



Analysis of Pedestrians Road Crossing Behavior at Dhaka City

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Abstract: *The development of any city depends on its road networks. Sometimes this network does not work properly due to haphazard road crossing of pedestrians. Pedestrian's accident risk increased when they decide to cross the road without using existing road crossing facilities. The fundamental objectives of the research are identified the main reasons which obstruct the pedestrians to obey the road crossing at uncontrolled intersections in Dhaka City. The study is done at Shahid Minar T- intersection through a video graphic observation and field survey. The researcher found that, 80.40% pedestrians do not obey the existing road crossing rules. There are some factors was identified for not using the existing road crossing facilities. Lacking of awareness has shown the main reason and others factors have been identified by authors are time consuming, lacking of securities and location is not at suitable place. Median barriers must be constructed to reduce haphazard pedestrians crossing. Parking zone must be prohibited at exit and entrances. Pedestrians warning sign also be installed at the perfect location.*

Keywords: Uncontrolled intersection, Pedestrians crossing facilities, Mode of transport.

1. Introduction

Dhaka, the capital of Bangladesh has the population density approximately 10 times higher than the overall population density of the country which is 8229 people per square km (Population and Housing census 2011). At present in Dhaka city more than 15 million people are living and everyday this people causes around 25 million daily trips by using several modes of transport (Dhaka City Corporation, 2013). Among these modes, walking is considered as the most sustainable, environmental friendly and simplest mode of transportation and has many benefits for pedestrians. There are different types of pedestrian's road crossing as like as at-grade crossing, grade separated crossing, crossing at node and mid-block crossing. Among these crossing, at mid-block crossing is more risk for pedestrians (Jain et al., 2014). According to Bangladesh Road Transport Authority from 1994 to 2019, a total of 96,763 accidents occurred in Bangladesh. From the Bangladesh road transport authority 2016-2017, these 26 years 79,664 pedestrians were killed in traffic crashes in Bangladesh, representing 53% of all the people that died in traffic crashes (Among the pedestrian fatalities, 24% happened in 4 metropolitan cities. Bangladesh police HQ conducted some road accident survey and they showed those pedestrians are involved in about 70% of road accidents (Ahmeda et al., 2013; Antonini et al., 2006). From the different study it is concluded that, pedestrians are the most vulnerable in Dhaka City. Therefore, a study is required to understand the crossing behavior of pedestrians in Dhaka city. In this study, road crossing behavior of pedestrians in Dhaka city will be studied by using video observation and questionnaire survey.

2. Objectives of the study

The objectives of the research are as follows:-

- (i) To find out the road crossing behavior of selected pedestrians
- (ii) To find out the pedestrians perception on using road crossing facilities.
- (iii) To suggest improvement measures.

3. Literature Review

Various types of factors are involved at road accidents. Among them, pedestrians fault 59%, driver's fault 32% and both are 9% fault (Alam *et al.*, 2011; Hasib *et al.*, 2012). Pedestrians have to wait at one side of street or at median for crossing the road. For this pedestrians' attention be reduced with the increases of waiting time of road crossing. (Hamed, 2010; Cherry *et al.*, 2010). Location of road crossing facilities is another important factor to occur accident of pedestrians. About 80% accidents are occurred when pedestrians crossed the road without using road crossing facilities (Gitelman *et al.*...2012; Kadali *et al.*...2013; BRTA 2016-2017). From the another study it has been found that, 38.2% crashes are occurred at the link of street (Olszewski *et al.*, 2015) From the above literature reviews, it is found that many studies have been done for other areas, but few studies have been done for Bangladesh.

3.1 Types of Pedestrians Crossing

There are different types of pedestrians crossing as like as:-

1. At-grade crossing and
2. Grade-separated crossing

At-grade crossings: At grade crossing are as follows

- Pedestrian crossings at intersections and
- Mid-block crossings.

Grade-separated crossing: Grade separated crossing is the most important solution for reducing of conflicting points of a junction at different level. At this crossing there is no intersection point between two or more roads.

4. Study Area and Methodology

The researchers have been collected the study data at Central Shahid Minar un-signalized T-intersection, which is shown in following figure.



