A study of walking habits of pedestrians in Pune

Study conducted in January 2020

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Table of contents

1. Introduction

Save Pune Traffic Movement (SPTM) is a non-Government organization promoting transport projects that make it safe, convenient and attractive to use sustainable modes, viz., walking, public transportation and cycling.

Pune city is growing by leaps and bounds. Using these "sustainable" modes is becoming challenging day by day, largely because our transport planning does not focus on these modes as much as it should. As an example, even though walking is the most basic mode of transportation and a fundamental right, facilities for pedestrians are largely unsafe, inconvenient and unattractive.

Data from fatal road crashes in Pune shows that about 30% of the victims of road crash fatalities in Pune are pedestrians. This amounts to about 75-80 pedestrian fatalities annually. Some of these fatalities happen when people cross roads and some when people are simply walking along roads.

Pedestrians' safety while walking along roads is affected by various factors, the most important being:

1. Presence of safe, walk-able footpaths that can accommodate all pedestrians,
2. Pedestrians being visible to vehicles,
3. Vehicles being visible to pedestrians.

In the last few years, Pune has taken some strides in designing better walk-able footpaths. The most notable among these are Pune's Urban Street Design Guidelines and Pedestrian Policy. While there is a lot of room for their speedy and quality implementation, these issues are not the main subject of the study covered in this report.

The latter 2 factors are especially important where safe, walk-able footpaths are not available.

As regards point #3 above, whether vehicles are visible to pedestrians, especially when a safe and walk-able footpath does not exist, depends largely on whether pedestrians are facing the flow of vehicles while walking.

It is readily understood that pedestrians would see a vehicle – that could potentially hit them – much more easily and quickly if they walked on the right side of a 2-way road. However, how many pedestrians follow this simple precaution is not known. If it can be determined that most people are unaware of this simple precaution, an awareness campaign could be conducted, which could potentially save a few lives. On the other hand, if it turns out that many pedestrians try to walk on the right side – as much as possible, the focus of actions to improve pedestrians' safety needs to be somewhere else.

SPTM supports data-driven decisions not only for transport planning, but also when it comes to deciding awareness campaigns. Considering all points mentioned earlier, SPTM decided to conduct a study of the habits of pedestrians in view of the following objective.

2. Objective of the study

To understand whether people take efforts to walk in a way such that they can easily see vehicles that could hit them when they walk.

3. Methodology

The data required for this study was collected using observations. The following tools were used for the observations.

1. A survey form to record quantitative data
2. Photographs of road to note the road conditions, footpath condition, traffic on road

3.1. Type of roads selected for the survey

The following considerations governed the selection of roads for the study.

1. Undivided roads without footpaths were preferred.
2. Undivided roads with bad, unusable footpaths (where most people are still found walking on the road) were also considered.
3. Roads with walk-able footpaths were not considered, since people walking in either direction on such a footpath can be assumed to be safe.
4. Relatively narrow roads with high pedestrian and vehicular volume were preferred. High vehicular volume and narrow roads increases the risk potential for pedestrians, and it is such roads on which it is possible to understand whether pedestrians are making a conscious decision to choose on which side of the road to walk.
5. Roads with only 1+1 lane for vehicular traffic, and without a divider, were chosen. Roads with 2+2 lanes of vehicular traffic are difficult to cross. Similarly, roads with dividers, regardless of the number of lanes, are also not easy to cross. People may not cross such roads consciously, just so that they can walk facing the traffic. Therefore such roads do not suit the objective of this study.

In addition to the above considerations, the following care was taken while determining the exact location to conduct the survey:

1. Locations with factors that could significantly impact pedestrians' flow were avoided. These factors could include: A garbage bin, a liquor shop, eateries or crowded shops, significant tree shade (or lack of it) on one side of the road.
2. Locations in close proximity of known major sources or destinations of pedestrian trips were avoided. These sources or destinations could include: An educational institute, an entertainment center.

One location on each of these roads was selected. The observer stood at least 10 meters away from an intersection, if any, to ensure that the intersection does not have much impact on the pedestrians' flow.

