Journal of Engineering Sciences
Vol 13, Issue 03, MARCH/2022
ISSN NO:0377-9254

ANALYSIS OF TRAFFIC AND CROSSING BEHAVIOR OF PEDESTRIANS AT MID BLOCK SECTIONS IN MIXED TRAFFIC WITH RESPECT TO URBAN CIRCUMSTANCES

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ABSTRACT

Pedestrian road crossing has become a major issue in road traffic, particularly in urban areas where there is no restrictions for pedestrian road crossings. Pedestrian road crossing behavior is the main threat at an uncontrolled mid-block section under mixed traffic conditions. Some of the pedestrians are using forced gaps to cross the road; at that time pedestrians were facing a lot of problems to cross the road at an uncontrolled mid-block section, due to more vehicular traffic in Hyderabad. The main objective of this project is to study on traffic analysis and model the pedestrian crossing behavior at an uncontrolled mid-block section under mixed traffic conditions in Hyderabad (Chikkadapally and Bhagyanagar bus stop locations). A survey is conducted to collect the data during the project by using field survey method and video graphic survey method. These surveys must be carried out during the peak hours. The data that is required for the analysis of pedestrian behavior at the mid-block crossings are depends on vehicle speeds, pedestrian crossing speeds and individual characteristics (gender, age etc) as well as type of pedestrian crossing behavior. Based on the age and gender the average crossing speeds and percentile speeds were determined at selected locations. By using the multiple linear regression model and binary logit model, the gap size was predicted at selected locations and it is examined that the effect of behavior aspects of parameters on the gender (male and female) coded as a discrete variable.

Keywords: *Pedestrians, crossing behavior, mid-block, mixed traffic, statistical analysis, multiple linear regression, Binary logit model and gap accepted.*

1. INTRODUCTION

A pedestrian is a person who travels on foot, either walking or running. Walking is the primary means of human transportation. The greatest benefits, such as improving human health, fitness, protecting the environment, and reducing the impact of transportation, can be achieved by increasing walking. The roadway should be designed in terms of modal separation of traffic, i.e. motorized and non-motorized vehicles. Non-motorized transportation are bicycling and walking. The existing road should be assessed from the perspective of the cyclist and should be modified to facilitate its use bypedestrians.

The urban population increased to 377.1 million in 2001 from 62 million in 1991 and isexpected to reach around 540 million by 2021 (Times of India). Rural areas are migrating to cities,so cities are not able to sustain high population growth, which leads to problems in the transport sector. This urbanization increases the growth in vehicle use, leading to unsustainable development. One study (source: health.harvard.edu) found that walking half an hour a day reduced the risk of heart disease. Short car trips will be reduced by walking more. Also, traffic jams will decrease. For this, it's necessary to multiply awakening places and arrange separate sidewalks, which will increase the

number of pedestrian movements. Pedestrian crossings can be broadly divided into single-level crossings. At intersections, pedestrians cross the roadway at the same level as the vehicles traffic. In urban areas this is very common. It can be uncontrolled behavior or controlled behavior. Unregulated crossings are those where the crosswalk is marked with nails or paint, but it's uncontrolled by a traffic signaling system or some form of zebra crossing. As for their location, these steps can be divided as: crosswalks at intersecting point and steps between blocks. Pedestrians have the right of way at unregulated crosswalks. When a road is allocated with a sidewalk especially for pedestrians, the driver not uses this sidewalk or this lane.

1.1 BEHAVIOR OF PEDESTRIAN CROSSINGS:

Behavior of pedestrian crossings analyzed to develop the pedestrian facilities in the wanted places, as well as to develop pedestrian safety when they are crossing the road. Failure to comply with traffic regulations at crosswalks, especially by drivers, creates a situation where pedestrians force oncoming vehicles in the flow of traffic to break to get preference at crosswalks. On the other hand, busy crosswalks are likely to occur unacceptable delays for vehicles. Crossing behavior of pedestrian is affected by pedestrian aspects such as different age groups, male, female, and holding luggage's, etc. Crossing behavior of pedestrian is generally effected by several factors based on pedestrian aspects, movements, traffic, road structure, and the environment. Therefore, it is particularly necessary to analyze the passing behavior of the models to ensure their security on the roads and reduce the delay ofvehicles.

1.2 RESEARCH OF OBJECTIVE:

- Carry out a parametric study of the speed of the trainingplaces.
- Evaluate the different characteristics of thetrail.
- Simulation of mid-block crosswalks using regression models and binary logit models to determine important parameters for a pedestrianstudy.

