# PEDESTRIAN RESPONSIBLE BEHAVIOUR FOR THEIR SAFETY WHILE CROSSING A ROAD AT MIXED TRAFFIC CONDITION

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*Abstract:* Walking is perhaps, one of the oldest among all other available modes but is totally discriminated for being considered as a mode of transportation. This may be because of the fact that it is a fundamental or natural means of transport for a person to move from one place to another and needs no vehicles for such. But for the trips of fewer distances, it is very much efficient as well as effective mode of transportation than any other. Pedestrian movement may be possible for many purposes like from home to market, office, school, colleges etc. Moreover, walking also assist the outgoings of all other modes. On Indian roads, due to less awareness about the complex traffic system the pedestrian are usually seen confused while walking besides or crossing the road, Also some Emotional and psychological factors affects the pedestrian while taking immediate decisions which may decrease their reaction time in case of critical situations. On Indian Roads susceptibility of the pedestrian compared to other road users is very high, and also, they become the victims of large number of road accidents every day. Giving sufficient awareness to the Pedestrian about their safety, security and their duties as pedestrian on the road is a practical solution of these problems. This can be achieved by considering a pedestrian as an important part of the traffic system while planning and providing some guidelines, rules and regulations for the pedestrian flow by justifying their reaction.

*IndexTerms* – **Walking, Pedestrian, Modes, Transportation, Accidents, Behavior, Regulations**

## 1. INTRODUCTION

In Transportation System Walking is perhaps, one of the Oldest among all other available modes. It is basic and necessary mode of transportation chain which is used by each and every person on this planet. Walking also assist the outgoings of all other modes, that is whatever is the mode one like to choose for travel, the Initial and final mode will be walking. It is the cheapest mode available for the Transportation of people which have minimum disturbance to the surrounding environment. Pedestrian is defined as a person who uses to walk from one place to another which includes Person with physical disabilities also, like those who use wheel chairs or any other kind of assisting devices. As per the demography, India is on the 2nd place in the list of Population, having 1.27 billion people. The contribution of this number to the world is about 1/6th which is about 17.6% of the total population of the world. In Previous decades because of extemporization of social and economic conditions in India, a large number of vehicles mobility has been witnessed at urban centers. With the fast growth rate of population and crowed on the roads, the need of the adequate pedestrian facilities is also increasing in the urban centers. The Design and Planning of such facilities is also very important to provide sufficient Space for the free movement of the Group of people. There are number of points which have reasonable affect on influencing the walking demand. Few of them are Vehicle ownership, Quality of Facilities, Safety and Security Provisions, Local Activities etc.

Vehicle Ownership: The number of private vehicles available in the locality also affects walking. More number of private vehicles minimizes the amount of pedestrian.

Quality of Facilities: A better quality of facilities maximizes the demand of walking.

Safety Provisions: It is Significant that the facilities provided should be safe and secure from any clash between vehicle - walker and have less risk for any kind of personal attacks.

Local Activities: It is an important factor which influences the rate of demand of walking. For Short trips walking is more

frequently a choice of people, such as for local origins and destinations.

Nature of People: It has been observed the community with maximum number of young person's has more frequency of walking demand.

With the fast growth of the vehicles in the whole world Environmental problems are raising rapidly, walking is an alternative to reduce such problems. Physical health is also an influencing factor for walking. Walking play a great role in keeping the one physically fit. While planning a facility for walking, Safety and security of pedestrian is a big issue at poor visible points where vehicle- pedestrian could clash with each other, such as at intersections. A poor facility may results in more accident circumstances. A lot of problems are being faced by pedestrian and a car driver on busy roads. Darting is one of such problem which reflects sudden appearance of pedestrian in front of vehicle. Dashing is another problem refers to running Pedestrian. According to a study children having age group less than 14 years are the one forming a list of more number of accident victims who have highest rate of injury. The fatality rate of the older group is more because of less chances of recovery from such injuries. Also the Behaviour of pedestrian may be affected by alcohol or any kind of intoxicating drugs. Seeing all this it is significant to have a better Facility System Which should fulfil the purpose of backing a pedestrian both in physiological and psychological manner and assure them against any overexertion or mischance. This is the reason because of which in recent decades a lot of research and study has been started in this area of Transportation System. Samples are usually taken at such locations where volume of walkers is more in numbers against the density. The point like Business locations, Group of people coming out from theatres and stadium doors at same time, malls etc.

