

CURRENT ROAD ACCIDENT SITUATION IN KHULNA METROPOLITAN CITY

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ABSTRACT

Road accident is a major concern in transportation system. It leads to death, injury and property damages. The traffic accident situation in Khulna Metropolitan City, the third largest city in Bangladesh, is really alarming. Loss of lives and property damages are expected to continue, if suitable measures are not taken. Therefore, it is necessary to carry out studies on current road accident situation in Khulna Metropolitan City. This study involves various aspects of road accidents in Khulna Metropolitan City. Road accident data for the five police stations of this city during the period of 2000 to 2013 were collected. A total of 481 accidents occurred during this period. 64% of the accidents were fatal. Pedestrians were the worst victims as 41% of the accidents were associated with pedestrians. The vehicles liable for accidents were buses (25%) and heavy trucks (19%). 32% of these vehicles collided with pedestrians. Finally, some safety measures and long term recommendations were made to improve the situation of Khulna Metropolitan City.

Keywords: Road accident, fatal, pedestrian, Khulna metropolitan city

1. INTRODUCTION

Road accident is a catastrophic problem in transportation system. “Study Global Burden of Disease”, a program simultaneously run by World Health Organization (WHO), Harvard University and World Bank, shows that road traffic accident was the 9th biggest cause of death in the year 1990. What's more alarming is that, by 2020, the 9th position of road accident will be raised to the 3rd place (Murray & Lopez, 1994).

Road accident results not only in casualties or sufferings but also in substantial economic losses. Developing countries are more affected from accidents than developed countries. The estimated global economic cost of road accidents is \$518 billion per year. The share of the developing countries is \$100 billion which accounts for 1 to 3% of their gross national product (Peden, Scurfield, Sleet, Mohan, Hyder, Jarawan, & Mathers, 2004).

Bangladesh is a developing country of South Asia. It consists of an area of 147,570 square kilometers, containing a high population density of 1,033.5 per square kilometer. Khulna is the 3rd largest city in Bangladesh with an area of 45.65 square kilometers. 1,500,689 people live here. The population density is 67,994 per square kilometer in the city. There are 1215 roads, totalling a length of 356.64 kilometers (Khulna City Corporation, 2015). Traffic flow on the roads is heterogeneous. The average speed of motorized vehicles varies from 24 km/h to 58 km/h in the Central Business District (Uddin & Sen, 2004).

The traffic accident situation in Khulna City as well as Bangladesh is really alarming. Loss of lives and property damages are expected to continue if suitable measures are not taken. Therefore, it is necessary to carry out studies on current road accident situation in Khulna Metropolitan City. The major objective of this study is to provide information on the characteristics of road accidents in Khulna Metropolitan City through the analysis of accidents, casualties and involvement of vehicles.

2. DATA COLLECTION

The study area is under the five police stations of Khulna Metropolitan City, which are: Khulna Sadar, Daulatpur, Khalishpur, Khanjahan Ali and Sonadanga. The data regarding road accidents for these five police stations for the years 2000 to 2013 were collected from the Head Quarter of Khulna Metropolitan Police (KMP) and Accident Research Institute (ARI) of Bangladesh University of Engineering and Technology (BUET). The data included the distribution of accidents and casualties by severity, police station, junction type, collision type; information on the involvement of vehicles in accidents etc. The First Information Report (FIR) from the police

stations is the primary source of information. The FIRs are sent to the Crime Department of the Head Quarter of KMP. Then the other organizations collect information from the Crime Department. Older reports are hard to find in the Crime Department. In that case, ARI, BUET is the most reliable source.

3. DATA ANALYSIS AND DISCUSSION

The data were analysed to understand the nature of road accidents occurring within the years 2000-2013 in Khulna Metropolitan City. It was divided into three categories: analysis of accidents, analysis of casualties and analysis of involvement of vehicles.