3.2. Sample Size

It is estimated that Pune city sees about 25-30 lakh walking trips per day. Using an online tool provided at http://www.surveysystem.com/sscalc.htm, it was determined that the survey needed to sample at least 2400 pedestrians to achieve a confidence level better than 95% for a confidence interval of 2%.

Pilot surveys indicated that about 150 or more pedestrians pass a given point every hour. Therefore it was decided to conduct the surveys for a total of at least (2400/15 =) 16 slots of one hour, covering different locations at different times of the day.

Table 1: Sampling for the study

Parameter	Sampling decision
Sample Unit	Pedestrians walking on Roads
Sampling	All pedestrians during the time span of the survey
Time Span	1 hour per day at three different times on the same road. Exact time could vary slightly from road to road.

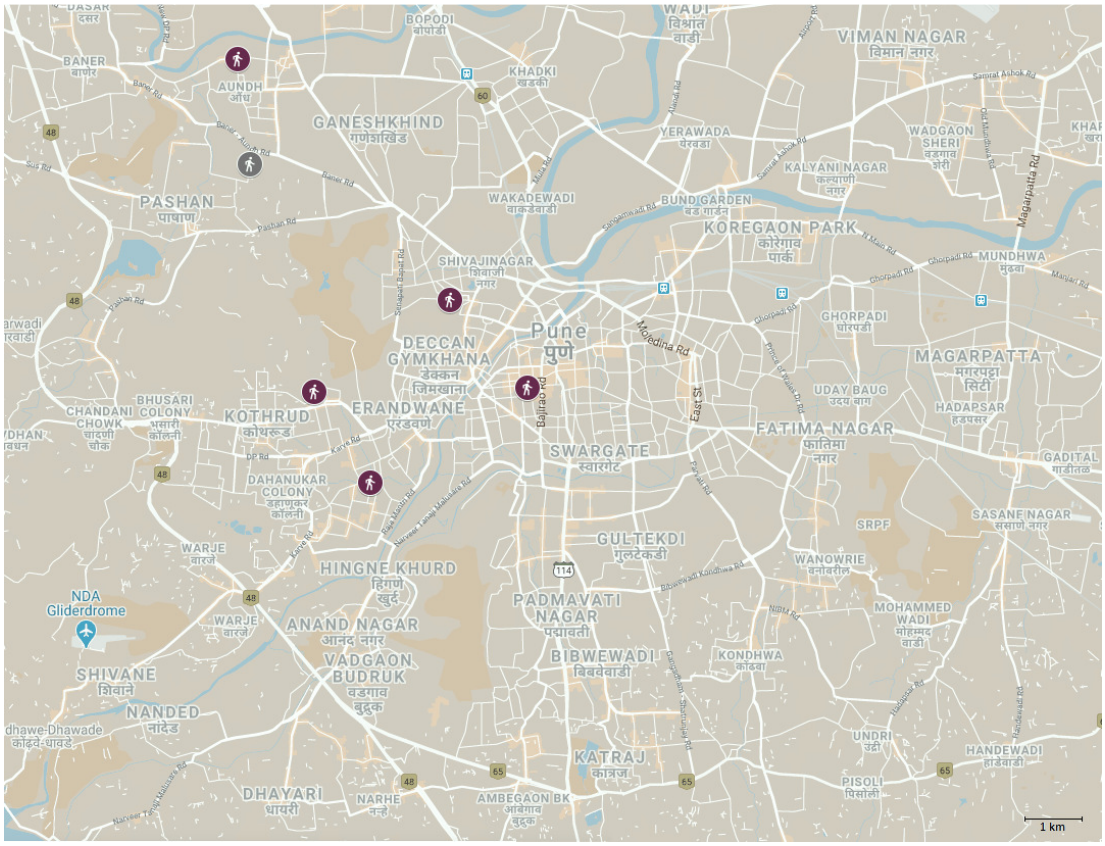
Thus it was decided that surveys conducted on 6 roads for 3 different one-hour slots would serve the purpose. The following roads were chosen for the survey.