Fig.1. Location of the surveyed Intersection in front of Central Shahid Minar (Source: Google Map 2018)

There are three approaches at this T intersection as north-west approach, south east approach and north east approach. There is no central median on north-west approach. The width of this approach is 50 feet. The Pedestrians crosswalk (zebra crossing) is situated 100 feet advance of the through road edge line. The width of south-east approach is 50feet and central median is existed on this approach but there are no pedestrians or central barriers. The width of north east approach is 33 feet. Central median is available on this approach without pedestrian's barriers.



Fig.2. Location of the surveyed Intersection in front of Central Shahid Minar (Source:Field Survey)

Data was recorded for one hour from each approach of the selected intersection. A questionnaire survey also done randomly selected respondent pedestrians during the period of September 5-10, 2018 from 12:00 pm to 1:00 pm and 3:30 pm to 7:00 pm; September 17-20, 2018 from 11:00 am to 1:00 pm and 5:00 pm to 7:00 pm; October 18-22, 2018 from 3:00 pm to 6:30 pm. The present scenarios of the study intersection are shown in following figure.



Fig.3. Hazards at the surveyed Intersection in front of Central Shahid Minar (Source:Field Survey)

4.1. Literature search

All readily available materials are reviewing at the section of literature search. Research knowledge are gathered from on-line data base, newspapers, magazines, annual reports, institutional publication.

4.2 Focus group discussion

A focus group discussion is used as a preliminary research technique to explore people's ideas and attitude. A group of people met in a conference room and discussed about the way of collecting information from the pedestrians who cross the study area.

4.3 Questionnaire survey

Questionnaire survey was conducted among the related pedestrians to find out the reasons why a significant percentage of pedestrians are not used the existing road crossing facilities. A total of 400 pedestrians were being randomly carried out to get questionnaire survey at the selected intersection. The sample was collected in two categories- (i) pedestrians who obey the rules and (ii) pedestrians who violence the rules.

5. Data analysis and Results

The main objective of the research work fully depends on the accuracy and process of data analysis and interpretation. To analyze the field data (from questionnaire and videos), graphical presentation are used. Total 15 days were surveyed to determine the number of pedestrians who cross the study areas. From the video graphic method, it is found that 505 pedestrians were crossed the selected intersection per hour. The surveyed pedestrians and their behavior have represented in the following table.

Table 1: Pedestrians behavior at the surveyed intersection

Type		Number of Pedestrians	
		Pedestrians flow/hour	Results (%)
Gender	Male	453	89.70
	Female	52	10.30

From the video graphic survey, it is found that, the percentage of women is relatively more than the men using the existing road crossing facilities although the road crossing tendency of male is more than the female. The study area is most busy intersection because of the CSM and Dhaka Medical College located near at the study area. Most of the pedestrians violate the road crossing rules which are indicated in the following figure.

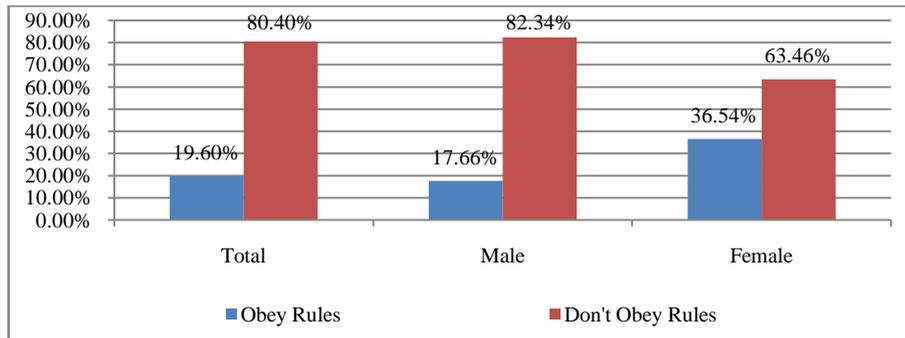


Fig.4. Existing road crossing rules Violation scenarios due to gender (source: Field survey)

5.1 Out come from the Questionnaire Survey

A questionnaire survey has been done among the 400 pedestrians, among them, 200 pedestrians were taken from road crossing rules violated group and 200 pedestrians were taken from road crossing rules obeyed group. From the questionnaire survey, following demographic characteristics in pedestrian behavior are observed.

5.1.1 Impact of age

Young people are more intendance to violate the road crossing rules than the older one. According to the survey results, most of the rules violated group is 18-24 years old and most rules obey group whose age is 60 or more than 60 years.