## 2. Literature Review

**Corol Holland and Ros Hill (2010)** observed in their research that age and gender of a pedestrian are the factors which may affects the variations in the accidental injuries and causalities. They did their study on 218 different adult pedestrians age group from 17 to 90 years. They used Methods of Simulation Study by using Filmed real traffic situations. They observed with increasing age, the women make unsafe decisions more while crossing a road, leaving small safety margins and estimates poor about walking speed. Men of the same age were not a big factor in predicting unsafe crossing decisions. The male who drives looks both sides while crossing a road in comparison to those who don't drive.

**Tiwari and Chatterjee (2013)** did a research on the pedestrian and comes to the conclusion that they are at high risk on the roads of Delhi. This is due to the fact that while planning part the needs of walkers were not recognized by the planning department. Also the rapid increase in the 2 or 4 wheeler vehicles on the roads is forcing to built a large number of expressways, flyovers etc for their free flow, which exposes the pedestrian to the high risk on the road. They prepared a statistical analysis on pedestrian's behavior towards risk taking while crossing the roads and in beginning and after the grade separator was provided there. It has been seen an important part of the pedestrian number was willing to take risk in both conditions that is before and after the facilities construction. Because of the construction of the grade separators the speed of all type of vehicle was increased on the road, these increases the waiting time of the pedestrian in the capital of the country. The study also revealed that when no signals where provided the behavior of the pedestrian becomes independent which results in the increase in risk taking behavior.

**Satish Chandra, Rajat Rastogi et al (2014)** studied parametric analysis of pedestrian gap acceptance in mixed traffic conditions and come to the conclusion that there are three different ways of crossings used by pedestrian. First is single stage, second type is two stages and third is rolling gap. Acceptance of single stage gap was found to have less deviation from critical gap. Two stage crossings were less in number and people preferred rolling gap crossing as compared to the other two types of crossing. The minimum gap was accepted for Young pedestrians while for the old pedestrians it was maximum. It was found that the older pedestrians exhibit a higher level of deviation in their accepted gap from critical gap than the other two categories. Based on age, it was found that young pedestrians take higher risk while crossing the roads. The critical gap at four locations was between 5.90 and 7.60 s and it decreases with increasing road width. It suggests that crossing speed of pedestrian increases with road width. Considering the safety aspect, a general value of 8 s is recommended for design of crossing facilities (like signal) and a higher value of 12 s are recommended at locations where female or old pedestrians are substantial.

**Asaithambi, O. Kuttan and S.Chandra (2016)** studied the behavior of pedestrian on the road while crossing under mixed traffic conditions. They studied the intersections points in the beginning and after the execution of the control measures at those points. They studied different parameters that involve gender, age, crossing time, speed, crossing pattern, waiting time etc. by videography. They concluded a large number of pedestrians while crossing a road likes to cross it in one step, after the execution of signals pedestrian had as much space while crossing road at the red signals for Cars and other vehicles. The pedestrian waiting time was increased after the signal installation. They also concluded 15% of Pedestrian Crossing Speed was reduced in both Scenarios than the recommended IRC (103) Crossing Speed of 1.2m/s. Because of Decreasing Speed, the critical space between the pedestrian was also reduced.

**3. Methodology and Data Collection**: In a city, thousands of pedestrian daily passes from this location and have high chances of vehicle-walker interaction. For study I have selected a Chowk which is an uncontrolled intersection of three legged T- Intersection. A sample of about 110 pedestrian of different age group is used for conducting the research work. The Data was collected by using Video graphic technique on the winter days when city has peak amount of population. The day selected for shooting Video was 14 February 2022, between 3 PM to 4 P<. The Video grapy was done by using Smartphone camera. It has the resolution of 1080P at 30 Frames per second. Total length of the video was 30 minutes covering large area of the road both longitudinally and laterally. It has been observed that more than 85% of pedestrian were violating the traffic rules. Pedestrian were not caring about the Signals while crossing road. So there were high chances of conflicts between pedestrian and Vehicles. The pedestrians were violating the rules because of the reasons like mixed traffic conditions, Less awareness to the pedestrians about rules, poor traffic management, no enforcement rules for pedestrians, joy walking behavior, etc. The pattern of crossing was different for every pedestrian and depends upon the space available on road. The data was extracted from the video by playing it using VLC software. jpeg image was obtained by using snapshot wizard software.



