To Study Pedestrian Safety at Undesignated Urban Midblock Section by User's Perception

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Abstract

Due to lack of pedestrian walking and crossing facilities pedestrian mostly used regular traffic lane. Continuously increase in motor vehicles increases chances of collision with pedestrians. In such scenario, pedestrian safety is an important issue in most of the developing countries. In developing countries like India. Pedestrian behaviour is prime important in order to provide better safety to the most vulnerable road users and to arrest illegal crossing of pedestrians and reduce crash at such location in urban area. User's perception is very much powerful tool to carry out such behavioural study. The present study has been carried out with the objectives to analysed pedestrian safety at undesignated midblock section using user's perception. Pedestrian's perception information will be collected different high-density urban area with help of Questionnaire form survey. Collected Pedestrian different characteristics data such as Socio-economical characteristics data, Crossing characteristic data, Behaviour characteristic data, Traffic Characteristics data. Also ask to pedestrian regarding safety and risk. To collected pedestrian perception behaviour information through Questionnaire survey. Analysed pedestrian safety at undesignated midblock section at five scale rating. Survey is conducted at Ahmedabad; India and 78 sample of questionnaire survey is collected. Analysis of data was further analysed to assess safety perspective of pedestrian. Based on analysis results people having habits to cross at undesignated midblock section. Education and purpose not affected the safety.

Keyword- Pedestrian, User's Perception, Safety, Midblock

I. INTRODUCTION

Walking is the most natural and simple mode of movement for humans. All human being are frequently pedestrians and practically every trip has some walking components. Walking is sometimes referred to as the neglected mode of transport. Developing countries like India are mostly lacking in providing adequate and proper designed facilities for pedestrian movement. Walking facilities like terminal, stair, sidewalk, and footpath, facilities for queuing, where pedestrians standing temporarily such as transit platform, elevator and street crossing facility like zebra crossing, foot over bridge (FOB) and under pass are not as per requirement. Pedestrian are vulnerable road users and despite there also are limited representation in traffic events. In this scenario, vehicle and pedestrian interactions are continuously increasing. According to National Crime Research Bureau (NCRB, 2016) of India. In the year of 2016, estimated the pedestrian death and injury was 28,434 of total urban road traffic accident (RTA). In the year 2015, total road traffic accident happen 4,64,674 in which 54.85% accident are happing in urban area, then 45.14% accident occurring rural area. NCRB (2016), It has been found that 15.9% accident are occurs near the residential area in mega city, and 10.7% of fatal are reported pedestrian crossing. 5.8% of the accident reported near school, college and other educational institution. About 1.25 million people die in RTA around the world every year and it is estimated that half of these are pedestrians, cyclists and motor-cyclists (WHO, 2015) it is estimated by WHO (2015) that pedestrian deaths are 22% which is approximately 275,000 deaths a year globally.