Table 2: Road crossing behaviors of pedestrians due to age structure

Pedestrians age	Total Pedestrians		Obey Rules		Don't obey rules	
	Nos. (400)	(%)	Nos. (200)	(%)	Nos. (200)	(%)
Below 15	40	10.00	22	55.00	18	45.00
15 or Above 15 but not more than 18	65	16.25	34	52.31	31	47.69
18 or Above 18 but not more than 24	80	20	33	41.25	47	58.75
24 or Above 24 but not more than 35	61	15.25	29	47.54	32	52.56
35 or Above 35 but not more than 45	66	16.50	32	48.48	34	51.52
45 or Above 45 but not more than 60	49	12.25	25	51.00	24	49.00
60 or Above 60	39	9.75	26	66.67	13	33.33

The young pedestrians like to take challenges so they comparatively more violence the road crossing rules and older pedestrians are careful so they try to maintenance the road crossing rules.

5.1.2 Impact of education

To tendency of violating the traffic rules is also depended on the education. The pedestrians whose did not follow the road crossing rules, their educational profile are given in figure 7. Most of the rules violated group is the students who are studying in higher secondary school certificate (H.S.C.).

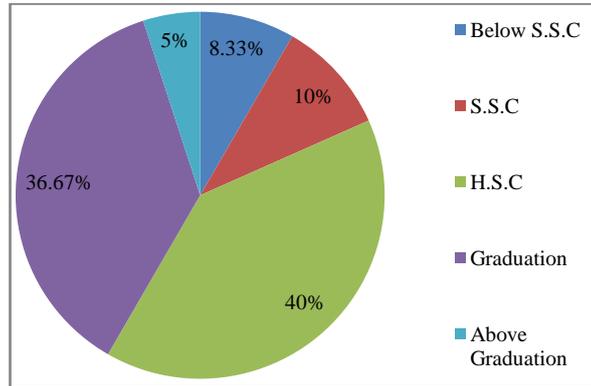


Fig.5. Violation of existing road crossing rules due to education (Source: Field survey)

5.1.3 Impact of occupation

Occupation of pedestrians leads the violating of road crossing rules. Hawkers who are more violated the road crossing rules on the other hand employee obey the more. The central Shahid Minar is a monument of language movement of Bangladesh on 1952. Dhaka Medical College, Bangladesh University of Technology and Dhaka University are situated at this place. The result is shown in following figure.

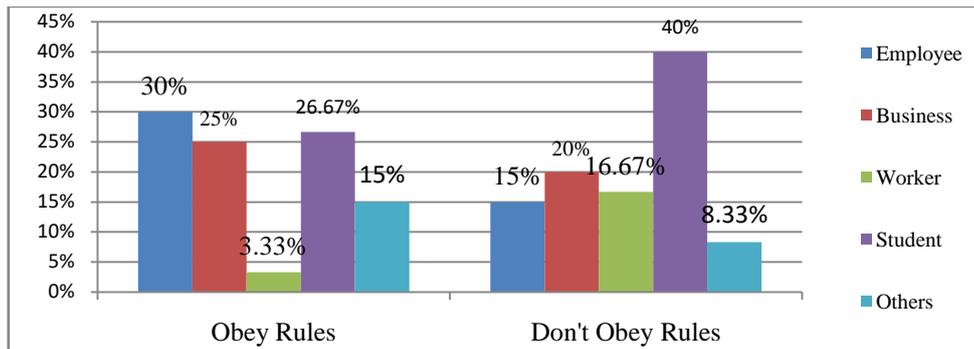


Fig.6. Violation of existing rules in road crossing according to occupation (Source: Field survey)

5.1.4 Impact of income

From the study the author shown that the road crossing pattern of pedestrian depends on income and these effects are shown in fig.7.