2.LITERATURE REVIEW

Avinash 2019[1] for developing countries like India, the accuracy of accident details is highly questionable. Hence there is a need of a more effective safety evaluation technique which is proactive; to develop predictive models. A Binary Logistic Model (the probability of pedestrian-vehicle non-conflict) was developed to predict the probability of avoiding conflict with an approaching vehicle and other parameters on pedestrians' decisions whether to cross the street at unprotected mid-block crosswalks. The result shows pedestrian behavioral characteristics significantly affect the PSM value as well as the probability of PVNC behavior. Model shows that the decision to cross the street with or without safety depends on the type of approaching vehicle, vehicle speed, pedestrian speed, vehicular gap available, number of lanes, pedestrian rolling behavior, land use, pedestrian age, platoon size, accepted gap/lag, type of gap. Pedestrian's individual characteristics were found to be insignificant whereas gender was found to have an impact on SM. Rolling behavior, presence of marking, number of lanes discourages pedestrians towards the decision to cross, regardless of the traffic gap. **Asaithambietal. 2016 [2]** investigated pedestrian road crossing behavior of an intersection before and after signal installation. Parameters like crossing patterns, waiting time, crossing time, and pedestrian crossing speed, pedestrian gender, age, types of vehicles and flow were retrieved from the video camera survey. From this study, after installing the signal pedestrians chose one-step crossing, as the pedestrians got space to wait to travel across the street at signal red of vehicular traffic.**Pawar and Patil 2015 [3]** Studied about the gap acceptance critical gap for a four-lane uncontrolled mid-block roads for pedestrians and illustrated that spatial gap acceptance is also affected by the disputing type of vehicle as the gap accepted size increments with the increasing size of the disputing vehicle factors

which impact the pedestrian crossing behavior on streets several models are developed by researchers.**Petzoldt et al 2014 [4]** Identified the safety gaps within moving cars when passing a section of road. Specific gap safety majorly depends on the time an approaching vehicle takes to arrive. Generally, its suggested that time to arrival is the foundation for selecting pedestrian's gap. Nonetheless, it is proven that moving vehicle at certain speeds have a minimum influence on gap size. As the speed of the vehicle increases pedestrians tend to accept smaller time gaps i.e., they take risks during crossings.**Akash et al. 2013[5]** Analysis was done on the crossing speed and effect of pedestrian characteristics on the Gaps accepted and pedestrian's safety margins. This paper presents the analysis of pedestrian crossing behavior from a study conducted at Rookie city (Uttarakhand state in India). The effect of pedestrian characteristics like age, gender and that of carrying baggage and luggage as well as their crossing patterns were examined on pedestrian flow characteristics like crossing speed and waiting time. Pedestrian safety was also analyzed with respect to safety margins and gaps accepted by pedestrian in traffic stream. The average crossing speeds were determined according to different type of crossing patterns. Variation in speed with respect to pedestrian personal characteristics like age category and gender; and crossing patterns like one step or two step crossing was analyzed .The final findings of the study revealed that the pedestrian crossing behavior analysis is the important factor for deciding the assurance of pedestrian safety on roads. **Kadali and Vedagiri 2013[6]** the research findings were extended and a study in India has investigated in more detail about the pedestrian crossing behavior at mid-block locations under mixed traffic conditions (Kadali and Vedagiri 2013). Pedestrian road crossing behavior at uncontrolled midblock had been modeled by the size of vehicular gaps accepted by pedestrian using multiple linear regressions (MLR) technique. Also choice model has been developed to capture the decision making process of pedestrian i.e., accepted or rejected vehicular gaps based on the discrete choice theory gaps). It has also been explained by the binary Logit model with the help of vehicular gap size, frequency of attempt and rolling gap. The study concludes that the pedestrian behavioral characteristics like the rolling gap, driver yielding behavior and frequency of attempt plays an important role in pedestrian uncontrolled road crossing. These inferences are helpful for pedestrian facility design and controlling.**Rastogi et al 2011 [7]** the pedestrian crossing speeds at Mid-Block were obtained in Research at places in India like Chandigarh, Delhi and Hyderabad. The effect of lanes ,Urban size ,traffic volume ,land use ,age ,gender , group , pedestrian movement singly or in a group, and width of the road etc were analyzed on the pedestrian speeds at three metro cities . It was found that the crossing speeds of pedestrians were influenced by the number of traffic lanes, traffic volume, Width of the road, size of the study area, land uses of the surrounding area, personal characteristics such as age and gender, and their movement in a group. Male pedestrians were found to cross the road faster (1.22 m/s) than female pedestrians (1.11 m/s) irrespective of road system and land use of surrounding area.

