Discerning Pedestrian Accidents in Dhaka-Barisal National Highway in Bangladesh

Fayaz Uddin, Dr. Farzana Rahman, Md. Mostafizur Rahman, Md. Ariful Islam

Bangladesh University of Science and Technology

Dept. of Civil Engineering, University of Asia Pacific, Bangladesh

Abstract

Although National Highways of Bangladesh comprise a minor portion of main street system, maximum number of accident take place there. Pedestrian accidents and corresponding causalities are the most concerning issue in the transportation sector of developing countries like Bangladesh. The objective of this research is to characterize pedestrian accidents on N8 route (Dhaka-Mawa-Barisal- Patuakhali National Highway) of Bangladesh. This research analyses various accident data of N8 Route from year 2004 to 2013 using Microcomputer Accident Analysis Package (MAAP5) software. Result demonstrates that pedestrian causality is accounted for 52% of total accident in N8 with fatality index 0.90. No mechanical problem was found for 90% of the vehicles during accident except for 3% of the vehicles had brake problem. Result shows that faulty road is the main reason of accident. 88% of the respondents perceive that pedestrians are careless when they are in the road which leads to accidents.

Keywords:
Accident, Causality, MAAP5, Pedestrian

I. Introduction

Pedestrian accidents and corresponding causality are the most concerning issue in the transportation sector in developing countries. According to WHO’s Global status report on road safety 2015, about 1.25 million people die each year worldwide and the report also indicated that 49% of all road traffic deaths occur among pedestrians, cyclists and motorcyclists (Who, 2015). Statistics demonstrated that Bangladesh is one of the most dangerous countries in terms of number of accident in South Asia. According to police reported road traffic accident database, every year about 2800 or more accidents occur in Bangladesh. But the actual estimated road fatalities are as high as 10,000-12,000 each year (Rabbi, 2013). Actual number of accident is always higher than police reported database due to the under reporting of accidents. Statistics clearly demonstrate that pedestrians are the most vulnerable road users in Bangladesh. A study by Uddin et al. (2015) demonstrates accidents in different routes depending on road class. Fig. 1 shows that 46% of total accident occurred in national highway which was the maximum. 18% of the total accident took place in city road, and 14% was in regional road. A study on road crashes from years 1993 to 2000 conducted by Bangladesh Police HQ showed that pedestrians are involved in about 70% of road accidents (Haque, 2004). Dhaka – Mawa – Barisal - Patuakhali national highway (N8) is one of the major routes where huge number of road accident took place. Therefore pedestrian safety is a major concern for this route (Rahman et al., 2015). This study focuses on characteristics of pedestrian accidents in N8 route.

Pedestrians tend to account for a much greater proportion of road traffic injury deaths in low and middle-income countries than in high-income countries. In Bangladesh, with a low level of motorization, the role of walk mode is quite significant. Pedestrians have received far less attention than vehicular traffic. Up to 61 percent of urban road accident deaths are pedestrians alone.

Fig. 1: Percentage of Crashes (2007-2012) by Road Class

According to National Road Safety Council, hit pedestrian is the dominant (51.4%) accident type (National Road Safety Council Annual Report, 2001). A statistics from BRTA (Bangladesh Road Transport Authority) demonstrated that from 1999 to 2008 total 35,105 accidents took place where 13,516 pedestrians were killed in total representing 53% of all the people died in road crashes (RTA, 2008). Due to pedestrian involvement in road crashes, a considerable part of economic and life loss took place (Pasha et al., 2014).

II. Methodology

This study involves the accident data collection, data analysis by using MAAP5 software, and site investigation followed by a questionnaire survey.

Data Collection: In Bangladesh there are many sources for collecting road accident data e.g. police records, hospitals, newspaper reporting etc. However the basic source of accident data is the Accident Report Forms (ARF), which is primarily filled up by police personnel. These ARF are edited by Accident Research Institute (ARI), BUET. Accident data was analyzed for the period of 10 years from 2004-2013.

Data analysis using maap5 software: The characteristics and striking features of n8 highway was analyzed for the period of 10 years (2004-2013) in context of pedestrian crashes. Findings of this analysis are organized by accident severity, accident period, and collision type.