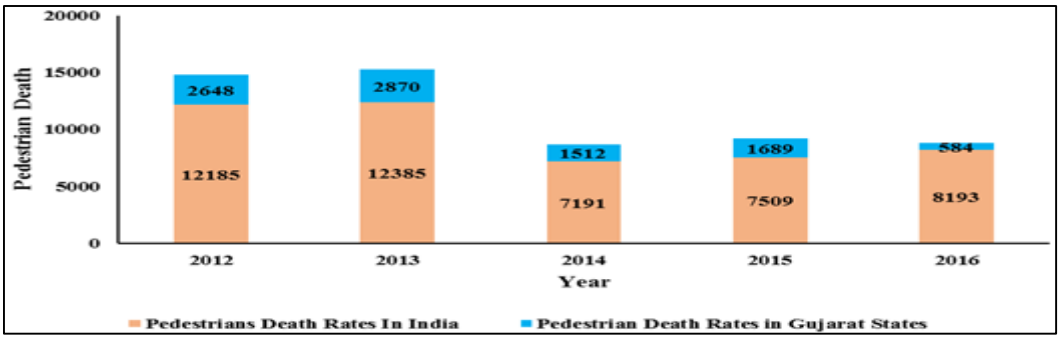

Fig. 1: Pedestrian Death Rate in India and Gujarat

The pedestrian illegal crossing behaviour is a major fact in road safety issues. When pedestrian having cross the unmarked mid-block, section increase the chance of a crash compared to crossing on a marked signalised crossing. The complexity Interaction between pedestrian and vehicular traffic increases mostly at uncontrolled mid-block and unsignalized intersection. It becomes necessary to study the behaviour of crossing pedestrian in order to avoid such risky operations by pedestrians. Many studies have been reported related to crossing pedestrian safety especially in developed countries. There are only few studies has been reported at midblock section in developing countries.

II. LITERATURE REVIEW

Guo et. al. (2014) indicated that pedestrians prefer overpass/under pass, and most pedestrians consider safety the first importance. The most influential subjective factor is deciding to cross at a designated crossing location. Zhoua et.al. (2016) examined structural equation modelling (SEM) to reflect the pedestrians' perception and that affects in level of service of the integrated transport hubs (ITHs). Kadali and Vedagiri (2013) this paper indicated the less safety at an uncontrolled mid-block location as compared to the other locations. And frequency of attempting gap and pedestrian rolling gap behaviour at uncontrolled mid-block locations increased the probability of accidents. Papadimitriou et.al. (2015) developed of pedestrian crossing choice models on the basis of road, traffic and human factors. The analysis has been showed, a pedestrian crossing behaviour is affected by road type, traffic conditions, traffic control and pedestrian characteristics. Serag M.S (2014) analysed accepted gaps depend on the speed of incoming vehicle. Pedestrians' decision to cross the street depends on the size of traffic gap, vehicle speed, pedestrian rolling gap, and frequency of attempts before crossing. Papadimitriou et.al. (2012) analysed the pedestrian attitudes, behaviours and perception based on SARTRE 4 (Social attitudes to road traffic risk in Europe). Pedestrian attitudes eight component in which six components is associated with pedestrian attitudes and two with pedestrian behaviour. Kaparias et.al. (2010) provided of safe zones and lighting level to pedestrians, vehicle traffic which most important external (scenario specific) attributes, when age and gender is dominant as internal (respondent-specific) attributes. Pedestrians feel most comfortable in shared space under conditions which their presence is clear to other road users. Zhao et. al. (2018) analysed there is no significant difference in the visual perception time of the conflict between straight driving and pedestrian conflict, the conflict between pedestrians and vehicles, people moved slowly, in a different degree of urgency under the condition of horizontal offset between sight is relatively small, with a large statistical error. Havarda and Willis (2012) examined before-and-after approach provided important information about the effects of infrastructural change on individuals' perceptions and behaviour, and the questionnaire survey show self-reported behaviour more consistent with observed behaviour. Rankavata and Tiwari (2016) study is determined pedestrian perception of getting involved traffic crash during the walking in different location in Delhi city. Study is identified various factor which affected the risk perception such factor is age, gender, road characteristics, traffic characteristics and sidewalk characteristics. Rizal et. al. (2013) observed pedestrian facilities condition is not suitable for pedestrian. Importance Performance Analysis (IPA) need to improve pedestrian ways, Planting plants, Availability of crossings, shade trees, Traffic management and Parking designs. Tova Rosenbloom and Roi mandel (2015) A hazardous condition male is found the higher score of safety then female and age difference are found when adult is scoring highest then child and older person. Peña-García and Hurtado (2015) investigated impact of public lighting on pedestrian perception a safety and well-being point of view. Shaaban et al. (2018) observed that pedestrians crossing from the curb will wait less time compared to those crossing from the median. High number of pedestrians jaywalking in a short segment between two signalized intersections equipped with pedestrian signals. Holland (2006) concluded that different ages groups need various safety aspect regarding them ages, and the woman is higher riskier during the road crossing than man. Many study has been carried out relate to pedestrian safety at intersection but there are very limited study has been carried out related to pedestrian safety at midblock section using user's perception.