Table 2: Roads selected for the study

Sr no	Name of the road
1	Alankar-Kumar Prangan Rd
2	Chaturshringi Road
3	Gadgil street
4	Hotel Rajwada Road
5	MIT Road
6	New DP Road

The following map shows the survey locations chosen for the study.

Figure 1: Survey locations chosen for the study



The following photographs give an idea of the roads selected for the study.

Figure 2: Examples of roads surveyed

3.3. Exclusion Criteria for Sampling

The surveyors were instructed to exclude the following pedestrians:

1. Walkers in a group e.g. students or tourists in a group of more than 6 or so were not considered, because their choice of edge of road to walk on is generally determined by only 1-2 people. Therefore, start and end times of schools/colleges and rush hours of tourist places were avoided.
2. If any obvious pattern was noticed by the surveyor, e.g. people going to a temple or coming from a vegetable market, the location and/or time of the survey was to be changed, because these factors are likely to heavily impact the side people choose to walk along.
3. In case of children or senior citizens being accompanied by their caretakers, only the caretakers were counted, because they decide the side on which to walk.

3.4. Method of analysis

A "safety index", which is the fraction of pedestrians walking while facing the vehicles, was determined. It was further classified according to the following attributes:

Safety index for:

1. The entire sample
2. Men and women
3. The time of the day

The following counts were used for the analysis:

1. Number of pedestrians on the road
2. Number of men and women
3. Number of pedestrians facing the traffic and walking with their back to the traffic

4. Processing survey findings

4.1. Data entry

The surveyors entered the following numbers in a spreadsheet:

- Number of pedestrians walking-
    - Along 2 edges (near and far)
    - In 2 directions each (towards right and left)
    - For men and women

These 8 values constituted one data set, representing the given road in the given time slot.

4.2. Method of drawing inferences

The data was processed using simple MS-Excel formulas. The following inferences were attempted by processing this data:

1. Preferred edge on a road
2. Preferred direction on a road
3. Safety index: Number of pedestrians walking in a safer way: men, women and total

4.3. Cleaning up the data

The data was processed to determine whether a road exhibited a "preferred edge" or a "preferred direction". If so, it was further scrutinized to decide whether that observation set should be considered in the final analysis.

4.3.1. Preferred edge

Preferred edge refers to the edge or side of the road on which most pedestrians were found walking.

An observation set was marked as "inspect further", if it was found that more than 2/3rd of the pedestrians were walking on one edge of the road, regardless of the direction in which they were walking. This could happen when one edge of the road exhibits a characteristic like presence of a garbage bin or lack of shops or houses.

4.3.2. Preferred direction

Preferred direction refers to the direction in which most pedestrians were found going toward.

An observation set was marked as "inspect further", if it was found that more than 2/3rd of the pedestrians were walking towards the same direction, regardless of the edge on which they were walking. This could happen when many pedestrians are walking towards the same source or destination, like an educational institute or an entertainment centre.

4.3.3. Observed "preferred edges" and "preferred directions"

One road (Hotel Rajwada Lane) exhibited a very highly "preferred edge", with more than 83% pedestrians walking on the same edge during all 3 observed time slots. Observations from this road were not considered, because the edge on which people prefer to walk here is apparently not determined by the vehicular flow, but some other factors.

One road (MIT Road) exhibited a very highly "preferred direction" at one time slot, with 80% pedestrians walking in the same direction. It also showed a highly "preferred edge" in the same time slot, with 71% pedestrians walking on one side of the road. This observation was not considered in the final analysis.

One road (Chaurshringi Road) exhibited a very highly "preferred direction" at one time slot, with 83% pedestrians walking in the same direction. However, it did not exhibit any "preferred edge", hence this observation was considered.

4.3.4. Safety Index

"Safety index" refers to the proportion of people walking such that they face the vehicles. If pedestrians choose the edge they walk on in a completely random way, the safety index would be 50%. If every pedestrian walked facing the vehicles, the safety index would be 100%.

The safety index was determined for the following cases:

1. For the complete set of observations
2. For men and women, separately
3. For the 3 time slots considered: Early morning, late morning or early afternoon, and evening.