Site investigation: A questionnaire survey was conducted on three most accident (pedestrian) prone locations on n8 route. The survey was done to police, local residences, local businessmen, pedestrians and eye witnesses of accidents. The main focus of the survey was to identify the reasons of pedestrian accidents and recommendations to reduce the level of accidents. The questionnaire consisted two main sections. Section one was about causes of accident and section two was probable remedy or suggestion.
Geometric data of the road was also collected. The edge of paved shoulder is somewhere damaged due to rutting of soft shoulder which resulted in a drop-off of about 3 to 18 inches. Road conditions were investigated on N8 highway route and following observations were obtained:

- Narrow road
- Narrow and risky bridge
- No shoulder and no road marking
- Broken road surface
- Road blockage by para/non-motorized vehicle
- Shoulder damage due to rutting of soft soil
- Unsafe pedestrians action
- No use of helmet during motorcycle driving
- Over-speeding and Over-taking tendency
- No dedicated space for bus stop/stand

The problematic in situ condition of N8 is shown in fig. 1 to 6:

Fig. 2: Narrow Bridge
Fig. 3: Risky Bridge
Fig. 4: Shoulder Damage and no Road Marking
Fig. 5: Shoulder Damage Due to Rutting of Soft Soil
Fig. 6: Soil Displacement from Edge
Fig. 7: Road Blockage by Para Motorized Vehicle

III. Results

A. Data analysis using MAAP5 software

This section discusses the characteristics and striking features of overall road traffic accidents on national highways in Bangladesh. Accident data analysis was conducted for the period of 10 years from 2004-2013. The analysis involves the determination of accident and severity in N8 route of Bangladesh (Dhaka – Mawa – Barisal – Patuakhali National Highway).
1. Pedestrians Accident

Fig. 8 shows a comparison between total number of accidents and pedestrian accidents in N8 routes of Bangladesh. Fig. 7 demonstrates clearly that in N8 route the difference between the total number of accident and the total pedestrian accident are comparatively less, which means that in these routes, pedestrian accident frequencies are higher. Database also indicates that about 52% of total accident is accounted for the pedestrian accident in Dhaka – Barisal highway.

![Fig. 8: Comparison of Hit Pedestrian and Total Accident Number](image)

2. Accident Severity

Fig. 9 shows the types of pedestrian accident according to severity (such as fatal, grievous and simple injury) in N8 routes. It was observed that 84% of the accidents are fatal while 15% are grievous.

![Fig. 9: Distribution of Accident Based on Severity](image)

3. Pedestrian's Gender

Fig. 10 shows the distribution of accident based on pedestrian gender. Result shows that 86% casualties occurred for male pedestrians.

![Fig. 10: Distribution of Accidents Based on Pedestrian's Gender](image)

4. Pedestrian's Age

Fig. 11 shows the distribution of accidents based on pedestrians’ age. It is found that accident frequency is most for child group age ranging from 6-10 years. Accident number is also high for 11-15, 21-25, 26-30 and 36-40, 0-5 years’ old groups. Ahsan et al. (2012) showed that every year 21% of total people killed in road accidents are children.

![Fig. 11: Distribution of Accident Based on Pedestrian's Age](image)

5. Pedestrian's Position

Fig. 12 shows the distribution of accident based on pedestrian’s position. When pedestrians walk/stay in road side then maximum (51%) pedestrian accident occurs. 24 % accident took place while pedestrians were crossing the road.

![Fig. 12: Distribution of accident based on Pedestrian Location.](image)

6. Pedestrian's Action

Fig. 13 shows the distribution of accident depending on pedestrian action. Fatal accidents as well as total pedestrian accident frequencies are much while the pedestrian walk on the edge or crossing road.

![Fig. 13: Distribution of Accident Based on Pedestrian Action](image)
7. Vehicle Defect

Fig. 14 shows the distribution of accidents based on types of vehicle defects. The figure clearly demonstrates that 90% of vehicles have no defects while 3% have defects in brakes.

8. Vehicle Maneuver

Fig. 15 shows the distribution of accidents according to vehicle maneuver. The figure clearly demonstrates that majority of the vehicles have tendency to hit pedestrian from ahead.

9. Light Condition

Fig. 16 makes clear that, most of the pedestrian accident and corresponding casualties occur in day light period. The frequency of accident in dusk is 14% of total pedestrian accident in route N8. At night in darken condition 9% of total pedestrian accident occurred. Point should be noted that at night pedestrian movement in route N8 is comparatively low.