3.METHODOLOGY

The methodology which is adopted in the present research study the methodology includes various steps and the steps are listed below

Step 1: Identifying the problem statement of the pedestrian safety on the unsignalised midblock crosswalk and finding the past research study on the problem faced earlier.

Step 2: Defining the research gap between the past study and the present criteria of the pedestrian safety analysis and development of necessary improvements for the study.

Step 3: Selection of the study area confining to the study.

Step 4: The data required for the research study is collected by means of field survey and video graphic survey and the required parameters are known.

Step 5: The collected and obtained data is imposed on the excel sheets, the safety margin and risk

index of the pedestrians are calculated from the data collected.

Step 6: The extracted data are analyzed and the required statistical models were developed using SPSS software.

Step 8: The results and conclusions from the research are then discussed.

3.1 IDENTIFICATION OF LOCATION

The study locations are selected based on both pedestrian movements and mid-block location from the intersection

- **Chikkadapally Location:**

At the place of study, there are no norms for building behavior at a pedestrian crossing for the circulation of walkers and automobiles. There was a bus stop at this location where pedestrians deliberately crossed the street in the middle of the block. The study location was 300 m from a nearby intersection, which is used by most walkers to cross the road in the middle of the block rather than using a signaled intersection to cross the street. The average vehicle speed at Chikkadapally was 24.8 km/h. An image of the location of chikkadapally is shown in figure. 3.1.

- **Bhagyanagar bus stoplocation:**

In this training place, it is not possible to build a pedestrian crossing with a mode of movement of walkers and automobiles. There was a bus stop at this location where pedestrians deliberately crossed the street in the middle of the block. The study site was 350 m from a nearby intersection, which is used by most walkers to cross the road in the middle of the block instead of going to the signaled intersection to cross the street. The average vehicle speed at the Bhagyanagar bus stop was 24 km/h. Image of Bhagyanagar bus stop location. Shown in figure3.2.

Figure 3.1: Image of chikkadapally

Figure 3.2: Image of Bhagyanagar bus stop

3.2 DATA COLLECTION:

In the present study, a video graphic procedure was used to collect the necessary data. Seven days of bus stop location data for Chikkadapally and Bhagyanagar were extracted from CCTV footage obtained from the Cyberbad Commissioner. Video surveillance images are selected so that the width and length of the study area under consideration are clearly visible for dataextraction. One week of data was collected in the Chikkadapally area. Data retrieved during peak hours. The location is in the middle of the block. At the Bhagyanagar bus stop, data was collected for one week. Data retrieved during peak hours. The location is in the middle of theblock.

3.3 DATA EXTRACTION:

Demographic characteristics of pedestrians include the gender of pedestrians, age group of pedestrians (under 15 - kids, between 15 to 30 years old, 30-50 year olds and over 50 years old) through video footage. Data on the behavior of pedestrians and drivers of vehicles was take out from the video. The crossing type is one of the main behavioral aspects. The added variables obtained from the video different classes to cross the cross section considered for the test locations. The collected variables are given in Table 3.1.

Table 3.1 Collected Variables

Variables	Variable type	Code/Unit	Description
Gap size	Continuous	Time in seconds	Time interval between two Vehicles with reference to a pedestrian Crossing point in place.
Speed of vehicle	Continuous	Km/h	Speed of Vehicle in Pedestrian area.
Speed of pedestrian	Continuous	m/sec	Pedestrian speed when crossing the street field of study
Gender	Discontinuous	Man-1;Women-0	Male or female.
Age group	Discontinuous	0:Elders (above 50yr)	By visual appearance.
		1:Middle(30-50 years)	
		2:Young (less than 30)	
Foot platoon	Discontinuous	0:Single	Number of pedestrians in the group.
		1: More than one	
Rolling gap forwalkers	Discontinuous	0-Yes; 1-No	Whether pedestrian rolls over the available less gaps.
Walkers baggage effect	Discontinuous	0-yes;1; no	Whether the pedestrian is Carrying luggage ornot.
Driver Behavior	Discontinuous	0-yes;1:no	If the driver slows down when the Pedestrian is already on the road.
Acceptance of the break	Discontinuous	Rejected; 0 Accepted;1	Accepts or rejects pedestrian space.

