Understanding Pedestrian Perceptions of Walkability

K. Singh*, P. K. Jain**

Abstract

To promote walking as well as to provide adequate pedestrian facilities, the preferences and perceptions of pedestrians have to be understood and included in the design methodology for pedestrian facilities. Developing design methodologies with user perception can be useful in creation of pedestrian infrastructure that can receive appropriate patronage and enhance modal share for walk trips. The main focus of this part of the study is on the pedestrian perceptions and preferences towards various pedestrian facilities including sidewalks, signalized and un-signalized intersection crosswalks, pedestrian signs and signals, crossing options and environmental conditions to recommend how facilities can be improved or redesigned to satisfy their needs. This study examines user perceptions of a number of pedestrian facilities and pedestrian environments in Bhopal, India to identify if there is a significant correlation between pedestrian perceptions of satisfaction and pedestrian environment. The study finds that the presence or absence of a facility, its physical status and surrounding environment plays an important role in the mechanics of pedestrian's perceptions. Adequate facilities in proper operating conditions surrounded with pleasant environmental conditions enhance the user’s perception of the walking path level of service. Hence the study findings can be used to design the city corridors to improve our everyday experience of walking.

Keywords: pedestrian facilities, pedestrian perception, pedestrian level of service, pedestrian environment, sidewalks, crosswalks.

Introduction

The needs of the pedestrians should be considered in the design of transportation facilities. These facilities should be pedestrian friendly to promote walking and safety of the pedestrians. Pedestrian attitudes, perceptions and preferences play an important role in the design and operation of any pedestrian facility. The decision to walk depends on how easy or how difficult walking is perceived. This consideration ensures acceptability of the facility design and minimum service standards to be maintained. The study on pedestrian level of service for sidewalk should consider the pedestrian perceptions, the traditional flow volume and capacity as well as other factors that affect walking comfort and safety synthetically to construct pleasurable walking space. Developing design methodologies with user perception shall be useful in creation of pedestrian infrastructure that can receive appropriate patronage and enhance modal share for walk trips. Pedestrians should be offered the opportunity to identify various facilities that create safe and desirable walking or crossing options and environments. This option increases likelihood of use of proper designated pedestrian facilities which may be helpful in improvement of pedestrian safety because proper use of sidewalks and crossing facilities creates separation of pedestrians and vehicles resulting in reduced conflicts. This article presents the results of perception and preference study carried out in Bhopal, India.

Literature Review

Considerable research has been done on the pedestrian flow and speed study, but limited studies on pedestrian perceptions and preferences

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are available in the literature. Rouphail (1984) conducted a user compliance and preference study on marked midblock crosswalks in downtown Columbus and found that users perceive un-signalized marked midblock crosswalks to be convenient but unsafe crossing options. Seneviratne and Morrall (1985) considered the perceptions of quality of service for the ranking and design of walkways. Mumayiz and Ashford (1986) provided perception response classification method and used it to evaluate LOS for airport facilities. Tanaboriboon and Jing (1994) studied pedestrian preferences in China. Their study is about sufficiency of crossing facilities and willingness to use the facilities. They concluded that users prefer signalized crossings to overpasses or underpass crossings. Landis et al. (2001) developed pedestrian level of service model considering pedestrian perceptions of safety. Lee and Lam (2003) used pedestrian preference interview survey to classify LOS for stairs of Hong Kong underground stations. Landis et al. (2006) found that in addition to safety, traffic volume on the adjacent roadway is a primary factor influencing pedestrian perception of LOS. Wang et al. (2012) through a case study in South Korea developed a path model that defines the relation between the latent factors identified from factor analysis, the physical factors of the sidewalk environment and overall satisfaction. They concluded that overall satisfaction is directly affected by both emotional perceptions and physical components of the side environments.

**Methodology**

Pedestrian perception and preferences were collected through questionnaire distribution and interview with real pedestrians.

**Survey Design**

Two important steps were considered in order to conduct perception and preference survey.