10. Weather Effect

Fig. 17 shows the relationship of weather with pedestrian accident number. Analysis shows that maximum number (97%) of accidents occurred in fair weather.

B. Questionnaire survey data analysis

Survey was conducted among 120 respondents who reside in the area and have their daily affiliations with the accident prone location. The main focus of survey is to evaluate the reasons of accidents and to suggest some recommendations to reduce the level of accidents.

1. Reason of Accident

Fig. 17 shows the respondents opinion about the reasons of accidents. Result shows that 42% of the accident took place due to roads fault (here road fault means road geometric fault), 32% happened due to drivers fault and 12%, 8% and 3% accidents took place due to pedestrian fault, absence of traffic control device, and vehicular defects subsequently.

2. Pedestrian’s Fault for Accident

Fig. 18 shows that 88% of the respondents perceives that pedestrians are careless when they are in the roads which leads to accidents and 12% of them blame inadequate understanding of traffic law as the main cause for accidents.
3. Consciousness About Law
Result demonstrated that 73% of the respondents think that pedestrians are not conscious about traffic rules while crossing the road.

IV. Discussion
Result shows that in N8 route pedestrian causality accounted for 52% of total accident and a total 343 pedestrian accidents occurred during the ten years period from 2004-2013. In this ten year the causality number is 369 with respect of 343 accidents. About 84% of the accidents are fatal which have caused severe casualty and loss to life as well as the economy of the country. It was demonstrated that accidents are concentrated on some portions of Dhaka –Barisal Highway. This portion requires proper treatment and remedial measures to decrease the higher accident rates. Details accident analysis on this route on various parameters has given the following accident scenario:

About 84% of the total pedestrian accidents are fatal. Hit pedestrian from ahead is the most dominant types of accident. Accident and casualty statistics of 10 years (2004-2013) shows that, this type of accident account for 90% of total accidents in route N8. Analysis shows that maximum (97%) accident occurs in fair weather in route N8. Most (90%) of the vehicles have found no mechanical problem during accident while only few have problem with brake during accident. Most of the pedestrian accident and corresponding casualties occur in day light period. Pedestrian casualty was maximum when pedestrians walk/stay in road side. Result shows that, road fault and over speeding are the most important causal factors behind accident. Majority of the respondents think that pedestrians are careless when they are in the roads which lead to accidents.

V. Conclusions
Pedestrians form the largest single road user and considered as most vulnerable road user group. N8 route is facing severe shortage of pedestrian facilities and available facilities are not properly maintained. In depth site investigation is required to design appropriate remedial measures. Some general observations/recommendations are provided:

- Narrow road and bridge is the main reason of pedestrian accident in location in N8.
- Some markets are located beside highways. These markets are responsible for unsafe pedestrian activities. So markets should be replaced to other place.
- Space should be provided for bus stop/ stand.
- Para-motorized vehicles block the highway space. So a proper management of these vehicles should be ensured.
- Over-speed and careless attitude of the drivers are the two most contributory factors of accidents on the highway found in the study. So adequate enforcement should be provided to ensure that the drivers follow the traffic rules strictly.
- Some facilities for pedestrians such as overpass, underpass, zebra crossing, pedestrian signal etc should be provided where required.
- Road side based commercial development should be controlled as it attract pedestrian.
- Field survey of accident prone locations like Boalia and Bottola of N8 route location gives the impression that the locations possess narrow road, lack of shoulder, rutting of soft soil and steep slope of the sides of road. It increases the chance in occurring pedestrian accident. So adequate footpath or shoulder must be provided.

• In Maligram ((Accident prone location) the average daily traffic (ADT) value is relatively higher. After completion of Padma bridge construction this location will be most dangerous place for pedestrian crossing and hence foot over bridge or underpass must be provided to ensure pedestrian safety.

Recently Padma Bridge Project has been started at Mawa-Jajira point beneath the route N8. It is high time for analysis accident, establish engineering countermeasure and improve road safety for decreasing accidents for efficient operation of Dhaka-Mawa-Barisal-Patuakhali Highway.

VI. Acknowledgments
The authors would like to express their profound gratitude and special acknowledgement to Dr. Tanweer Hasan, Professor, BUET and former Director of Accident Research Institute (ARI), BUET, for providing the crash data.

References