III. METHODOLOGY

A. Questionnaire Survey Form Formulation

Based on literature review, there are number of different factors which affected pedestrian during the undesignated midblock crossing. Design questionnaire form based on different pedestrian characteristics, such as socio-economics, pedestrian and pedestrian behaviour characteristics. A questionnaire with a total of 35 variables is developed to measure pedestrian perception in mainly three aspect: (a) safety (b) comfort (c) risk and attitude. It is believed that each variable could potentially impact on sidewalk performance. In the present study all factor is rated on a five-point Likert-type scale with "Extremely unsafe" representing strongly safe, and "Extremely safe" representing strongly unsafe. To collect the data, onsite interviews were conducted in the study location at Ahmedabad city.

B. Study Area and Data Collection

Data were collected at Ahmedabad city near Paldi location. At Paldi area, road sections having six-lane divided urban arterial roads. Question which previously printed in form to asked the pedestrian how they feel during the undesignated midblock crossing. Data were collected for young, middle and old age sample groups via a questionnaire that included related to road traffic safety, attitudes and behaviours, and risk perception in various traffic situations. Collected around 78 questions form to near Paldi location Ahmedabad city. Collected data in which show in graph gender, age, educational as well as purpose wise in graphically.

Fig. 2: Data Collection Pics

IV. ANALYSIS OF DATA

The analysis has been carried out based on three basic pedestrian characteristics namely Gender, Education and Purpose of trip. It was observed that in the collected samples 53% was male and 47% of female respondents. Education and purpose wise share of respondent is shown graphically in Fig.

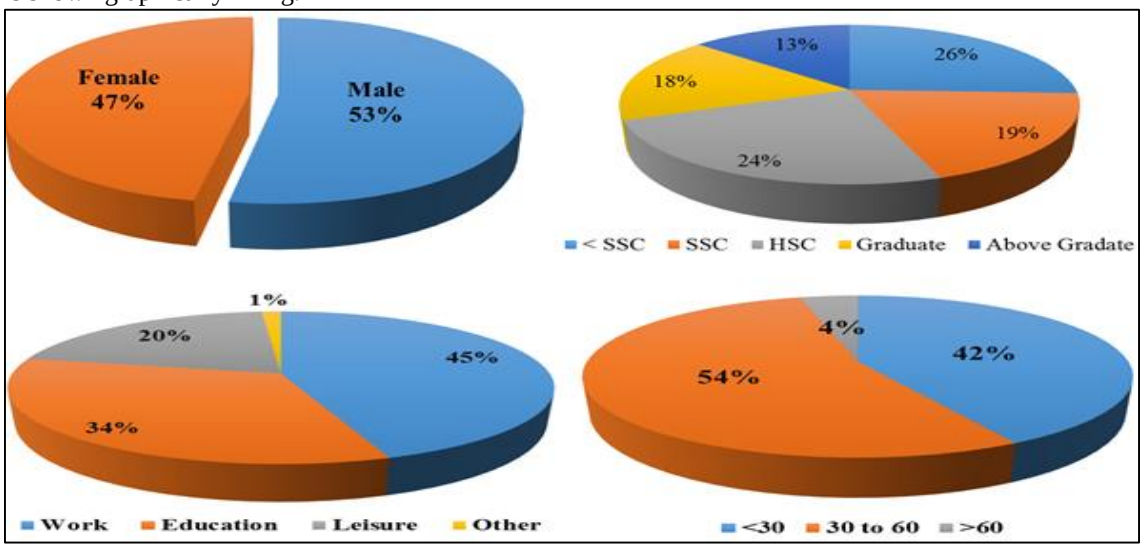

Fig. 3: Pie Chart Showing Proportion of Responder with respect to Gender, Education, Purpose of Trip and Age

A. Analysis Based on Gender

Based on gender analysis during the undesignated road crossing female is feel extremely safe than male. Similar way, when female is in alone to cross the road, they feel safer then male. When male and female is during the undesignated road crossing much extremely safer then groups. Which is shown graphically.

