Pedestrian Safety in Multi Modal Public Transport: A Way forward to Create Safer City

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Abstract

Pedestrians are neglected because they make no noise. They go quietly finding their ways in prevailing chaos. At city level, each and every resident is a pedestrian but treated as neglected road user. A recent study conducted in Indian Cities states that more than 20% of the road accidents involve pedestrian. Hence safety of pedestrian is a basic step to create safer city. A report entitled “Road Safety in India: Challenges and Opportunities” March 2009 states that road traffic fatalities have been increasing at about 8% annually for the last ten years. About 60% of all fatalities in urban areas belong to pedestrians. Hence pedestrian safety is a challenge for transport planners, traffic engineers, town planners, urban local bodies and policy makers to make city safer. “The Network and Walkable Improvement Project” under JNNURM, Nanded; Bandra (E)- Kalanagar Skywalk, Mumbai and Walkable Pedestrian to BRT Corridor in Delhi, etc are some of the examples for planned and safe pedestrians movements. However, the concept of “Pedestrian Plaza” in old cities and “Dedicated Paths for Pedestrians” in newly developing IT/BPO towns, satellite townships, etc are desirable to make city more safer.

Keyword: Pedestrian, Multi modal public transport, pedestrian facilities, JnNURM.

1.0 Introduction

Walking is a universal phenomenon but generally not considered as a transport mode because it does not employ vehicles as modes. The term “Pedestrian” is used to recognize the fact that the approach to pedestrian pathway development must be as scientific and systematic as the techniques which are applied to highway design and development. At city level, each and every resident is a pedestrian but treated as neglected road user. A recent study conducted in Indian Cities states that more than 20% of the road accidents involve pedestrian (Mohan, Dinesh 2009). Hence safety of pedestrian is a basic step to create safer city.

In metro cities, more than one mode of public transport is available now-a-days. Due to expansion of city boundary and urban sprawls, the single mode of transport is neither viable nor efficient as the spatial separation between commuters and work places has increased. Hence, public transport has become multi modal which combines two or more modes to provide comfort, rapid and environmentally compatible movement of the commuters. Similarly, integration of pedestrian with public transport enhances share of non-motorized modes and reduces use of personalized vehicles (Kumar, Pawan et al 2009). Hence, pedestrian safety is an integral part of overall transport system.
2. 0 Role of Multi Modal Public Transport

Multi Modal Public Transport (MMPT) relates to single trip consisting of combination of modes i.e. vehicle modes (bus, metro, car, etc.) or service modes (private/public) between which the commuter has to make a transfer. In fact, it provides multiple choices to enable a trip to be performed in the most convenient manner but the critical requirement of the whole system is integration of modes at various level. Pedestrian (walking) is an access and egress mode which provide crucial link to public transport. It is roughly estimated that public transport users walk at least four times everyday. Hence, better pedestrian infrastructure is required to easy and better accessibility to public transport.

In this context, pedestrian safety is a crucial issue particularly for women, children, elderly disabled, etc. In metro cities, the use of cheaper non-motorized modes such as walking and cycling has become extremely risky as these modes have to share the same right of way with motorized modes. Table No 1 states about shares of pedestrian in various size of the Indian cities.

Table No. 1: Mode Share of Pedestrian (Walking) in Indian Cities, 2007

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Cities classified according to Population</th>
<th>% of Walking</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Less than 5 lakh Population (Plain Terrain)</td>
<td>34</td>
</tr>
<tr>
<td>ii.</td>
<td>Less than 5 lakh Population (Hill Terrain)</td>
<td>57</td>
</tr>
<tr>
<td>iii.</td>
<td>5-10 lakh Population</td>
<td>32</td>
</tr>
<tr>
<td>iv.</td>
<td>10-20 lakh Population</td>
<td>24</td>
</tr>
<tr>
<td>v.</td>
<td>20-40 lakh Population</td>
<td>25</td>
</tr>
<tr>
<td>vi.</td>
<td>40-80 lakh Population</td>
<td>25</td>
</tr>
<tr>
<td>vii.</td>
<td>More than 80 lakh Population</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: MoUD, New Delhi.
Walking (pedestrian) has major contribution in urban mobility as vast majority of people i.e. urban poor who have no access to personalized mode or cannot afford public transport for daily commuting, are pedestrians. In fact, low income households are captive pedestrians to reach up to nearest bus stops, metro stations and workplaces.