4. DATA ANALYSIS AND RESULTS OF DISCUSSION

4.1 PARAMETRIC ANALYSIS: Overall crossing speed: It is assumed that the speed of the pedestrian crossing is the same throughout the street. The street dimensions were recorded, and walker's speeds were calculated based on the pedestrian time taken to cross the road. Pedestrian and automobile flows were also taken into account using video graphic data. Average pedestrian speeds were evaluated in various walking environments and flow conditions. Average pedestrian crossing speeds and percentile (15th and 85th) rates were determined for the surveyed locations.

Table 4.1 Average pedestrian crossing speeds and percentile speeds at chikkadapally location

Speeds (m/sec)	Chikkadapallymid block location					
	Male			Female		
	Younger	Middle age	Elder	Younger	Middle age	Elder
Average crossing speeds distribution among age group (m/sec)	1.3	1.15	1.01	1.19	1.09	0.9
Average crossing speed (m/sec)	1.25			1.12		
15th Percentile speed (m/sec)	0.9			0.5		
85th percentile speed (m/sec)	1.5			1.3		
Average gap size (m/sec)	3.23			3.6		

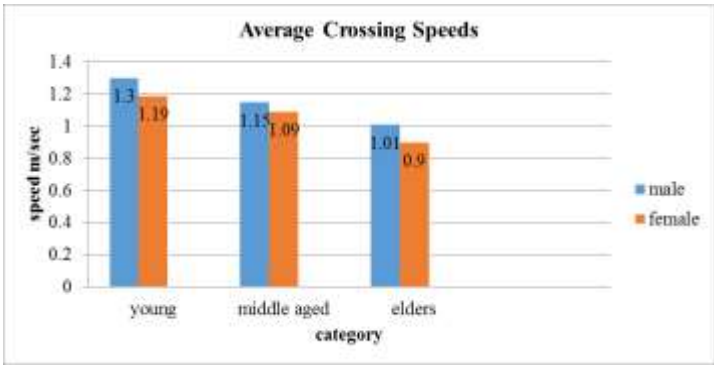


Figure 4.1: Average crossing speed by age group

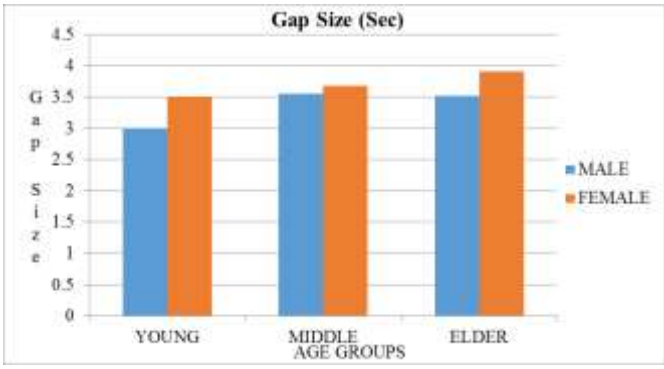


Figure 4.2: Average gap size