3.1 Analysis of Accidents

3.1.1 Yearly Distribution of Accidents

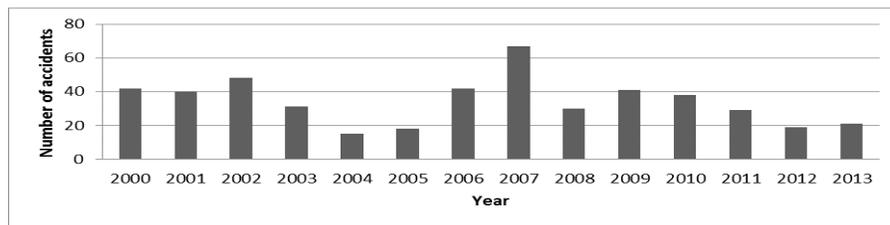


Figure 1: Yearly distribution of accidents

The yearly distribution of accidents is shown in Figure 1. A total of 481 accidents occurred within the years 2000-2013. The maximum number of accidents (67) occurred in the year 2007 and the least number of accidents (15) occurred in the year 2004.

3.1.2 Distribution of Accidents by Severity

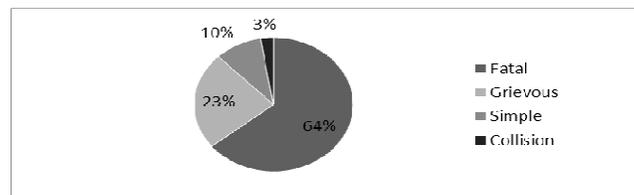


Figure 2: Distribution of accidents by severity

The distribution of accidents by severity is shown in Figure 2. The majority of the accidents were fatal as fatal accidents were 64% of the total accidents. Accidents causing grievous injuries were 23% of the total accidents. Accidents causing simple accidents were of 10% and collisions without casualties were not significant (3%).

3.1.3 Accident Severity by Year

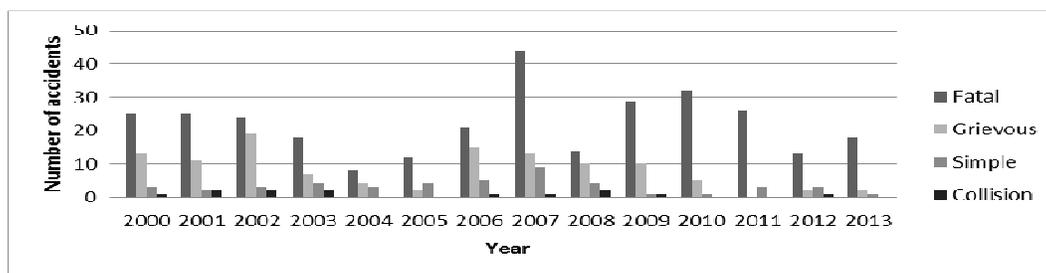


Figure 3: Accident severity by year

Accident severity by year is shown in Figure 3. The maximum number of fatal accidents occurred in the year 2007. The maximum number of simple accidents also occurred in the year 2007. The maximum number of grievous accidents occurred in the year 2002. In the years 2004, 2005, 2010, 2011 and 2013, accidents without casualties did not occur.

3.1.4 Distribution of Accidents by Police Station

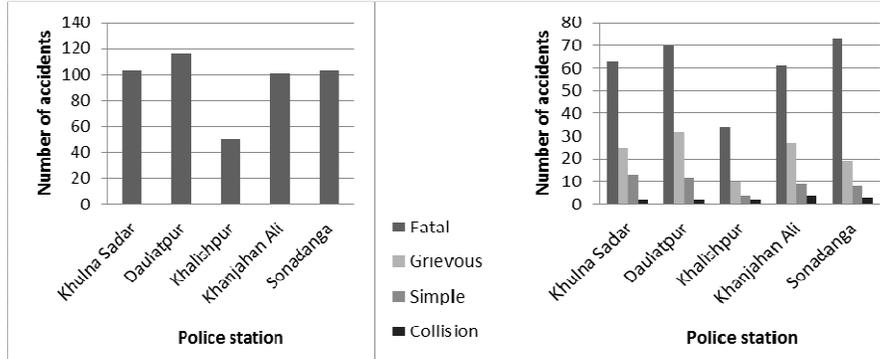


Figure 4: Distribution of accidents by police station

The distribution of accidents by police station is shown in Figure 4. It was found that Daulatpur was the most dangerous area with 116 accidents and Khalishpur was the safest area with 50 accidents, over the years 2000-2013. The maximum number of fatal accidents occurred in Sonadanga, whereas the maximum number of grievous accidents occurred in Daulatpur.

