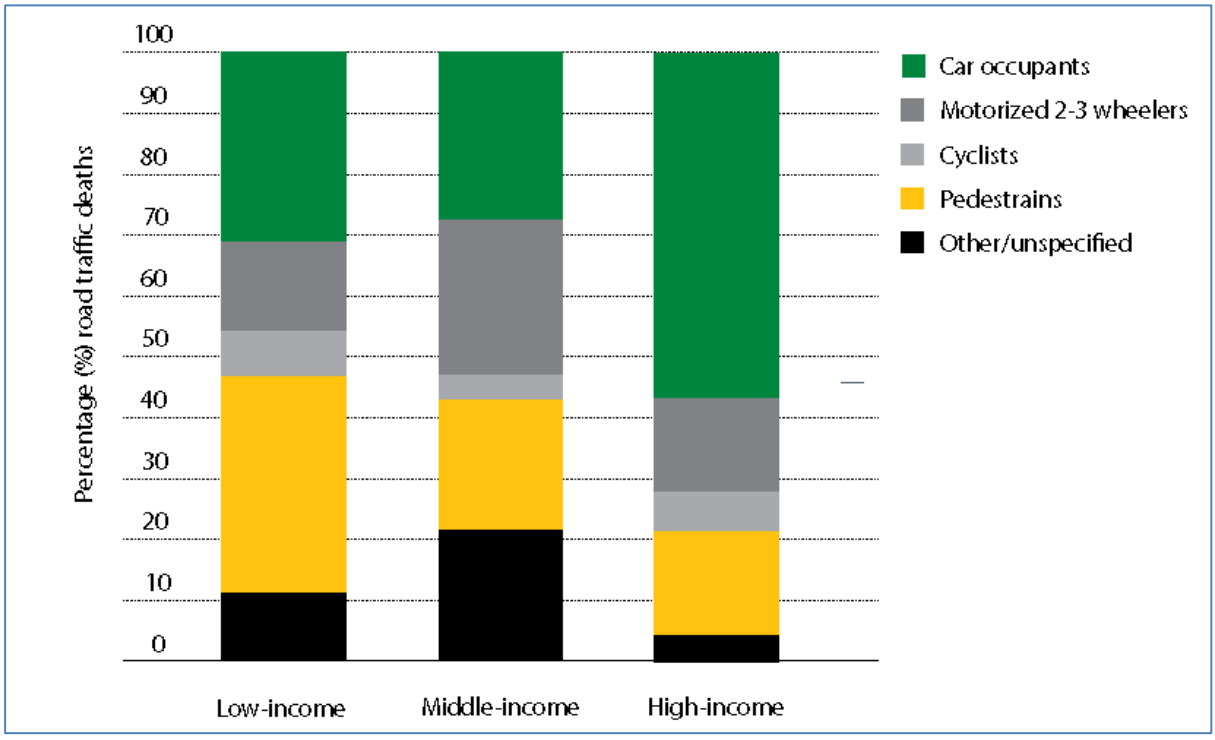
# Pedestrian Injuries and Facilities

## Overview of road traffic injuries

Road crashes and injuries have become a growing issue worldwide, as evidenced by the publication of WHO reports in 2004, 2009 and 2013, and the launch of the UN Decade of Action for Road Safety in 2011 (Guillen, Ishida, & Okamoto, 2012; WHO, 2004, 2009, 2011, 2013a). Every year, around the world, 1.24 million people die due to road traffic injuries in addition to 20-50 million non-fatal injuries occurring (WHO, 2013a). Road traffic injury is also recognized as a major contributor to disability (WHO & WorldBank, 2011), ranging from brief short-term impairments to serious lifelong conditions.

In 2010, 273,000 pedestrians were killed along the roads, which represented 22% of road traffic deaths worldwide (WHO, 2013b). The highest percentage was observed in African region, where 38% of road fatalities were pedestrians, compared to 28% in Eastern Mediterranean, 27% in Europe, 25% in Western Pacific, 23% in the Americas and 12% in South-east Asia (WHO, 2013b). Additionally, in low-income countries, more than 35% of road traffic deaths were pedestrians. This pedestrian proportion was less in middle and high income countries, as shown in figure 1 below (WHO, 2013b).

**Figure 1: Proportion of road traffic deaths among road user types, by income group in 2010, (WHO, 2013b, p. 3)**




## Characteristics of crashes involving pedestrians

In low and middle income countries, pedestrians in rural areas tend to have higher risk than in urban areas (WHO, 2013c). Most pedestrians were injured while crossing the road, such as 68% in Ghana and 73% in Kenya (WHO, 2013c). This proportion is similar to

higher income countries, such as Israel, where 80% of collisions happened when pedestrians crossing a road, at mostly locations without pedestrian facilities (non-crosswalk or no traffic signal) (Gitelman, Balasha, Carmel, Hendel, & Pesahov, 2010).