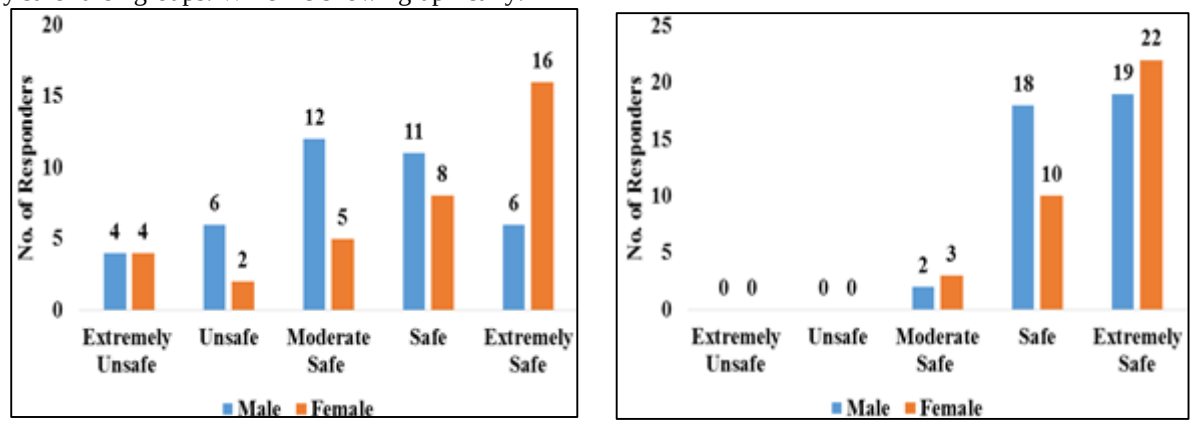

Fig. 4: User's Perception for Safety Based on Gender when Pedestrian Crossing Alone and in Group

B. Analysis Based on Age

Age wise analysis show when young and middle age people is cross the undesignated midblock section is higher rates. When young and middle age people feel unsafe when they cross the undesignated midblock alone. When all three age groups during the crossing in groups they feel extremely safer then alone.

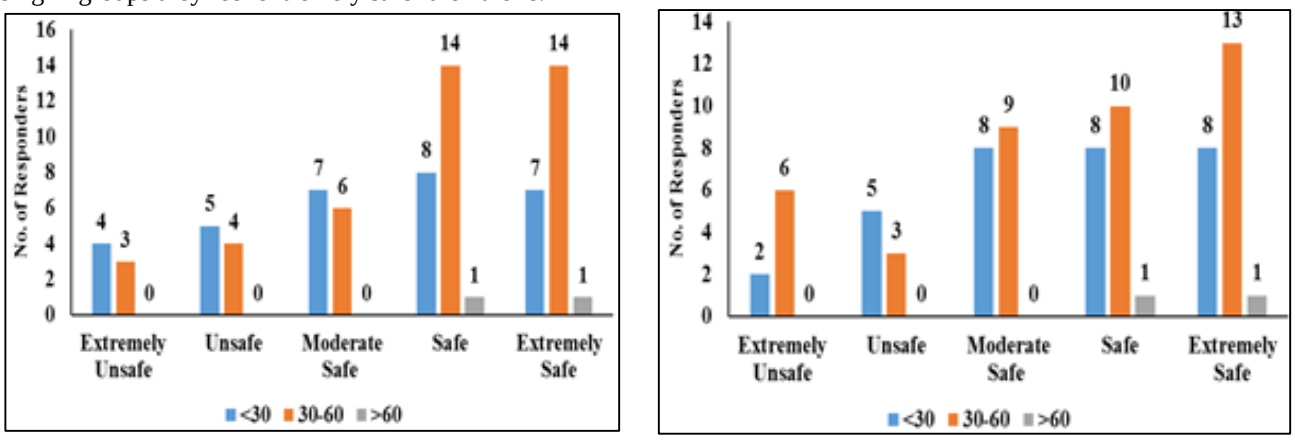

Fig. 5: User's Perception for Safety Based on Age when Pedestrian Crossing Alone and in Group

C. Analysis Based on Education

Based on Educational wise analyses the pedestrian perception. When less than SSC educated feel when they cross the undesignated midblock unsafe as well as above graduated people feel unsafe. There is not much more different between educated and uneducated pedestrian perceptions.