1. Selection of the target population and area
2. Development of a survey instrument

To get general attitudes towards walking and pedestrian facilities, a survey was conducted in different parts of Bhopal city. The location and people were chosen randomly. In the next part of the study, 12 prominent and highly-used sites in Bhopal, India were selected for pedestrian perception and preference study.

Bhopal is used as a case study because there is a lack of planning for pedestrians in Indian cities and Bhopal is one of them. The views of the pedestrians regarding physical environment are value-laden, and determine their behavior. Their behavior depends on where they are, in what capacity, and how they interpret their overall experience of the pedestrian facilities. The gap between what they like and how they perceive the facility might impel them to avoid certain areas or use them reluctantly.

Some needs are common to most people, such as safe and comfortable accessibility. Therefore the study focuses on aspects which are relevant to most pedestrians, and investigates how these aspects are reflected in their perception. Design and maintenance of pedestrian facilities that induce user perceptions which enhance people’s attraction would encourage people to use facilities willingly and frequently.

The pedestrians in this study are everyday commuters who travel mainly by public transit. The focus is their walking experience, observation and preferences towards certain pedestrian facilities.

The development of the survey instrument met the following criteria:

- Statement of study purpose and its importance
- Clearly defined questions
- Reasonable number of questions
- Lack of offensive or personal questions
- Answers expected in tick format, no need to write extra
- Appropriate format for easy data coding and handling

The questions included in the questionnaire and interview format covered the following areas:-

- Users profile (age group, gender, income, employment status)
- Users trip purpose, travel mode, frequency of travel
- Factors that affect pedestrians’ walking and crossing behavior
- Users perceptions with respect to traffic safety, motorist behavior
Questionnaire was designed to obtain frequency of use, pedestrian perception and preferences of crossing facilities.

**Data Collection**

Initially, a general perception was obtained through questionnaire distribution in different parts of the city, randomly selected. A total of 192 responses were obtained from the initial survey. Pedestrian perception and preference data with real pedestrians were collected through pedestrian interview at 12 locations. Fifteen volunteer students were employed for this purpose. Interviews with 30 pedestrians at each site were conducted followed by site observations to analyze the perception of different groups of pedestrians at the sites. Each site is a public space linked to either transit facilities or major activity center. The focus is the pedestrians walking along sidewalk and crossing the roads.

Study of the perception of pedestrians is more relevant in the level of service determination, because they are frequent users and are in direct contact with their surrounding pedestrian facilities. This immediacy with the physical environment makes it possible to identify how their surroundings influence them directly. Interviews were conducted informally approaching pedestrians who were walking or waiting at the bus stops. The volunteer students were already explained about the interview procedure i.e. they were given classroom as well as field training before all the surveys and were monitored at regular intervals so as to avoid mistakes during the survey. Respondents were requested to give their opinion of the facilities they were using, telling the importance of the study.

**Data analysis and results of perception survey**

There were 552 people surveyed in total for this study. Males accounted for 64.67% of the survey respondents and females for 35.33%. The percentage of the interviewed respondents belonging to the age group of 20 years or less was 30.80%, 58.51% were between 21 and 50 years of age and the remaining 10.69% were over 50 years of age. The respondent percentages by sex and by age group are shown in fig.1 and fig.2 respectively.

![Figure 1. Respondent percent by sex](image1)

![Figure 2. Respondent percent by age group](image2)
Travel mode choice

When people were asked what mode of transport they used to reach their workplace/office, the response of the majority of the people was walking mode and motorcycle. These two modes have an equal share of 38.41%. Car and bus users are found to be 12.32% and 9.24% respectively. The people who use taxi/auto to reach their workplace are 1.63% only. Another question related to mode choice was when their destination places are below 2km in distance. The response in favor of walking was again high with 44.57% people willing to choose walking mode. Motorcycle mode has been found to be the second choice (35.51%) and auto/taxi as the third choice (10.69%). Some respondents (6.16%) prefer to use car for this small distance and very few (3.08%) are willing to use cycles.