### 3.0 Pedestrian Safety: Need of the Hour

A report entitled “Road Safety in India: Challenges and Opportunities” prepared by IIT Delhi and University of Michigan, USA which was released in March 2009 states that road traffic fatalities have been increasing at about 8% annually for the last ten years. About 60% of all fatalities in urban areas belong to pedestrian. Similarly, 20-40% of fatalities involve pedestrians and cyclists on the highways. In the city of Mumbai, 78% of traffic fatalities involve pedestrians (Mohan, Dinesh 2009). Hence pedestrian safety is a challenge for transport planners, traffic engineers, town planners, urban local bodies and policy makers.

In India, pedestrian related accidents are higher than cycle related accidents across all the cities. In 2005, pedestrian accidents (approx. 20%) were much higher than the cycle accidents. Table 2 states about share of pedestrians in road accidents.

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Cities</th>
<th>Pedestrian Accidents (% of total accidents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Delhi</td>
<td>24</td>
</tr>
<tr>
<td>ii.</td>
<td>Mumbai</td>
<td>35</td>
</tr>
<tr>
<td>iii.</td>
<td>Kolkata</td>
<td>64</td>
</tr>
<tr>
<td>iv.</td>
<td>Chennai</td>
<td>5</td>
</tr>
<tr>
<td>v.</td>
<td>Bangalore</td>
<td>44</td>
</tr>
</tbody>
</table>

Source: Road Accident History from Traffic Police Records of various Cities (2005).
Infact, the actual statistics may be much higher as many cases are neither reported nor recorded properly. However, a safer city requires safe environment for pedestrian, cyclists and pavement dwellers movement inside the city.

National Urban Transport Policy, 2006 also states that encroachment of footpaths affects pedestrian safety adversely and requires strict enforcement coupled with public participation (Govt. of India 2006). Pedestrian safety is also adversely affected by the lack of safe crossing facilities at busy intersections of even high traffic corridors. However, the Central Govt is financing for construction of safe pedestrian crossings.

4.0 Basic Issues in Pedestrian Safety for Safer City

Pedestrians are neglected because they make no noise. They go quietly finding their ways in prevailing chaos. They don’t cause:

- air pollution,
- fuel wastage
- loss of revenues for the State /central Govt, etc.

and hence no attention is paid to them. However, importance of the pedestrian in a city needs to be recognized.

The pedestrian is the most efficient and effective mode of transport for short trip (up to 3-4 Km). At present, fare structure of both bus and metro forces the poor households to make more pedestrian trips. In context of multi modal transport system, the role of pedestrians can be identified as follows:

- complete segregation of pedestrian from vehicles either through time or space.
- partial segregation of pedestrians either through zebra crossings, signalized crossings or guardrails.

- integration of pedestrians to enhance ridership of metro and BRT.

However, integrated engineering design of road geometric with due consideration of walking as a mode is required to ensure pedestrian safety along the line of movement throughout the length and width of the city. In metro cities, pedestrian traffic is always high and continuous particularly during peak hours in morning and evening. Similarly, pedestrian flow is of mixed types in terms of age, sex, trip purpose, trip length, etc. (Parida, Purnima et al 2008). Additionally, permission of mixed land use in residential areas also raises safety issue for pedestrians. In fact, design components of pedestrian facilities, their location and user characteristics are responsible to provide better safety to the pedestrians (Fruin, John J. 1979).