3.1.5 Distribution of Accidents by Junction Type

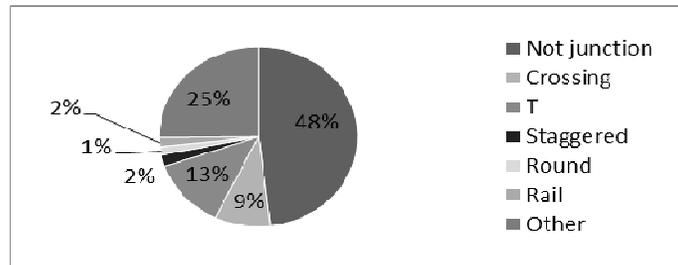


Figure 5: Distribution of accidents by junction type

The distribution of accidents by junction type is shown in Figure 5. It can be observed that nearly half (48%) of the accidents occurred in places where there were no junctions. 13% of the accidents occurred in T-junctions. 9% of the accidents occurred in crossings. Other types of junctions were insignificant.

3.1.6 Distribution of Accidents by Collision Type

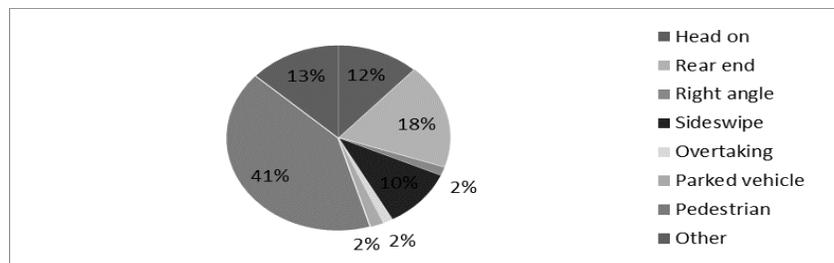


Figure 6: Distribution of accidents by collision type

Figure 6 shows the distribution of accidents for each type of collision. It is seen that pedestrians were the most vulnerable in road accidents as pedestrian accident was found to be the largest amount having 41%. These accidents are usually caused by the negligence or inattentiveness of drivers, but other factors such as driver confusion or aggressive driving significantly increase the chance of pedestrian accidents as well. Moreover, in many roads of Khulna, there are no pedestrian crossings, foot over bridges, sidewalks, or guard rails to separate the pedestrians from the vehicles. The other types of collisions, such as right angle and overtaking collisions are not significant in Khulna (about 2%).

3.1.7 Yearly Distribution of Accidents for Each Police Station

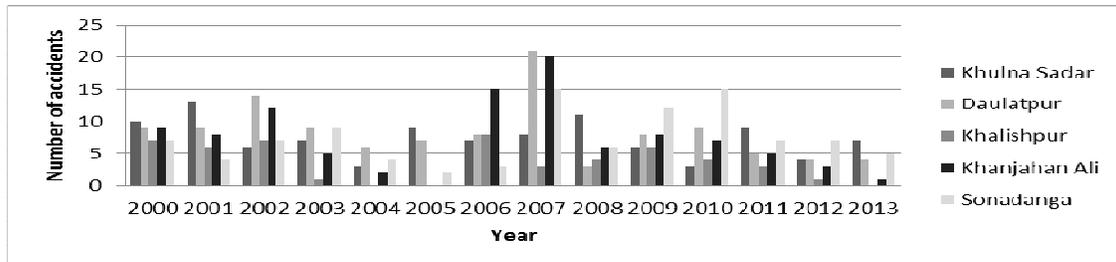


Figure 7: Yearly distribution of accidents for each police station

The yearly distribution of accidents for each police station is shown in Figure 7. In the year 2007, the maximum number of accidents occurred in 3 out of the 5 police stations i.e, Daulatpur, Khanjahan Ali and Sonadanga. In Khulna Sadar, the maximum number of accidents occurred in the year 2001, while in Khalishpur, the maximum number of accidents occurred in the year 2006.