Fig 1        Fig 2

*Figure 1,2  Pedestrain crossing road at intersections*

**4. Data Extraction and Analysis :** The data extracted from the video graphy techanique is used to obtain the useful information of the Pedestrain walking individually or walking in a group. The information like age, gender, their pattern while walking, walking speed, density, pedestrain behaviour at intersections etc
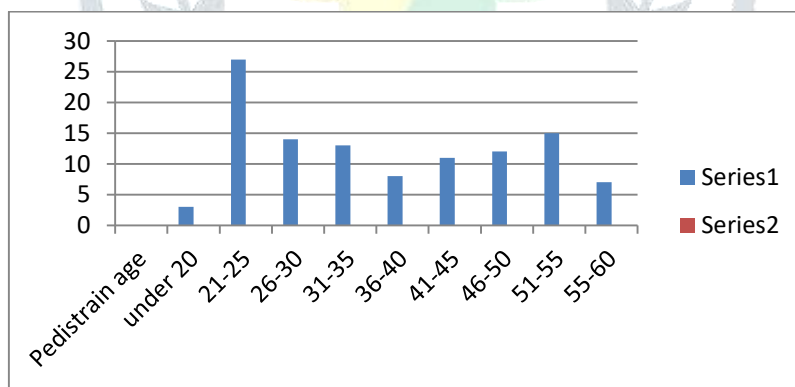


*Figure 4 Pedestrian's age group*

The Figure 4 shows pedestrian's  Age groups. The figure 4 is a bar chart plotted between pedestrian age and pedestrian number. There were 9 age groups of the pedestrian on which the study has been conducted. As the location was near most of the educational institutes of the city, hence the pedestrian group consists of a large number of Students age varying between 21-25 and 26-30.  The pedestrian of age group 21-25 has maximum number in the available data and Age group of lesser than 20 has minimum number of Pedestrian. Other age groups in the Pedestrians list were 31-35, 36-40, 41-45, 46-50, 51-55 and 55-60. The figure 5 is bar chart comparing the gender of pedestrian to its number.
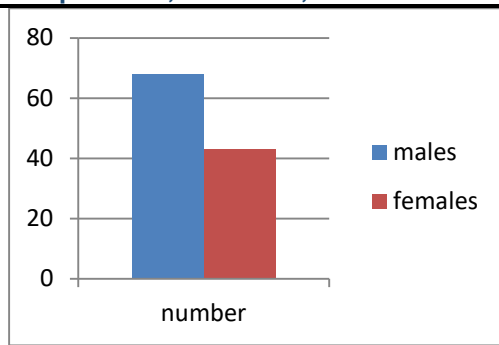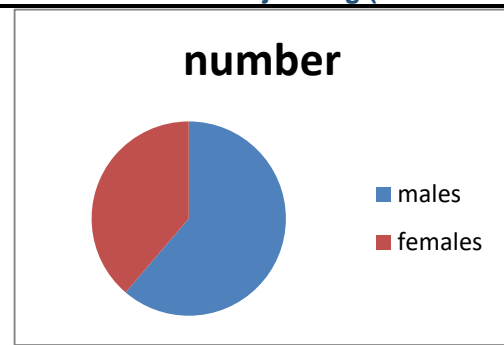
*Fig 5 Gender of Pedestrian*



*Fig 6 Gender of Pedestrian*

In the above bar charts, it has been observed that the Males were maximum in number than the females out of total pedestrians. The total males were 68 and females were 43 in number.