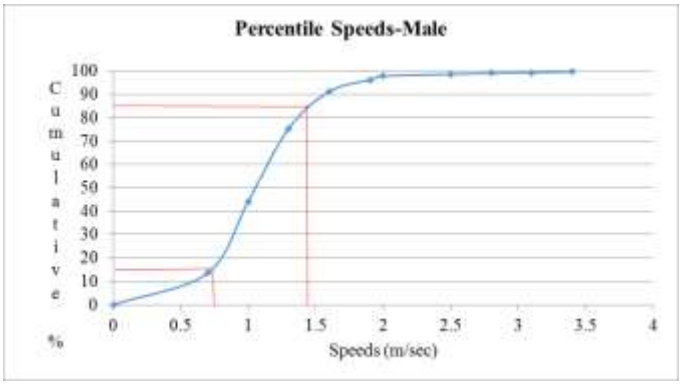


Figure 4.3: Percentile Speeds- male

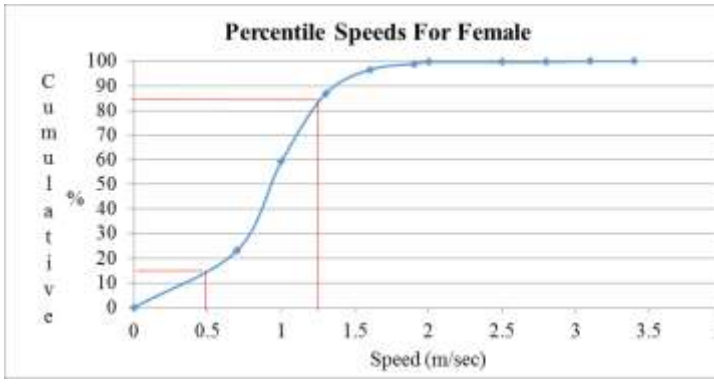


Figure 4.4: Percentile speed Female

Table 4.2 Average pedestrian crossing speeds and percentile speeds at Bhagyanagar bus stop

Speeds (m/sec)	Bhagyanagar bus stop mid block location					
	Male			Female		
	Younger	Middle age	Elder	Younger	Middle age	Elder
Average crossing speeds distribution among age group (m/sec)	1.5	1.3	1.1	1.3	1.15	1.2
Average crossing speed (m/sec)	1.4			1.2		
15th Percentile speed (m/sec)	0.64			0.58		
85th percentile speed (m/sec)	1.9			1.5		
Average gap size (m/sec)	3.82			4.15		

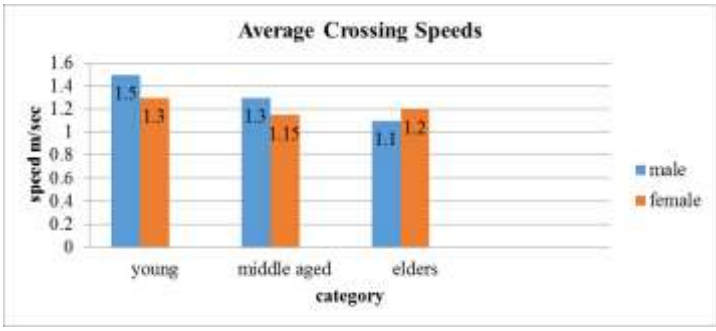


Figure 4.5: Average crossing speed by age group

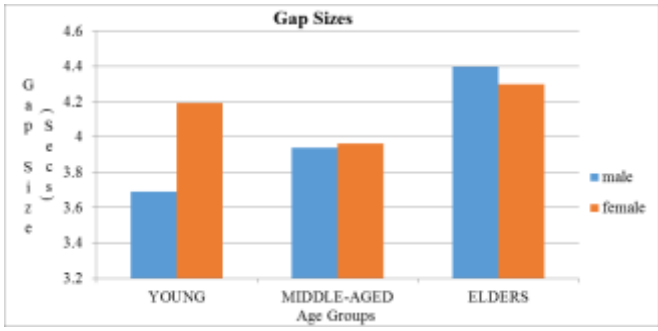
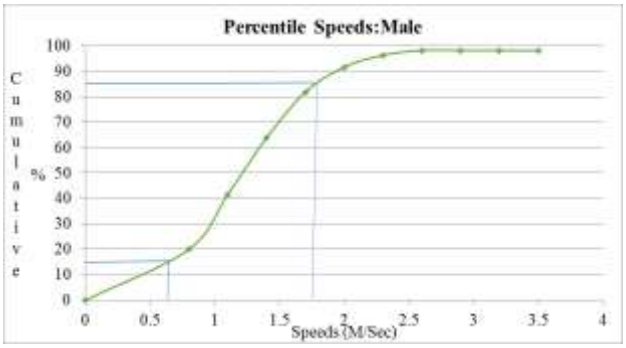


Figure 4.6: Average gap size



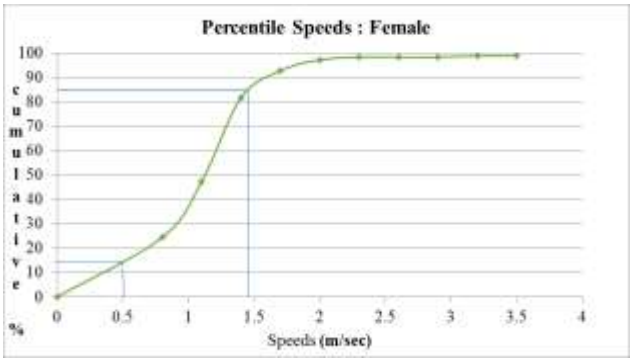


Figure 4.7: Percentile Speeds- male Figure 4.8: Percentile speed -Female

4.2 STATISTICAL ANALYSIS:

Statistical analysis is performed using a statistical package for social and social sciences. In this analysis we are consider two regression models to predict the gap size. They are multiple linear regression and binary logistic model.