3.1.8 Distribution of Accidents by Junction Type for Each Police Station

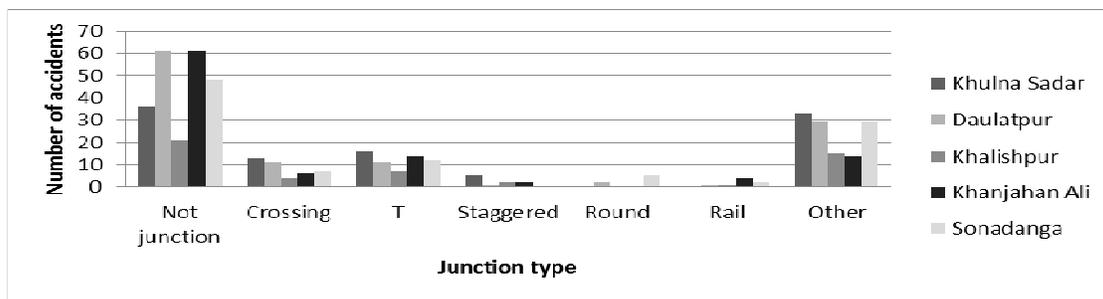


Figure 8: Distribution of accidents by junction type for each police station

Figure 8 shows the distribution of accidents by junction type for each police station. In all of the police stations, the maximum number of accidents occurred in places where there were no junctions.

3.1.9 Distribution of Accidents by Collision Type for Each Police Station

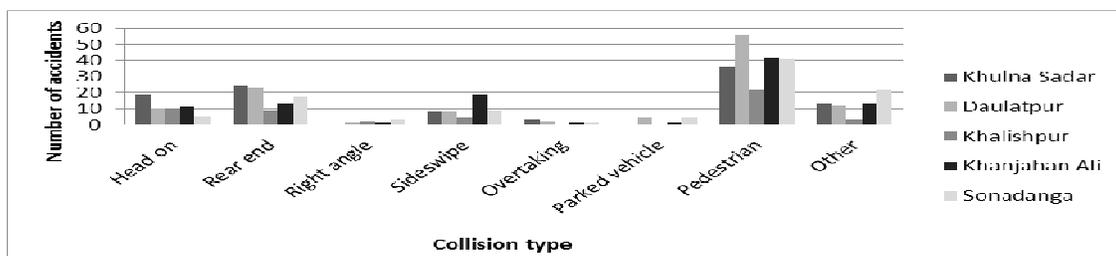


Figure 9: Distribution of accidents by collision type for each police station

Figure 9 shows the distribution of accidents by collision type for each police station. In all of the police stations, the maximum numbers of accidents were associated with pedestrians. The second most significant type of collision for Khulna Sadar, Daulatpur and Sonadanga was rear end collision. For Khalishpur, it was head on collision; while it was sideswipe for Khanjahan Ali.

3.2 Analysis of Casualties

3.2.1 Yearly Distribution of Casualties

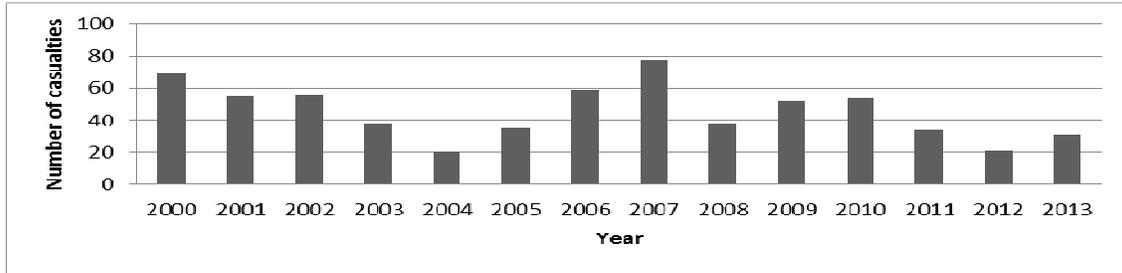


Figure 10: Yearly distribution of casualties

The yearly distribution of casualties is shown in Figure 10. A total of 640 casualties occurred within the years 2000-2013. The maximum number of casualties (78) occurred in the year 2007 and the least number of casualties (20) occurred in the year 2004.