**4.1, Analysis of Crossing Behavior:** From the available data, an attempt was made to understand the behavior of the pedestrian on his/her priority towards safety. We have categorized the walking behavior in two ways.

a. **Tactful Behaviour**: Tactful pedestrian where those who were showing active and thoughtful behaviour on the road while crossing. They were very careful and safety concern and crossing the road while waiting for safe space to walk.

b. **Perilous Behaviour:** Perilous Behaviour was careless behaviour of the pedestrian who took risky decisions on the road while crossing it. They were not much safety concern and showing hurry in every reaction.
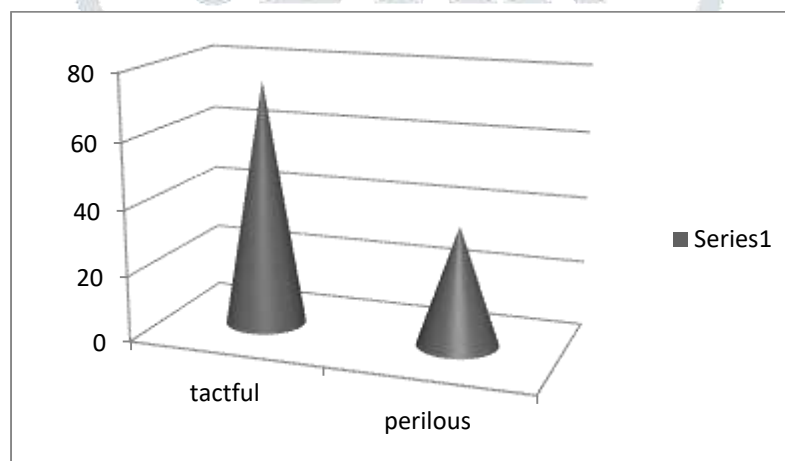


*Fig 7 comparison of Tactful and Perilous behavior*

Figure 7 shows a bar chart in which Tactful and Perilous behavior of the Pedestrian is shown on the basis of number. It has been observed that most of the Pedestrian were showing tactful behavior while crossing the road while other pedestrian was showing Perilous Behavior. In this study it has been observed that 75/ 110 pedestrian were tactful on the road while crossing it and 35/110 pedestrian were showing Perilous Behavior. Further when the data was studied on the basis of the gender and the age group of the pedestrian, it has been concluded that females of all age group are more tactful than the males of that age. The figure 8 shows the bar chart on Perilous behavior on Road on the basis of gender. Here the blue color represents the male pedestrian and brown color represents the Female pedestrians. From the data it has been studied that the females gives more priority to the safety on the road and males of all age groups are less safety concern than the females of that age group.
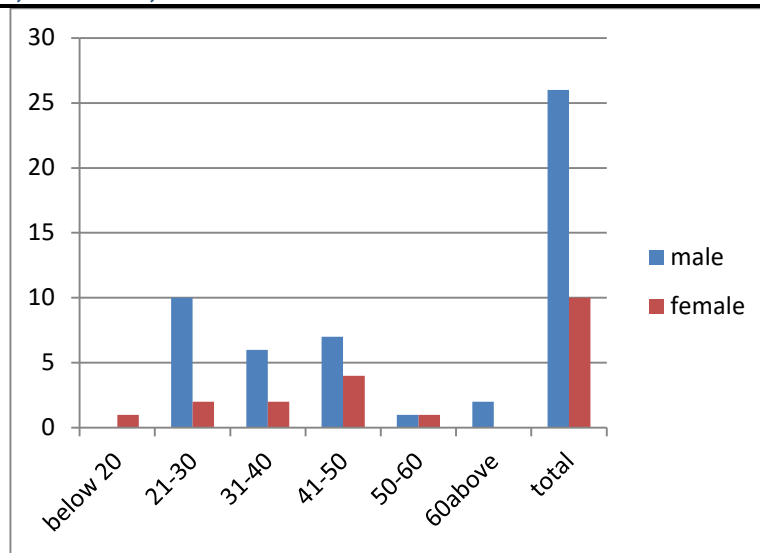
**Fig 8** *Perilous behavior on Road on the basis of gender*

**5. Conclusion:** While crossing road safety is an important factor for the smooth functioning of the traffic system. In this research paper an attempt is made to understand the priority towards safety in comparison to speed, by the pedestrian on the basis of their age group and gender. This data can be used while designing the various facilities for assisting pedestrian movement. It has been concluded that the females of all age group are more concern about their safety on the road while crossing. They take more wise decisions on the road in such situations. While the male have quite careless behavior and are less safety concern than them. Also the pedestrian waking with their families was more tactful and safety concern than an individual pedestrian, especially the pedestrian with the children were showing very careful reaction while crossing the road.

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