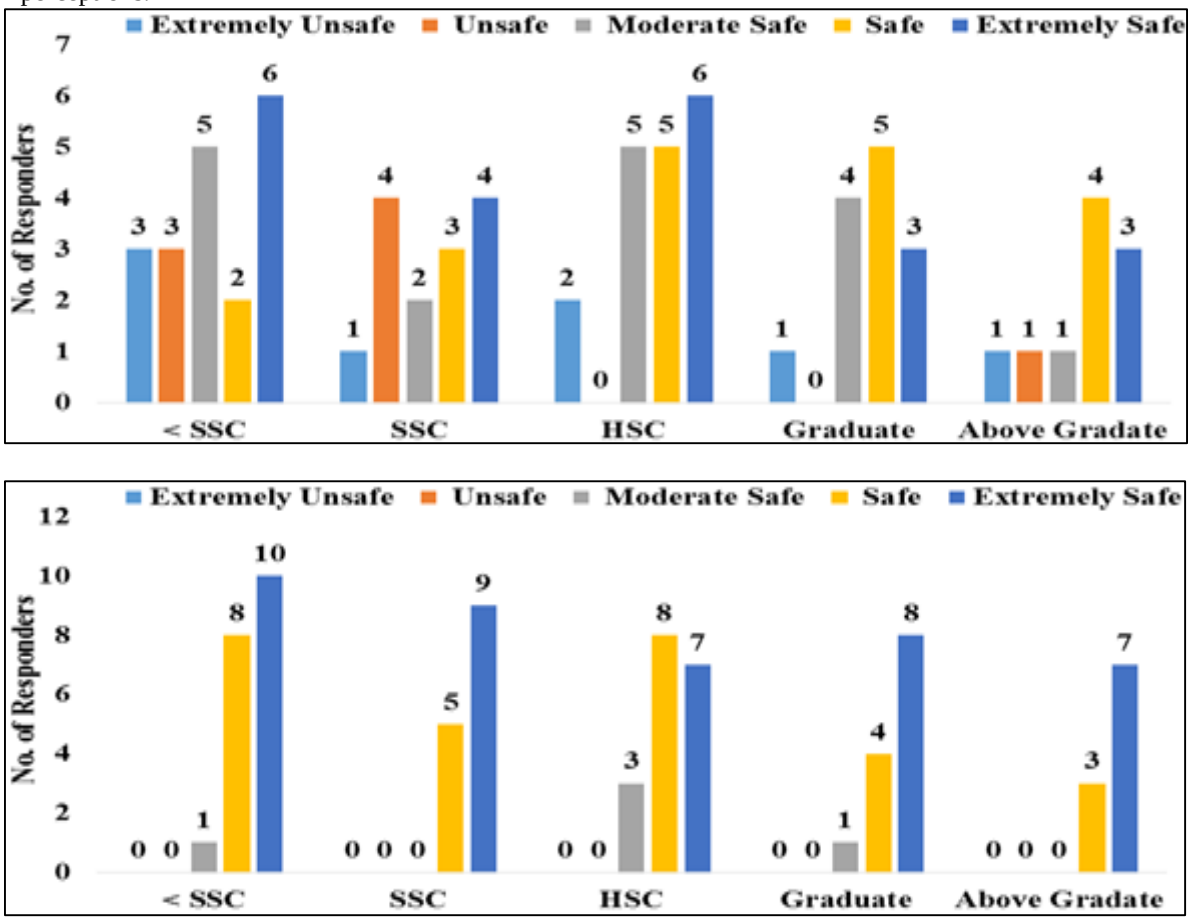

Fig. 6: User's Perception for Safety base on Education when Pedestrian Crossing Alone and in Group

D. Analysis Based on Purpose

When pedestrian cross the undesignated midblock for easily access their destination. When work oriented pedestrian is much more time to cross undesignated midblock section. Based on analysis work and education trip is more. Employed is feel safer when cross the midblock section. All three work, educational as well as recreational trip people feel extremely safer when they cross in groups.