3.2.2 Distribution of Casualties by Severity

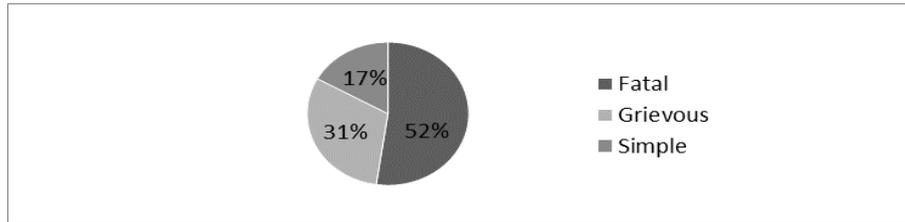


Figure 11: Distribution of casualties by severity

The distribution of casualties by severity is shown in Figure 11. More than half of the casualties were fatalities as fatalities were 52% of the total casualties. 31% of the casualties were grievously injured and 17% of the casualties were simply injured.

3.2.3 Distribution of Casualties by Police Station

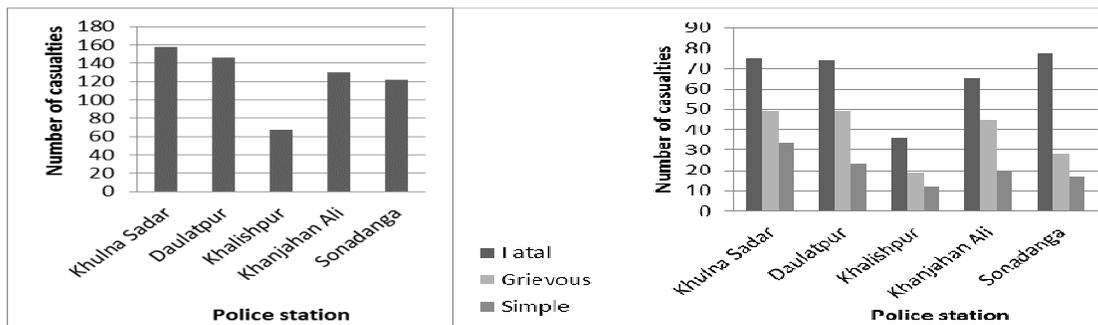


Figure 12: Distribution of casualties by police station

The distribution of casualties by police station is shown in Figure 12. It was found that the maximum number of casualties occurred in Khulna Sadar (158). The maximum number of fatalities occurred in Sonadanga (77). The maximum number of grievous injuries occurred in Khulna Sadar and Daulatpur (49). The maximum number of simple injuries occurred in Khulna Sadar (34).

3.2.4 Distribution of Casualties by Junction Type

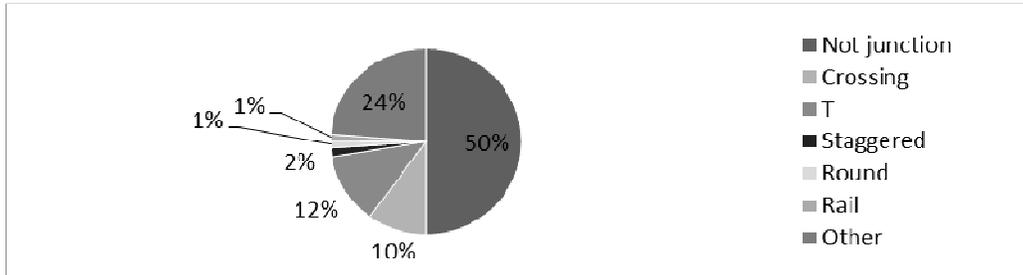


Figure 13: Distribution of casualties by junction type

The distribution of casualties by junction type is shown in Figure 13. It can be observed that half of the casualties occurred in places where there were no junctions. 12% of the casualties occurred in T-junctions. 10% of the casualties occurred in crossings. Other types of junctions were insignificant.