Walking purpose

People may walk for many purposes. This study found that percentage of school/college going students is more who use walking mode to reach school/college than that of other categories of people. Shopping and pleasure related walking is almost equal with little variation. Work related walking is 15.40%. Percentage of the people who said that they walk to reach parking places is 10.69% and 7.61% said that their purpose of walking was to reach bus stop. The share of health related walk trip is found very less (1.81%). The split of the walking purpose of the people is depicted in fig. 3.

![Walking Purpose (%)](image)

Figure 3.Split of the Walking % by Purpose

Reason for not walking

Maximum number of people (43.12%) did not choose walking because of distance. This aspect is very significant when planning the areas for the pedestrians. 15.40% people gave the reason as walking being dangerous due to traffic. The reason of footpath surface not being good was also given by 15.40% respondents. The other reasons quoted are to save time (9.24%), footpath not provided (9.24%) and do not like walking (7.61%). The reasons given by people for not walking are presented in table 1.

Perception of traffic speed

The perception of traffic speed on the roads was also assessed in the study. The question on speed aspect was described through four descriptors—very fast, somewhat fast, slow and very slow. The responses are obtained for the first three descriptors only. No response has been obtained for the fourth descriptor, i.e. very slow. This shows that no one considers the speed very slow in the city traffic. 56.88% of the respondents perceived the traffic speed as somewhat fast whereas the perception of 30.80% respondents was that the traffic speed is very fast. Small percent (12.32%) of the respondents assessed the traffic speed as slow. The speed perception of the respondents is depicted in fig. 4.
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<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of Responses</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Busy, use vehicle to save time</td>
<td>51</td>
<td>9.24%</td>
</tr>
<tr>
<td>Distance is too much</td>
<td>238</td>
<td>43.16%</td>
</tr>
<tr>
<td>Walking is dangerous because of traffic</td>
<td>85</td>
<td>15.40%</td>
</tr>
<tr>
<td>Footpath surface is not good</td>
<td>85</td>
<td>15.40%</td>
</tr>
<tr>
<td>Footpath is not provided</td>
<td>51</td>
<td>9.24%</td>
</tr>
<tr>
<td>I do not like walking</td>
<td>42</td>
<td>7.61%</td>
</tr>
</tbody>
</table>

Table 1. Reasons given by people for avoiding walking

![Figure 4. Perception of traffic speed (in percentage)](image)

Walking preference in use of footpaths

This study shows the preferences of pedestrians in using footpath or carriageway while walking. The respondents were asked “while walking which portion of the road you choose to walk on?”

The pedestrians who always choose footpaths to walk on are 26.09%. Pedestrians always walking on the side of the road are 32.25%, always on footpath but sometimes on the side of the road are 35.33% and always on the side of the road but sometimes on footpaths are 6.34%. The high proportion of pedestrians using side of the road instead of using footpath is because of the absence of footpaths at many locations. Walking preferences in use of footpaths is presented in table 2.

<table>
<thead>
<tr>
<th>Portion of the road used while walking</th>
<th>Number of Responses</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always on footpath</td>
<td>144</td>
<td>26.09%</td>
</tr>
<tr>
<td>Always on the side of the road</td>
<td>178</td>
<td>32.25%</td>
</tr>
<tr>
<td>Always on footpath but sometimes on the side of the road</td>
<td>195</td>
<td>35.33%</td>
</tr>
<tr>
<td>Always on the side of the road but sometimes on footpath</td>
<td>35</td>
<td>6.34%</td>
</tr>
</tbody>
</table>

Table 2. Walking preferences in using footpaths

Reasons for not using footpaths

This information is important to understand pedestrian’s attitude towards acceptability of footpath to walk on. The reasons represent the existing design and environmental conditions along the road for the pedestrians. Highest percentage of response (46.20%) was obtained for the reason that footpath not provided followed by narrow footpaths (18.48%) and presence of obstructions (15.40%). Relatively low response is obtained for crowded with pedestrians (9.24%), footpath surface broken (4.35%) and surface not clean (3.08%). Reasons of encroachments and inconvenience have got very low response with 1.63% each.
The important finding of this study is that pedestrians are not using footpaths because they are not provided or if provided they are narrow or there are obstructions. Encroachments have not been seen as a major cause of not using the footpaths by majority of the respondents. The reason for this perception may be attributed to the fact that the people have become habitual to walking along the encroached roads. The reasons given by the respondents are presented in Table 3.