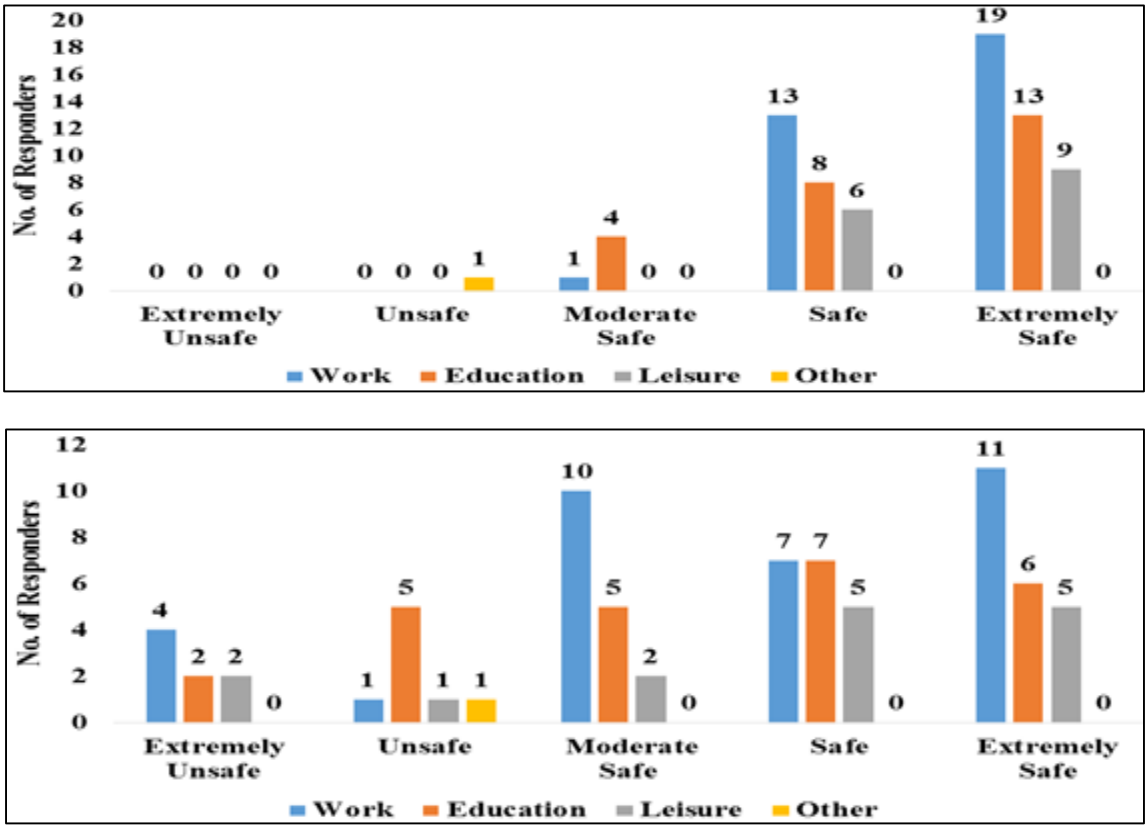

Fig. 7: User's Perception for Safety base on Purpose of Trip when Pedestrian Crossing Alone and in Group

E. Analysis Based on Frequency of Crossing

Analysis based on crossing frequency, when people cross the undesignated midblock daily feel extremely safe then occasionally crossing. More daily crossing people feels safe conditions then occasionally cross the people. When the daily crossing people in group feel extremely safe then occasionally cross the people.