Speed and alcohol are the major risky behaviours of drivers that led to vehicle and pedestrian collisions worldwide (WHO, 2013c). Most pedestrian casualties were male and tended to be from poor communities (WHO, 2013c). Road crashes and injuries affected pedestrians in all different age groups. For example, in India, middle age group (21 to 40 years old) shared more than 60%, while in Africa, children shared almost 70% among all injured pedestrians (WHO, 2013c).

Additionally, a study in a Brazilian town, Porto Alegre, which has a similar situation as in many developing countries, found that interactive risk factors related to bus system (busways, stops), volume of pedestrians and vehicles, road width and number of traffic lanes have contributed to higher risk of pedestrian crashes (Diogenes & Lindau, 2010).

According to the 2011 annual report on road crashes and casualties in Cambodia, 10% of overall fatalities in this country were pedestrians (National Road Safety Committee, 2012). Similar to the finding by WHO (2013c), speeding and drunk driving were the major causes of collisions involving pedestrians. Children younger than 9 years old and elderly shared higher proportions (27% and 17% respectively), compared to other age groups (National Road Safety Committee, 2012). Almost one third of pedestrian fatalities were students, and a peak of fatalities were observed at night (7pm to 8pm) and during the weekend (National Road Safety Committee, 2012).

## Situation of road infrastructure for pedestrian safety

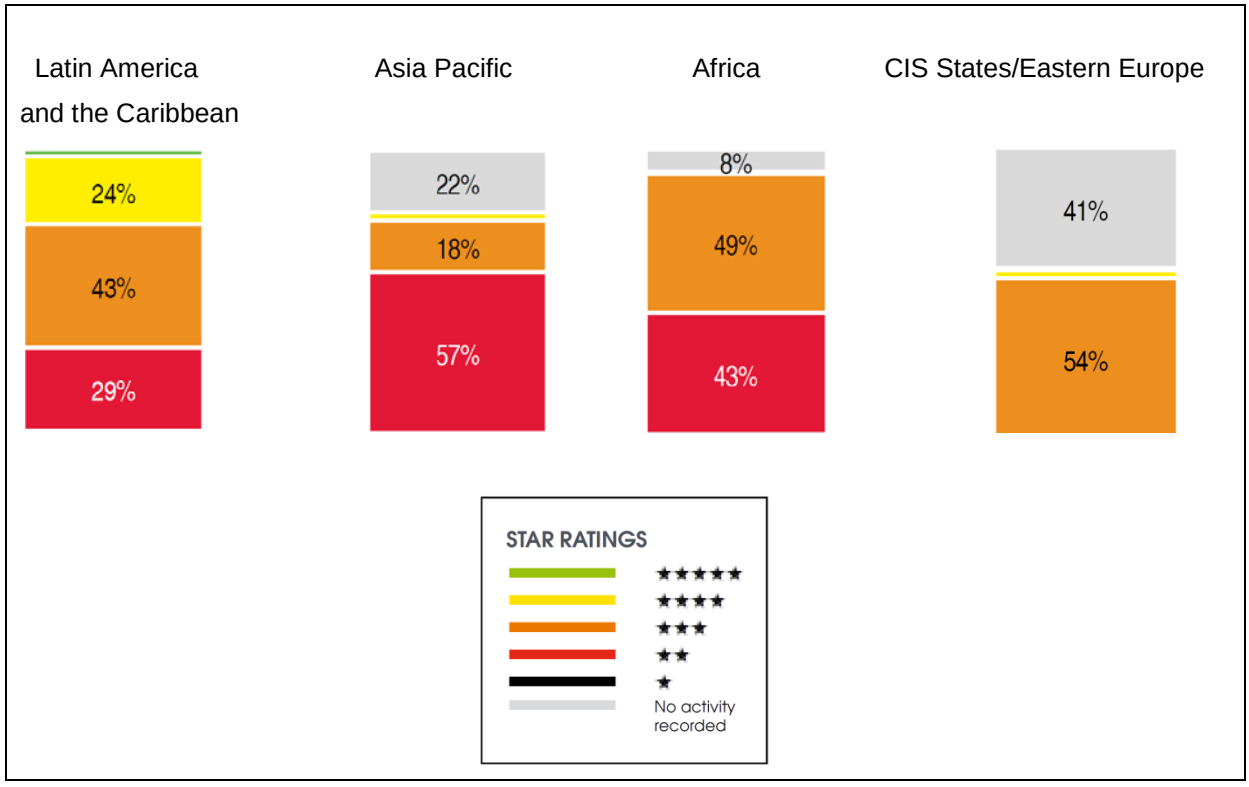
In low and middle income countries, pedestrian infrastructural facilities are very limited in addition to a common feature of traffic mix (WHO, 2013c). The mix of traffic led to high risk of injury for pedestrians as they need to travel on the same lanes with high speeding vehicles (WHO, 2013c).

iRAP (international road assessment programs) has introduced a standard road assessment program on specifically pedestrian infrastructural safety in low and middle income countries since 2008 (iRAP, 2012). The program consisted of comprehensive techniques to inspect selected sections of roads and record all road attributes, which included pavement condition, pedestrian crossing facilities and quality, side walk provision, traffic speeds etc. (iRAP, 2012). Based on the results from the inspection and road crash

data, roads have been classified into 5 star rates. The lowest rate (one star) is considered as the highest risk of deaths or serious injuries, while the highest rate (five star) is for the safest ones (iRAP, 2012).