### Table 3. Reasons for not using footpaths for walking

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of Responses</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footpath not provided</td>
<td>255</td>
<td>46.20%</td>
</tr>
<tr>
<td>Footpath being narrow</td>
<td>102</td>
<td>18.48%</td>
</tr>
<tr>
<td>Footpath crowded with pedestrians</td>
<td>51</td>
<td>9.24%</td>
</tr>
<tr>
<td>Footpath surface broken</td>
<td>24</td>
<td>4.35%</td>
</tr>
<tr>
<td>Surface not clean</td>
<td>17</td>
<td>3.08%</td>
</tr>
<tr>
<td>Encroachments</td>
<td>9</td>
<td>1.63%</td>
</tr>
<tr>
<td>Obstructions</td>
<td>85</td>
<td>15.40%</td>
</tr>
<tr>
<td>Inconvenience</td>
<td>9</td>
<td>1.63%</td>
</tr>
</tbody>
</table>

Perception of driver reaction

This study is about the driver behavior for the situation when pedestrians cross the road at a location where pedestrian signal is not provided. This study can be used to decide pedestrian signals at prominent spots. Perception of 40.58% respondents was that drivers rarely stop their vehicles and let them cross the road. The responses in the category of occasionally, usually and almost always obtained are 29.17%, 22.64% and 7.61% respectively. Figure 5 shows the perception of respondents towards driver reaction at un-signalized pedestrian crossings.

**Figure 5. Perception of driver stopping reaction at the un-signalized pedestrian crossings**

Perception of crossing safety at the intersection

While crossing at the intersections, 7.79% of the respondents have expressed safe feeling. Majority of the respondents (53.85%) feel a little unsafe and 38.41% feel very unsafe. Very small proportions of respondents have reported safe feeling at the intersections. This shows that respondents do not perceive the intersections as a safe crossing place. Perceived safety at the intersections as obtained from the survey is illustrated in figure 6.

**Figure 6. Perceived safety at the intersections**
Pedestrian crossing patterns

This factor is important both from safety and operation point of view. Figure 10 shows the proportion of pedestrian crossing locations. From the figure it is clear that among the pedestrians surveyed, a majority (63.04%) replied that they typically cross at designated locations (50.72% at marked crosswalks/zebra crossings and 12.32% at the marked mid-blocks). The remaining (36.96%) said that they typically cross at any convenient location.

Figure 7. Typical pedestrian crossing location

Figure 8 shows typical crossing conditions for respondents. 38.40% of the respondents replied that they cross the road whenever there is a gap in vehicular traffic. On the other hand, 27.72% said that they cross the road only when all the traffic clears completely. 33.88% said that they cross the road when traffic light is red.

Figure 8. Typical pedestrian crossing conditions
Respondents were also asked about the frequency of crossing at non-designated locations. 55.43% of the respondents replied that they cross the road at non-designated locations sometimes. This means that these pedestrians do not have predetermined crossing preferences. Reply of 23.01% respondents was that they rarely cross at non-designated location, whereas very few (4.71%) never cross at such locations. 10.69% almost always and 6.16% usually cross at these locations.

Reasons for crossing at non-designated location

Pedestrians were asked the reason based on which they make a decision to cross at a non-designated location. The answer of this portion provides the priorities put by the users. Time saving is the number one priority given by the respondents (30.80%). Second major reason given (27.72%) is that traffic is light and there is no risk of crossing.