Table No. 3: Design Components of Pedestrian Facilities

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Design Components</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Footpath Surface</td>
<td>Smooth surface without any crack or bump for comfortable walking.</td>
</tr>
<tr>
<td>ii.</td>
<td>Footpath Width</td>
<td>Sufficient width of the sidewalk available to the pedestrians during peak hours.</td>
</tr>
<tr>
<td>iii.</td>
<td>Obstructions</td>
<td>Hoardings, garbage bin, electric pole, trees, letter box, telephone wire box, etc cause obstructions and must be properly planned and placed.</td>
</tr>
<tr>
<td>iv.</td>
<td>Encroachment</td>
<td>Informal commercial activities along the sidewalk to cater day to day needs. Extent of encroachment must not rise to a level that the sidewalk facilities becomes inaccessible/usable by the pedestrians.</td>
</tr>
<tr>
<td>v.</td>
<td>Potential for Vehicle Conflicts</td>
<td>Pedestrian can be protected from vehicle conflicts by the raised footpaths and guardrails. Sidewalks need to be segregated from fast moving vehicles on the roads.</td>
</tr>
<tr>
<td>vi.</td>
<td>Continuity</td>
<td>Continuity of pedestrian pathways/sidewalks is important for disabled and old aged users. Continuous ups and downs make the sidewalk more uncomfortable.</td>
</tr>
<tr>
<td>vii.</td>
<td>Convenience</td>
<td>Circuitous routings and grade discontinuities of pedestrian pathways cause inconvenience. It must be avoided.</td>
</tr>
<tr>
<td>viii.</td>
<td>Coherence</td>
<td>An ideal pedestrian system must connect all major traffic generators with direct linkages in a coherent and easily identifiable configuration.</td>
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</tbody>
</table>
Imageability of pedestrian environment requires descriptive elements that comprise space, edges, paths, nodes and landmarks, be logically organized to clearly express the image of ‘Pedestrian Space’ as a livable environment for better and pleasant mobility.

It is more than aesthetic design to attract more pedestrians to walk and enjoy the scenic beauty along the transit corridors.

Location aspects of pedestrian facilities define the estimated no. of pedestrians using the sidewalks, safety factor during day as well as night while using a sidewalk, sufficient activities on the surrounding areas to ensure security, presence of trees, benches, vegetation canopy to provide comfort and pleasing walk environment, etc. Similarly, user profile in terms of age, sex, income, etc and their travel characteristics i.e. trip purpose, trip frequency, trip distance, etc define use or non-use of footpaths and side walks. The use of pedestrian space is an experience by itself, through the application of well planned sensory gradients of colors, light, sound, surface texture, ground slope and other interested features.

5.0 Best Practices in India: Learning Experience

The Ministry of Urban Development, Government of India, launched the Jawaharlal Nehru National Urban Renewal Mission (JnNURM) in December, 2005. The Mission aims at creating economically productive, efficient, equitable and responsive cities in an integrated framework with focus on economic and social infrastructure, basic services for the urban poor and implementing urban sector reforms for strengthening the urban local bodies. The Mission is essentially a reforms linked Mission and reforms are envisaged both at the State Government and Local Government level. The both State Govt. and ULBs are required to undertake reforms over a specific time period in order to avail central assistance (Govt. of India 2005). The JNNURM consists of two sub-missions:

- Urban Infrastructure and Governance, and
- Basic Services to the Urban Poor.

The Mission covers 63 cities, consisting to 7 mega cities, 28 million-plus cities/UA and 28 cities/UAs with less than one million populations. These cities need to have elected bodies in position to access funds. During 2009, the cities of Tirupati and Porbandar were added in the list of mission cities. To avail the grant assistance under JNNURM, cities have to produce the following documents:

- City Development Plans
- Detailed Project Reports and
- Urban Reform Agenda
JNNURM has an estimated provision of Rs.50,000 crore over a seven-year period starting from 2005-06, making it the single largest Central Government initiative in the urban sector. During this period, funds are available to ULBs and para-statal agencies which may utilize these funds for implementing projects that meet the Mission’s requirements.

**Case Study I: Network and Walkable Improvement Project, Nanded**

“The Network and Walkable Improvement Project” under Centrally Govt. funded Jawaharlal Nehru National Urban Renewal Mission (JNNURM) programme was conceived in 2006. **Nanded** is one of the Mission cities and Nanded Municipality and private firms have taken up this project. A major initiative to improve the streets of the city was undertaken. About 50kms of the street in Nanded was redesigned, improved and built. The pedestrian pathways have been planned in such a way that space is allotted to pedestrians, cyclists and multiuse zone which include parking space, bus stops, hawker platforms, so that they don’t encroach upon the footpaths or the roads. Pedestrian crossings, pedestrian refuge islands, signage and traffic signals have been provided. Intersections have also been designed and cobbled *(*Mhaisekar, Deepak 2009)*. Even the entry & exit of the adjacent buildings have been changed to make it little bit more pedestrians friendly, a taste of new urbanism.