5. Accuracy of the study

5.1. Volume of the study (valid observation sets)

Number of pedestrians counted, after excluding data sets as explained earlier:

Table 3: Number of pedestrians counted in the study

Case	Number of pedestrians counted
Total	3745
Gender-wise:	
Men	2206 (59%)
Women	1539 (41%)
Time of the day	
Early morning	812
Late morning / afternoon	1360
Evening	1573

5.2. Confidence level and confidence interval

As stated in Chapter 3.2, the objective was to study 2400 pedestrians to achieve a confidence level better than 95% for a confidence interval of 2%. This objective is easily achieved. With 3745 pedestrians observed, this study achieves a confidence interval of 1.6%.

5.2.1. For studying whether the choice of the edge to walk on differs with gender

1539 or more samples suggests that this study would be 95% confident of its findings being within 2.5% of the actual figures.

5.2.2. For studying whether the choice of the edge to walk on varies with time of the day

812 samples in early morning suggests that this study would be 95% confident of its findings being within 3.5% of the actual figures.

1360 or more samples in late morning / afternoon / evening suggests that this study would be 95% confident of its findings being within 2.7% of the actual figures.

5.2.3. For studying whether the choice of the edge to walk on differs with locality

The number of pedestrians counted in a given locality varied between about 500-1000. Although it might be tempting to draw inferences for localities where 1000 or more pedestrians were counted, there could be minor local factors that could affect the pedestrians' choice of edge to walk on at a given location. Therefore no attempt was made to find whether people from a locality consciously choose a safer edge to walk on.

6. Findings of the study

Do pedestrians in Pune show safe walking habits?

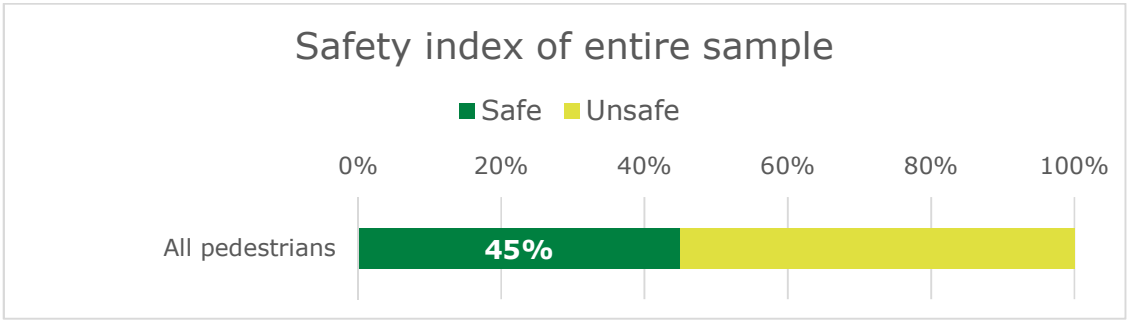
As said earlier, the study allows us to determine a "safety index" for:

1. The entire sample
2. Men vs women
3. The time of the day

6.1. Safety index for entire sample

Only 45% (±1.6%) of the pedestrians were found walking safely, facing the vehicles.

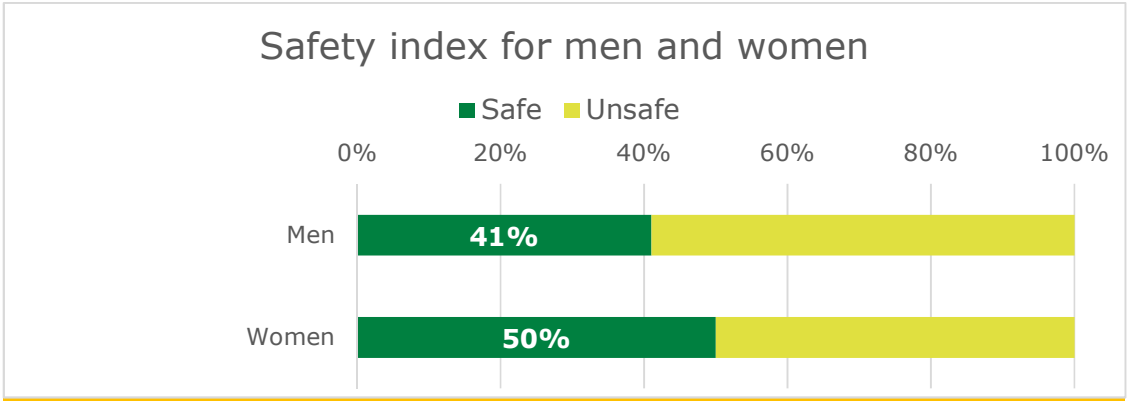
Figure 3: Number of pedestrians walking with safe habits