![Figure 9. Main reason to cross at non-designated location](image)

The reason of crossing location being far away is also an important factor influencing crossing decision. 26.63% users have given this reason in their crossing decision. 14.86% responses are obtained with convenience as the main reason. The results are shown in fig. 9.

**Pedestrian/vehicle priority**

The answer of this question provides a basis for the priority to be given to pedestrians or to vehicles. 11.59% respondents expressed the view that vehicles should always yield to pedestrians, whereas more than half (52.31%) said that vehicles should yield to pedestrians at designated/zebra crossing only. 33.70% favored the pedestrian green period for the pedestrian priority. Very few people (2.36%) are of the opinion that vehicles should never yield to pedestrians and should always be given priority. Figure 10 depicts the distribution of responses.

![Figure 10. Pedestrian/vehicle priority locations](image)

**Dangerous vehicles to pedestrians**

The perception of dangerous vehicles affects pedestrian walking decisions. Respondents are asked which types of vehicles are dangerous to them. Buses have been identified as a more dangerous vehicle by a majority of the respondents.
(44.57%). Bikes have been perceived as the second dangerous vehicle with 36.96% responses. Buses might have been perceived more dangerous because of their size, but perception of bikes as more dangerous may be attributed to their significant proportion in the traffic and reckless driving by the young. Small proportions of people (15.40%) have put cars in the dangerous category whereas very few (3.08%) have said that auto rickshaws are dangerous for the pedestrians. The responses are depicted in figure 11.

**Figure 11.** Perception of dangerous vehicles

**Overall rating of the road segments**

The respondents were asked to rate the road segment on the basis of comfort, convenience, safety and attractiveness. The scales for the ratings from the highest to the lowest are excellent, very good, average, acceptable and poor. Excellent category has obtained 8.70% responses. Maximum response (35.33%) has been obtained for average followed by poor (23.19%), acceptable (21.56%) and very good (11.23%). The overall rating obtained from all the respondents is presented in table 4.

<table>
<thead>
<tr>
<th>Rating of the road segment</th>
<th>Number of Responses</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>48</td>
<td>8.70%</td>
</tr>
<tr>
<td>Very Good</td>
<td>62</td>
<td>11.23%</td>
</tr>
<tr>
<td>Average Good</td>
<td>195</td>
<td>35.33%</td>
</tr>
<tr>
<td>Acceptable</td>
<td>119</td>
<td>21.56%</td>
</tr>
<tr>
<td>Poor</td>
<td>128</td>
<td>23.19%</td>
</tr>
</tbody>
</table>

**Table 4.** Overall rating of the road segments

**Summary and conclusion of the study**

To promote walking as well as to provide adequate pedestrian facilities, the preferences and perceptions of the pedestrians have to be understood and included in the design methodology for pedestrian facilities. To understand the pedestrian perceptions and preferences towards various pedestrian facilities and environment, a study was carried out in different parts of Bhopal city and also at 12 prominent and highly-used sites using pedestrian interview technique. The important studies carried out are: travel mode choice, walking purpose, reasons for not walking, perception of traffic speed, walking preference in use of footpaths, reasons for not using footpaths, perception of driver’s reaction, perception of crossing safety at the intersection, pedestrian crossing patterns, reasons for crossing at not-designated location, pedestrian/vehicle priority, dangerous vehicles to pedestrians and overall perception of the road segment on the basis of comfort, convenience, safety and attractiveness. Significant proportions of respondents have expressed preference to walking mode for small distances. Some people do not like walking because footpath is not provided or surface is not good. Highest percentage of responses (46.20%) was obtained for the reason of footpath not provided followed by narrow footpaths (18.48%) and presence of obstructions (15.40%). While crossing at the intersections, only few people (7.79%) feel safe and remaining feel either little unsafe (53.85%) or very unsafe (38.41%). The overall rating of the road segments is average. The results obtained in this study can

be helpful in the planning and design of pedestrian facilities as these reflect the common behavior of the pedestrians.

References