The results of the assessment showed that half of the roads in low and middle income countries have been classified in high risk categories (either one or two stars) (iRAP, 2012). Footpaths are a basic requirement for pedestrian safety, but they are absent in 84% of the assessed roads in those low and middle income countries (iRAP, 2012). As shown in the figure below, almost 60% and more than 40% of assessed roads in Asia Pacific and Africa are two-star roads, which have much higher risk for pedestrians than in other regions, such as Latin America and the Caribbean, and Eastern Europe.

**Figure 2: Road assessment on pedestrian safety in low and middle income countries (iRAP, 2012, p. 10)**




Another comprehensive study in Bangladesh was conducted to analyse 1,372 km roads on pedestrian safety and revealed that 72% of the selected roads were classified in 1-star and 25% were 2-star (iRAP, 2013). In high income countries, the government has committed to improve their road star ratings, for example to at least three-stars in the Netherlands and four-stars in New Zealand (iRAP, 2012).

These results in low and middle income countries highlighted the poor quality of pedestrian infrastructures, which led to safety issues and significant numbers of pedestrian fatalities and injuries. This poor quality especially reflected the high proportion of deaths in

those low and middle income countries and alerted for better actions to improve the situation.

## Proposed countermeasure

Improving road infrastructure is one of the major countermeasures proposed by WHO (2013b), iRAP (2012), Turner and Smith (2013), A J Downing (1991) and Houten (2011). This countermeasure includes pedestrian facilities separating from other traffic (sidewalks, over passes,..), crossing facilities, traffic calming measures to reduce vehicle speeds, pedestrian zones, and street lighting.

Moreover, road infrastructure has become an important part of the integration of comprehensive interventions to improve pedestrian safety in the safe system approach (WHO, 2013c). “The safe system approach recognises that humans, as road users, are fallible and will continue to make mistakes” (Turner & Smith, 2013, p. 2). Road infrastructure has been introduced in the safe system approach as it takes into account the human errors and vulnerabilities of road users (Turner & Smith, 2013). Turner and Smith (2013) recommended pedestrian crossing and footpaths as countermeasures in the safe system approach.

Moreover, the UN decade of action on road safety has also clearly raised a priority for safety and protective quality of road networks (the second pillar of the action: Safer Road and Mobility) for the benefit of pedestrians as well as other vulnerable road users (WHO, 2011). This global plan suggested “the implementation of road infrastructure assessment and improved safety-conscious planning, design, construction and operation of roads” (WHO, 2011, p. 12).

Turner and Smith (2013) demonstrated significant benefit of pedestrian crossings and footpaths. For example, a road with proper a pedestrian crossing have decreased vehicle-pedestrian crashes by 25% to 60%, (Turner & Smith, 2013). According to Turner and Smith (2013), pedestrian footpaths provide significant benefit in reducing vehicle-pedestrian crashes by 40% to 60%.

Examples in high income countries have proven the benefit of road infrastructures in increasing pedestrian safety and reducing injuries and fatalities. In the Netherlands, road design measures have contributed to the pedestrian safety as well as reducing pedestrian fatalities and injuries (WHO, 2013c). Pedestrian infrastructure (such as countdown signals, safe speed zones) was one of a major intervention, adopted by the New York government.

This infrastructure improvement has contributed to the reduction of pedestrian collisions by 25 to 51% (WHO, 2013c).

Successful interventions were also found in low and middle income countries. In New Delhi, walking shared around one third of all daily trips, but pedestrians shared the largest proportion in road traffic fatalities, around 50% in 2007, 2008 and 2009 (WHO, 2013c). The government decided to improve pedestrian facilities, which included traffic signals, footpaths, zebra crossing, rumble strips to reduce vehicle speed and pedestrian holding areas at the roadside along 5.8 kilometer roads (WHO, 2013c). Following the intervention, the speed of buses was reduced, which led to reduction of pedestrian incidents and especially there were 60-90% pedestrian fatality reduction along 10 high risk locations.