3.2.5 Distribution of Casualties by Collision Type

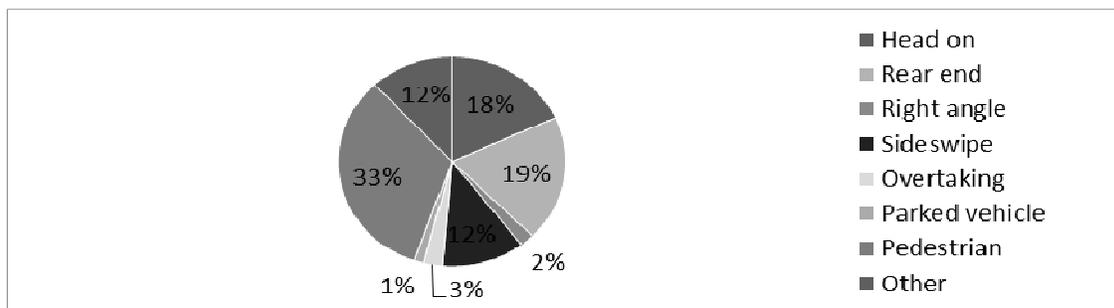


Figure 14: Distribution of casualties by collision type

Figure 14 shows the distribution of casualties for each type of collision. It is seen that pedestrians were the most vulnerable in road accidents as pedestrians were 33% of total casualties. 19% of the casualties were associated with rear end collisions and 18% of the casualties were associated with right angle collisions. 12% of the casualties were victims of sideswipe.

3.2.6 Yearly Distribution of Casualties for Each Police Station

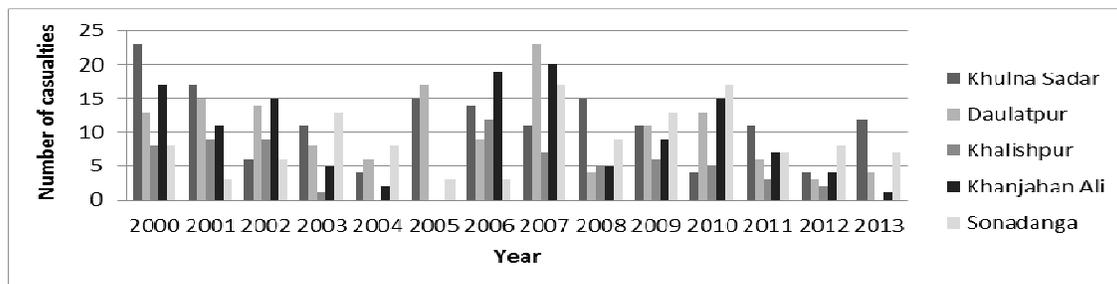


Figure 15: Yearly distribution of casualties for each police station

The yearly distribution of casualties for each police station is shown in Figure 15. In the year 2007, the maximum number of accidents occurred in 3 out of the 5 police stations i.e, Daulatpur, Khanjahan Ali and Sonadanga. In Khulna Sadar, the maximum number of casualties occurred in the year 2000, while in Khalishpur, the maximum number of casualties occurred in the year 2006.

3.2.7 Distribution of Casualties by Junction Type for Each Police Station

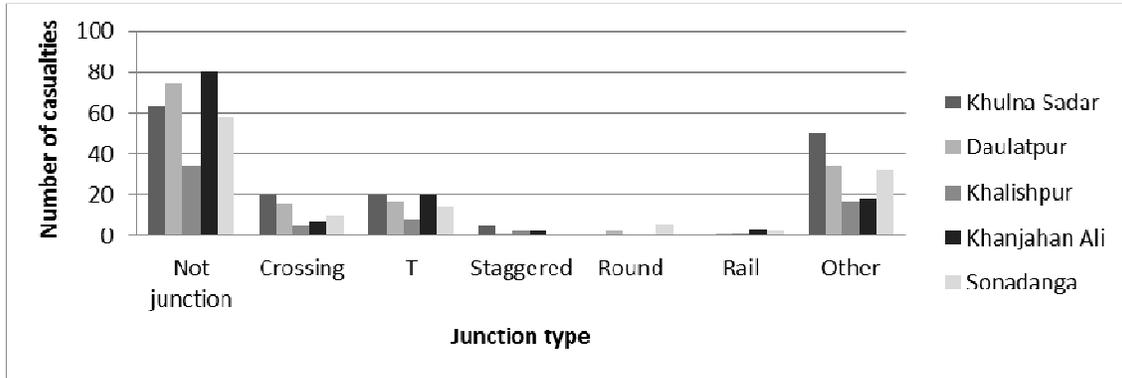


Figure 16: Distribution of casualties by junction type for each police station

Figure 16 shows the distribution of casualties by junction type for each police station of Khulna Metropolitan City over the years 2000-2013. In all of the police stations, the maximum number of casualties occurred in places where there were no junctions.