**Case Study II: Bandra (E) – Kalanagar Skywalk, Mumbai**

Mumbai Metropolitan Region Development Authority (MMRDA) has initiated a project of skywalks under the Station Area Transit Implement Scheme (SATIS). It integrates pedestrian movement with railway station. Bandra Skywalk (from Bandra Station (E) to Kalanagar) covers 1.3 km having 4 mt wide walkway *(Mumbai Metropolitan Region Development Authority 2008)*. A skywalk crosses over number of arterial roads, with multiple entries and exits for convenience of the commuters. Some of the skywalks have hawkers zones designed to rehabilitate affected hawkers and for the shopping convenience to the commuters.

The Skywalk has been constructed to serve the commuters traffic between Banda Kurla Complex and the Station. This Skywalk is covered by multi wall polycarbonate sheet for weather protection to the pedestrian. The Skywalk has been constructed for a peak hour capacity of 5500 commuters. The Project have been completed and opened to public with effect from 24th June, 2008.

**Case Study III: Pedestrian way to the BRT Corridor in Delhi**

Pedestrian way to the BRT Corridor in Delhi is one the examples to provide safe and comfortable sidewalk to access public transport. In Delhi, BRT is a component of multi modal transport system. Important features are as follows:

- Dedicated pedestrian path in the pilot corridor of BRT system between Ambedkarnagar and Chirag Delhi is an example for dedicated and specially designed space for pedestrian.
Roadway design has retained the continuity of the side walks. It has wide and well surfaced sidewalks and is disable friendly.

Sidewalks are easily negotiable by women, children, senior citizens, as the height is close to 15 cm. Width of sidewalks varies from 1.5 mt (minm) to 4.5 mt (maxm) along the corridor. Sidewalks are well lit.

Crossings are easily accessible with kerbed ramps and there is a holding are for people to want at the side and at the pedestrian refuge islands.

Pedestrian path on the BRT corridor has the least permanent and temporary obstructions on the sidewalks.

The sidewalks are continuous. The pedestrian don’t have to get off and on the footpath as they used to before the corridor was constructed. Its salubrious environment invites more pedestrians to get easy and safe access to BRT services (CSE 2009).

6.0 Concluding Remarks

JNNURM and Urban Infrastructure Development for Small and Medium towns (UIDSMMT) provide funds for development of roads and other infrastructure. Hence, Urban Local Bodies must come forward to develop infrastructure projects in small and medium towns. Common Wealth Game, 2010 is an opportunities for Delhi to rebuild pedestrians space. Sufficient budget has been allocated for road construction but it is important that road design must attach primacy to pedestrians and public transport. Hence, public transport plans need linkage with pedestrian plans for better connectivity and safety of the commuters. It is also important that approval and clearness of all road projects should make adherence to pedestrian guidelines mandatory.

Recently, various State Govts have been developing IT/BPO towns, satellite towns, SEZ, etc. Hence, it is desirable that development of such townships must have provision for both pedestrian and cycle tracks to reduce personalized motorized modes. However, if it is not possible to provide dedicated paths for pedestrians and cyclists, traffic calming measures must be adopted to limit the speed of motorized vehicles for safe movement of pedestrians. Similarly, construction of flyover should have proper design for taking care of movement needs of pedestrians.

In metro cities, low cost pedestrian vehicle segregation techniques such longitudinal segregation and lateral segregation must be followed. The most ideal situation is “Complete Pedestriation”. The streets with intense pedestrian pressure must be declared as “Pedestrian only Streets”. The area where several such streets meet, the total area may be converted into “Pedestrian only” better known as “Pedestrian Plaza” or “Pedestrian Precinct” or “Pedestrian Mall”. It is recommended that the entire pedestrian zone may be created at slightly higher level than the motorable roads and the same may be paved with special materials so as to be more prominent.
than the surroundings. Similarly, pedestrians planning at transport terminals, metro stations, etc requires special zoning regulations to design walkable pedestrian for better and safe access to the public transport.

7.0 References


vi. Mohan, Dinesh (2009) *Road Safety in India: Challenges and Opportunities*, University of Michigan, USA.


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