Based on an assessment and recommendation from iRAP (2012) on pedestrian facilities in Costa Rica, footpath construction can significantly contribute to the reduction of 3,000 fatalities and injuries and save $215 million of crash cost in 20 years. Another project focusing on pedestrian facilities in the Republic of Moldova also proved a positive effect to the pedestrian safety. The extension of the four star roads from 8% to 84% of overall roads has been proved in reducing fatalities and serious injuries by 40% (iRAP, 2012).

Another study in Ghana illustrated the benefit of speed humps in reducing pedestrian injuries. The study analysed secondary data from traffic police to compare before and after the installation of speed humps in six sites (Afukaar & Damsere-Derry, 2010). Afukaar and Damsere-Derry (2010) found the effectiveness of speed humps in reducing pedestrian crashes by 72% and pedestrian casualties by 63% (Afukaar & Damsere-Derry, 2010). The humps also helped in lowering the average of vehicle speeds between 71 km/h and 87 km/h before the installation to 32 km/h and 36 km/h after the construction (Afukaar & Damsere-Derry, 2010).

Therefore, it is clear that road infrastructure is an important factor in contributing to pedestrian safety. It has been considered as an applicable countermeasure in high, middle and low income countries.

## Challenges in implementation

Turner and Smith (2013) produced a report on the safe system infrastructure for low and middle income countries, based on discussions in the 2012 Global Road Safety Partnership (GRSP) / iRAP Asia Pacific workshop in Bangkok, Thailand in March 2012. One of the objectives of the workshop was to identify primary treatments for pedestrian safety and

challenges in implementation in low and middle income countries. Based on the discussion among workshop participants (from governments and road authorities around the Asia-Pacific region), it has been concluded that main factors such as cost, compliance issues (failure of traffic to give way, obstruction and misuse by vehicles including motorcycles, shops,…), public acceptance and maintenance, have led to less treatment effectiveness in low and middle income countries, when the same treatments are used in high income countries (Turner & Smith, 2013).

The report also highlighted technical implementation issues in pedestrian crossing and footpath intervention, such as below (Turner & Smith, 2013):

- Public education and awareness campaigns are needed to inform pedestrians as well as drivers on the facilities
- Enforcements need to be conducted to improve the effectiveness of the facilities
- Funding is an issues for governments in low income countries, for equipment installation, such as signalized crossing
- Facilities should be installed in according to pedestrians' perception and needs, as they will only be used when they are in line with pedestrian's preferences
- Footpaths are occupied by parked vehicles, shops,… Maintenance is required to ensure paths remain useable.
- Non-standardised designs may cause confusion and non-compliance.

Public acceptance and compliance issue are also illustrated in a study in China. Guo, Wang, Guo, Jiang, and Bubb (2012) conducted the study to analyse pedestrian crossing behaviours at signalized crosswalks. The study concluded that while most pedestrians have waited for the green pedestrian light to cross the roads, there are still some pedestrians attempted to cross without waiting (Guo et al., 2012). Pedestrians are more likely to violate the light, when they have to wait longer (Guo et al., 2012). The study also highlighted that the crossing behaviours tend to depend on individual's characteristics, but not on external environment (Guo et al., 2012). Similar results were also found in another study conducted by Tiwari, Bangdiwala, Saraswat, and Gaurav (2007) in seven selected intersection in Delhi, India. "As signal waiting time increases, pedestrians get impatient and violate the traffic signal", (Tiwari et al., 2007, p. 12). Tiwari et al. (2007) suggested to reduce the waiting time for pedestrians in order to decrease the probability of crossing the roads during red lights.

# Conclusion

Walking plays a significant role in daily trips in especially developing cities. Besides, pedestrians are one of the most vulnerable road users that represented 22% of road traffic deaths worldwide. Low income countries had the highest pedestrian fatality rate compared to the rest of the world. It has been clearly proved that there is a need for action to reduce fatalities and injuries among pedestrians, in especially the low and middle income countries, where road infrastructures have been assessed as poor quality without proper basic standardized facilities, such as footpaths.

Road infrastructure has become an important part of the integration of comprehensive interventions to improve pedestrian safety in the safe system approach and the UN decade of action for road safety. It has been considered as an applicable countermeasure in high, middle and low income countries. Although successful experiences have been observed in those low and middle income countries, challenges in implementation are still remain. Factors such as cost, compliance issues, public acceptance and maintenance, have led to less treatment effectiveness in low and middle income countries, when the same treatments are used in high income countries.

Lack of pedestrian facilities along the roads and the high proportion of pedestrian fatalities and injuries are evidenced in low and middle income countries. At the same times there are successful experiences and interventions in many countries in reducing those deaths and injuries. Those kinds of proper interventions and actions must be prioritized, in especially those low and middle income countries, in order to achieve the overall 2020 target in reducing the number of fatalities by 50%, as set in the UN decade of action for road safety (WHO, 2011). Stronger political will especially in term of investing more funding is urgently needed from each country to overcome those challenges and issues.

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