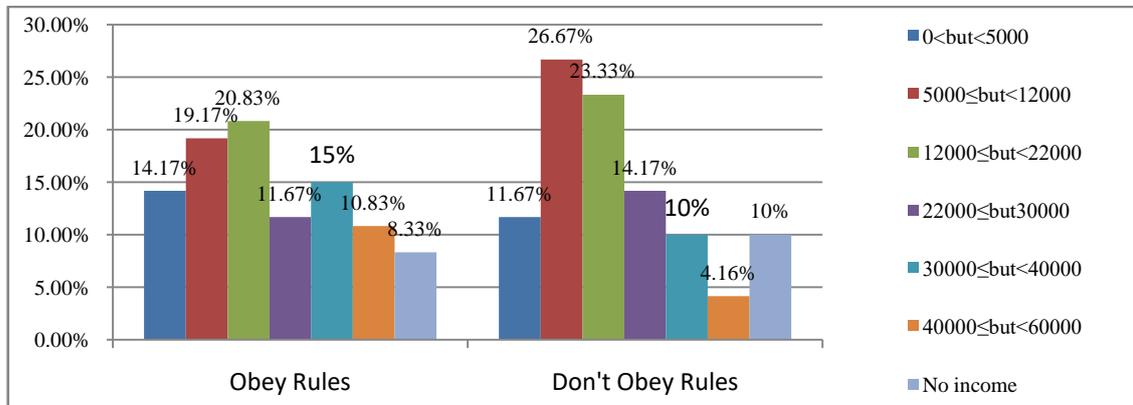


Fig.7. Violation of existing rules in road crossing due to income (source: Field survey)

5.2 Causes of obstruction the traffic rules

From the study it is seen that, 80.40% pedestrians are not use the existing road crossing facilities. The possible reasons for not using the existing road crossing facilities are identified by using questionnaire and video observation survey. Lack of awareness is identified as top reasons of not using road crossing rules. It is also found that 76.67% pedestrians know how to cross the road, but lacking of awareness they are not use road crossing facilities during the crossing time. Second top reason of not using the road crossing facilities is unsuitable location. The lighting facility at south-east approach of CSM is very poor some pedestrians are discouraged to use available facilities.

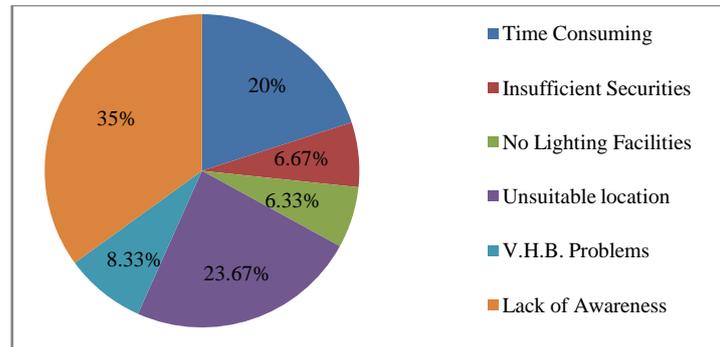


Fig.8. Causes for not using existing facilities during crossing the road (Source: Field survey)

6. Conclusions

- ❖ Lacking of awareness: At central shohid minar intersection 35% pedestrians violence the road crossing system due to lack of awareness. 76.67% pedestrians know the road crossing rules but they do not obey the rules. Although they know how to cross the roads but they do not obey due to lacking of awareness.
- ❖ 82.34% male pedestrians and 63.46% female pedestrians do not obey the road crossing rules.
- ❖ Road crossing rules violate due to age: Comparatively young people less flow the road crossing rules. From the study 58.75% pedestrians violated the road crossing rules whose age from 18 years to 24 years and 66.67% pedestrians obey the rules whose age is 60 or more than 60.
- ❖ Obey the road crossing rules depends on education: Higher educated and reach people comparatively more obey the crossing rules. At the intersection only 5% pedestrians violate the traffic rules that have completed their graduation degree and 40% pedestrians do not use the traffic rules whose are studding in S.S.C.
- ❖ Crosswalk Unsuitable placement: At CSM intersection 23.67% pedestrians assume that the crossing facilities are not suitable situation so they violate the road crossing rules.
- ❖ Impact of income: The road crossing systems are mostly violated whose income is comparatively low. 26.67% pedestrian's income between 12,000 taka to 22,000taka who violate the road crossing rules and 4.16% pedestrians whose income around 40,000 taka to 60,000 taka per month.

7. Recommendations

From the study data analysis the author suggested some recommendation as:-

- ❖ Road side barriers have to construct and Median barrier should be improved to separate pedestrian movements from vehicular traffic.
- ❖ People's awareness about the road crossing has to be increased.
- ❖ To improve the surrounding environment of the crosswalk and construct underpass or foot over bridge.
- ❖ Public awareness should be prompted by the government and different road authorities.
- ❖ Different message sign can be installed to warn the pedestrians.

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