6.2. Safety index for men and women

Only 41% (±2.5%) of men, but 50% (±2.5%) of women were found walking safely, facing the vehicles.

Figure 4: Number of men and women walking with safe habits

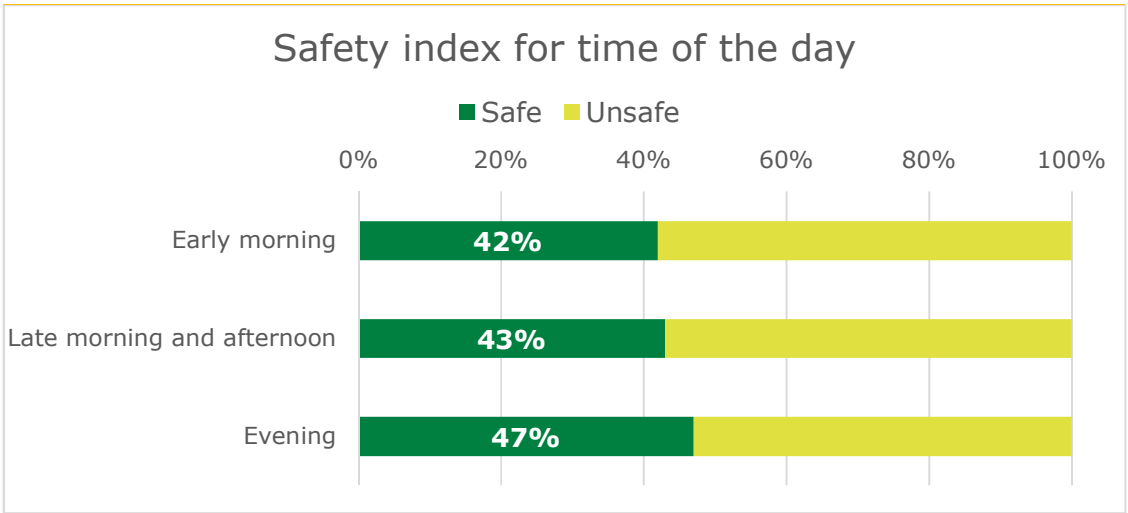


6.3. Safety index for time of the day

The safety index varied with time of the day as follows:

1. Early morning: 42% (±3.5%)
2. Late morning and afternoon: 43% (±2.7%)
3. Evening: 47% (±2.7%)

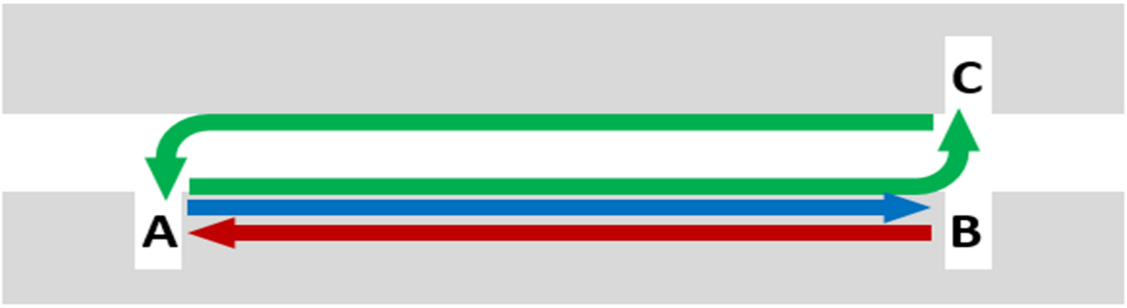
Figure 5: Safety index for time of the day



6.4. What could be an "ideal, yet practical" safety index?

Please see the diagram below.