- **Multiple linear regression model (MLR):**

Model is useful in determining the gap size allowed for pedestrians. The pedestrian can reject more of the small space sizes available and can accept larger space sizes. Log-normal regression was chosen to develop the minimum deviation acceptance model, since pedestrians allow deviations that follow a normal distribution. Accepted deviation sizes fit best using a normal distribution, taking into account the logarithm of the deviations. The formula is

$$\textbf{Log-Gap} = \beta 0 + \beta 1\ X1 + \beta 2X2 + \beta 3X3 \ldots\ldots\ldots\ldots + \beta nXn$$

Where,Log-Gap = logarithm of accepted gaps; Xi-n = illustrative variables.B1-n = Parameters estimated by the model;

β_o= continual.

Table 4.3: Coefficients of MLR model for Chikkadapally location

MLR model	Coefficientsof Unstandardized		Coefficients of standardized	T	Significance
	B	Std. Error	Beta		
(Constant)	.606	.249		2.441	.019
Male (X1)	.010	.014	.101	.799	.681
Female (X2)	.003	.013	.035	.341	.857
Cars (X3)	.009	.015	.088	.596	.641
Two Wheeler (X4)	-.036	.018	-.275	-1.952	.04
Three-Wheeler (X5)	-.028	.021	-.191	-1.381	.0434
Minibus (X6)	-.009	.016	-.084	-.551	.621
Trucks (X7)	.006	.009	.096	.671	.500

MLR Equation can be rewritten as

Log (Gap size) =0.606-(0.036)*X4-(0.028)*X5

Table 4.4: Coefficients of MLR model for Bhagyanagar bus stop

Model	Unstandardized Coefficients		Standardized Coefficients	T	Significance
	B	Std. Error	Beta		
(Constant)	2.668	0.622		4.288	.000
Male (X1)	-0.138	0.129	-0.169	-1.067	0.293
Female (X2)	0.238	0.097	0.364	2.441	0.020
Cars (X3)	0.009	0.165	0.010	0.056	0.956
Two Wheelers (X4)	-0.348	0.161	-0.324	-2.161	0.038
Three Wheelers (X5)	-0.267	0.179	-0.219	-1.490	0.145
Minibus (X6)	-0.099	0.116	-0.127	-0.860	0.396
Truck (X7)	0.196	0.009	0.280	1.987	0.055

MLR equation can be rewritten as

Log (Gap Size) =2.668+0.238*X2-0.348*X4

- **Binary Logistic Model (BLModel):**

Binary logistic regression is useful where the dependent variable is discontinuous (e.g., accept/reject). For example, we may be interested in predicting the likelihood that a new case will be in one of the two outcome categories.

Y= αi + βi1 X1 + βi 2X2 +……+βinXn

Where,

Y= choosing alternative i; i= alternative; n= number of invidualist variables; α= continual; β = co-efficient

The utility of alternative "i" must be converted into a probability in order to predict whether a particular alternative will be chosen. Next, the probability of choosing alternative "i" is calculated using the following function:

P(i)=1/(1+ex(-Ui)]

Table 4.5: Coefficients of Binary logit model for Chikkadapally location

Model	B	S.E.	Wald	df	Significance	Exp(B)
Age (X1)	.025	.016	2.631	1	.108	1.025
Rolling (X2)	.92	.375	6.288	1	.015	2.499
Driver (X3)	-.291	.299	.929	1	.343	.756
Single (X4)	-.081	.319	.060	1	.813	.942
Baggage(X5)	.007	.310	.000	1	.992	1.007
Gap(X6)	1.060	.297	12.769	1	.000	2.868
Constant	-1.755	.682	6.586	1	.011	.174

A. Variable(S) Entered: Age, Rolling, Driver, Single, Baggage, and Gap.

BL model can be rewritten as

Ln (Odds) = -1.745+0.915*X2+1.050*X6

Table 4.6: Coefficients of binary logit for Bhagyanagar bus stop location

Model	B	S.E.	Wald	df	Significance	Exp(B)
Rolling Gap (X1)	.822	.412	4.012	1	.046	2.241
Driver (X2)	.371	.321	1.287	1	.261	1.424
Baggage (X3)	.340	.318	1.091	1	.311	1.342
Single (X4)	-.710	.341	4.461	1	.037	.499
Gap (X5)	.315	.319	.968	1	.331	1.374
Age (X6)	.015	.018	.377	1	.532	1.021
Constant	-.891	.732	1.531	1	.221	.412