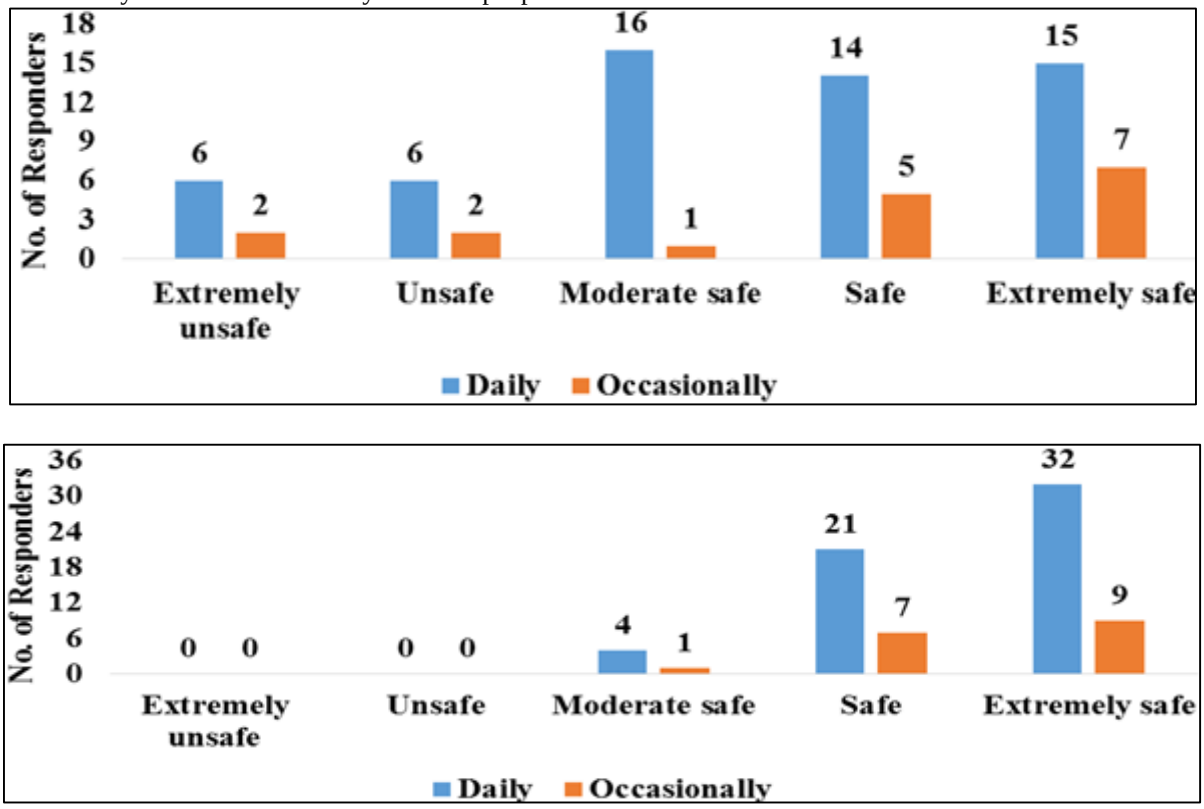

Fig. 8: User's Perception for Safety base on Frequency of Crossing when Pedestrian Crossing Alone and in Group

V. CONCLUSION

The study has been carried out to analyse safety of crossing pedestrian at midblock location based on user's perception. The user's response was asked for their perception during crossing the road at midblock section. The analyses has been carried out based on Gender, Age, Education, Purpose of Trip and Frequency of crossing. It was observed that female pedestrian feeling safer than male pedestrian. Moreover, male and female pedestrian were feeling safe when crossing in group. Pedestrian of all ages are felling safe during crossing at midblock section when they cross along or in group. The analysis based on education showed that less educated pedestrians were feeling unsafe during crossing the road at midblock section whereas educated pedestrians were feeling safe. Pedestrian were feeling safer when their purpose for crossing was going for work. Daily commuters as well as rarely crossing pedestrians were also feeling safe during such crossings.

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