Figure 6: Types of pedestrian trips



A pedestrian on this street could be making any of these 4 types of trips:

1. Going from A to B
2. Returning from B to A
3. Going from A to C
4. Returning from C to A

The pedestrian correctly follows the blue arrow for trip no 1, facing oncoming vehicles. However, as he returns to A (trip no 2), he cannot always be expected to cross the road twice, just to ensure that he faces oncoming vehicles. Therefore, he follows the brown arrow for trip no 2.

For trip no 3 and 4, the pedestrian can decide where to cross the road. If he were to ensure that he faces oncoming vehicles as much as possible, he would follow a path indicated by the green arrows.

Since all pedestrian trips can be categorized in one of these 4 types, and if they happen with equal distribution, a study like this could find that only 25% of the pedestrians are making an unsafe choice for the edge to walk on (viz., like the brown arrow).

Thus the ideal, yet practical, safety index would be about 75%.

7. Conclusion

Even if pedestrians walked in a completely random manner, one would expect to see 50% pedestrians walking while facing the vehicles. However, it was found that only about 45% of Pune walks in a safer way (while facing vehicles).

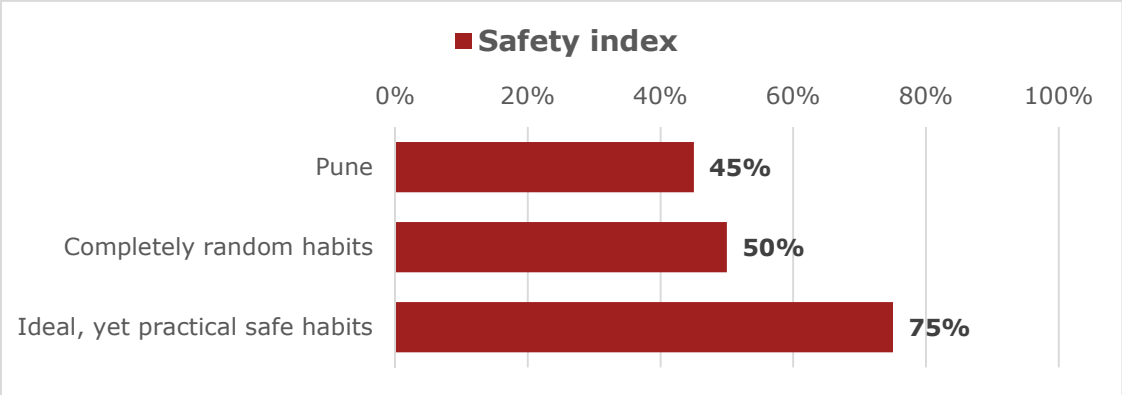
In most cases (total sample, gender-wise and time of the day -wise), the index was found to be less than 50%, even after considering the estimated margin of error.

Only 41% men were found walking while facing vehicles. Women fared relatively better, with a safety index of 50%.

The safety index in early morning hours was only 42%. It improved a bit in the evening, to 47%.

The safety indices determined in this study suggest that some pedestrians in Pune **might be consciously walking in an unsafe manner, with their backs facing vehicles. This suggests that some of them might have been taught unsafe practices.** An intense outreach campaign needs to be conducted to make people unlearn wrong habits and learn safe habits afresh. The goal of such a campaign should be to increase the city's safety index to an "ideal, yet practical" value of 75%.

Figure 7: Pedestrians in Pune walk in an unsafe manner



The safety index was found to be lower in men than in women. It was also found to be lower in the early morning than at other times of the day. Though the variation with gender and also time of the day was not significantly large, these observations suggest how an awareness campaign could be focused.

8. Acknowledgement

SPTM would like to thank its volunteers, who devoted their valuable time to conduct the surveys – by waking up early on chilly mornings and also by taking some time off from their work. Their help will go a long way in determining steps that our city should take to make our pedestrians safer.