A. Variable(S) Entered: Age, Rolling, Driver, Single, Baggage, and Gap.

Ln (Odds) = X1*0.803-0.700*X4

4.3 DETERMINING THE CRITICAL GAP

Tc= (L/Sp)
+ Ts

Where

Tc = critical gap for one pedestrian (seconds), L = length of the pedestrian crossing in (m)
Sp = Average walking speed (m/s), Ts= Authorization time for walking start and finish (sec) According to HCM 2000, Ts is assumed to be 3 seconds.

- **The Critical gap for Chikkadapally**

Tc= [L/Sp] + Ts

L = 13m, Sp = 1.19m/sec, Ts = 3secs.
TC = (13/1.19) +3, TC = 14sec

The Critical Gap obtained for Chikkadapally is 14secs.

- **The Critical Gap for Bhagyanagar busstop:**

Tc= [l/Sp] + Ts

L=12m, SP = 1.27 m/sec, Ts = 3secs
TC = (12/1.27)+3, TC = 13sec

The Critical Gap obtained for Bhagyanagar bus stop is 13secs.

4.4 BEHAVIOR ANALYSIS

There are certain behaviors that affect how data is presented for work. A special pattern is the concept of a "rolling gap". At the mid-block locations, especially when there was heavy vehicle movements, pedestrians are not waiting to cross the road until vehicles are cleared in the section. Rather, they expect lanes to be cleared as they are crossed and use moving space to cross the street, i.e.; in effect, there was a separate space for each lane, coinciding with a pedestrian's path down the street. Pedestrians rolling in a small car space are characterized as a rolling space, as shown by the A-A route in the figure. Rolling space was the type of pattern seen in Chikkadapally and Bhagyanagar bus stops. The pedestrian crossing did not wait to unload traffic, but switched to Rolling Gap to cross the street in different lanes. As a result of this type of behavior, the accepted clearances were much smaller than the critical clearance calculated according to HCM.2000. Moving gap behavior was observed at Chikkadapally and Bhagyanagar bus stop. Gap size was used as a discrete variable to determine pedestrian behavior in a binary logit model. In that model at Chikkadapally and Bhagyanagar bus stop, the moving gap with a variable was found to be significant. Pedestrians are rolling, as shown on the path A-A in fig.4.9.

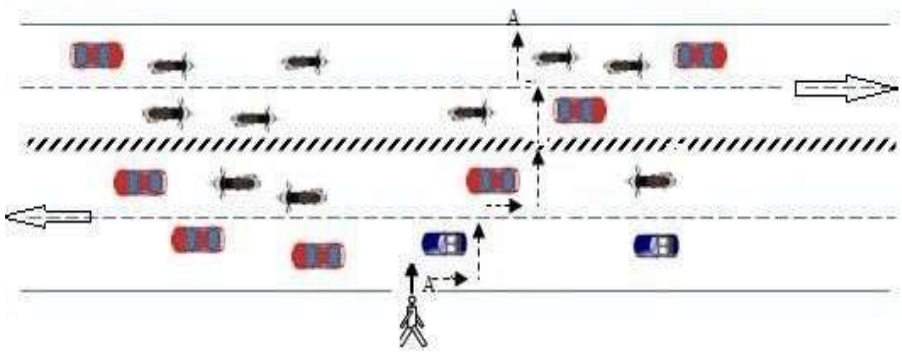


Figure 4.9: Pedestrian Rolling Gap Movement

5. DISCUSSION

The average speed of pedestrians was 1.19 m/s at the Chikkadapally bus stop and 1.26 m/s at the Bhagyanagar bus stop. According to HCM, a walking speed of 1.2 m/s is recommended if people over 65year make up to 20% of pedestrians. If the elderly are above 20%, a value of 1.0 m/s is suggested. Since the percentage of older people over 65yr is less than 20%, a walking speed of 1.3 m/s is consideredacceptable. Pedestrian speed varied across the survey sites and indicated that pedestrians at the Bhagyanagar bus stop were crossing the road at a faster rate than at Chikkadapally. This confirms the fact that the traffic density at Chikkadapally was higher than at the Bhagyanagar bus stop. The 85th percentile and 15th percentile speeds at Chikkadapally are 1.4 m/s, 0.65 m/s, and at the Bhagyanagar bus stop are 1.8 m/s and 0.68 m/s respectively. A parametric study of pedestrian speedsinthemiddleoftheblock(Rastogietal.)yielded15thand85thpercentilespeedresultsof 0.84 m/s and 1.58 m/s in Hyderabad, which refines the validity of the values obtained in Hyderabad. The average transition rate of the elderly is lower than that of middle-aged people than that of young people in Chikkadapally. This gives a general idea that older people walk at the slowest speed and the youngest walkers have the highest speeds of all age groups. Speed results also show that men cross streets faster than female pedestrians in the surveyed areas. The average transition rate of the elderly is lower than that of middle-aged people than that of young people in Chikkadapally. This gives a general idea that older people walk at the slowest speed and the youngest walkers have the highest speeds of all age groups. Speed results also show that men cross streets faster than female pedestrians in the surveyed areas. Behavior at a crosswalk is completelyunpredictableinanuncontrolledareainthemiddleoftheblock.Thechikkadapallyand bhagyanagar bus stop locations had different significant variables. This can be seen as a difference in traffic, i.e. in the traffic discipline in the studiedareas.

A binary logit model was performed for the studied locations. Binary logit modeling was performed with discrete independent variables. The "rolling space" behavior pattern was significant, indicating that it was a type of multi-lane highway crossing pattern. Moving space indicates the risk that pedestrians face when crossing the tracks. Another fact that has been understood is that drivers are not pedestrian friendly, i.e., Do not yield to pedestrians; it is designed to force pedestrians to cross the street for the life and safety of pedestrians and drivers. The critical gap determined by the HCM 2000 equation. Thus, gaps larger than the calculated critical gap were not always accepted by pedestrians in this study. Thus, pedestrians often timed their crossing maneuvers to take advantage for crossing the road. As a result, the 85th percentile gap for both locations was smaller compared to the criticalgap.

6. CONCLUSION

Because pedestrians are the most vulnerable road users, they are at high risk of injury or death. To address these safety concerns, it is necessary to improve the behaviour. To analyse these pedestrian safety issues, various statistical methods are used to predict pedestrian space in the centre of a block without traffic lights. The current work of the study concerned pedestrian crossings in the middle of the block in Hyderabad. The Chikkadapally area and the Bhagya Nagar bus stop were selected as sites for the study. The following conclusions are drawn from this study:

The study was conducted in Hyderabad, at Chikkadapally and Bhagya Nagar bus stops on dual carriageways.

- The average crossing speed of bus stops chikkadapally and bhagyanagar was 1.19 m/s and 1.26 m/s, corresponding to (HCM 2000) 1.2 m/s, ie; the effectiveness of the results is98.33%.
- Men have a higher average crossing speed at both locations compared to the average crossing speed forwomen.
- The younger age group has higher crossing speed when compared to the middle and older age groups.
- The 85th percentile speed at Chikkadapally and Bhagya Nagar bus stops is 1.4 m/s and 1.8 m/s respectively. This shows that 85 percent of people have a speed higher than the average crossing speed at the studysites.
- Research shows that the crosswalk layout is a rollinggap.
- The yielding behavior of drivers in the study areas was analyzed and it was concluded that drivers do not yield topedestrians.
- The gap accepted size was not larger at any of the study sites, with an 85th percentile gap of 4.9 seconds at Chikkadapally and 5.2 seconds at the Bhagya Nagar bus stop. The theoretical critical clearance has changed according to the actual allowable clearance and can be explained by traffic density and walking behavior in thejay.
- Modeling a crosswalk in the middle of the block using regression models and a binary logit model to determine the important parameters of the results of a study of pedestrians showed that the behavior and discipline of traffic can influence and place to place model development was vary.
- A multiple regression model makes it easy to predict variables compared to a binary logitmodel.
- It is stated that the sophisticated regression models and results of parametric speed studies can be very useful for regulating the behavior of pedestrians during careless crossings in uncontrolled inter block places. There is an opinion that the developed models work quite well in developing countries under mixed trafficconditions.

6.1 FUTURE ENDEAVOR

This research could be extended to other locations in the city. Other parameters can be considered in regression models and the behavior of pedestrian crossings can be further expanded. The overview can be expanded to show the relevant variations with an effect of weeks, months and years. A change in speed depends on the intersection pattern and sidewalk.

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