3.2.8 Distribution of Casualties by Collision Type for Each Police Station

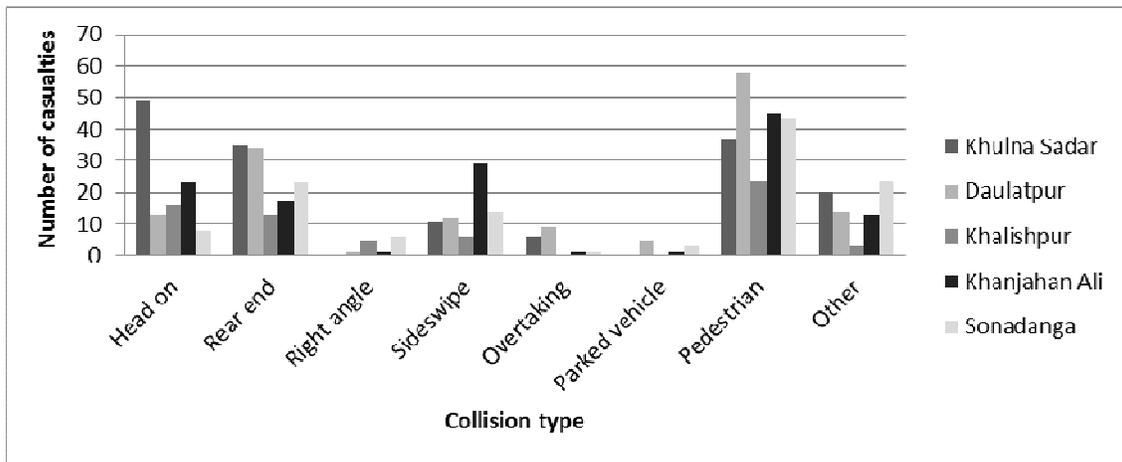


Figure 17: Distribution of casualties by collision type for each police station

Figure 17 shows the distribution of casualties by collision type for each police station. In all of the police stations except Khulna Sadar, the maximum numbers of casualties were due to collision with pedestrians. In Khulna Sadar, the maximum number of casualties was due to head on collision.

3.3 Analysis of Involvement of Vehicles

3.3.1 Yearly Involvement of Vehicles in Accidents

The yearly involvement of vehicles in traffic accidents is shown in Figure 18. A total of 638 vehicles were involved in accidents occurring between the years 2000-2013. The maximum number of vehicles (86) were involved in the year 2007. The least number of vehicles (20) were involved in the years 2005 and 2012.

Referring to Figure 4.1, it can be seen that the number of accidents is less than the number of involved vehicles for each year. So, it can be said that some of the accidents involved multiple number of vehicles.

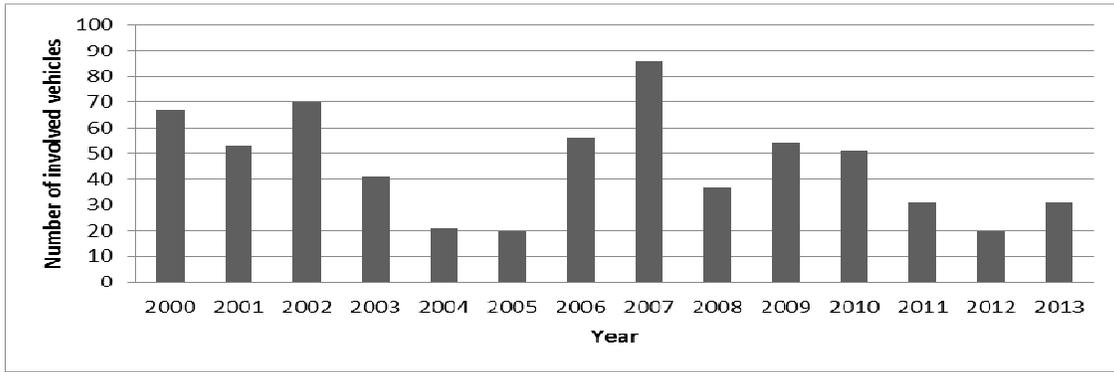


Figure 18: Yearly involvement of vehicles in accidents

3.3.2 Distribution of Different Types of Vehicles Involved in Accidents

Figure 19 shows the distribution of different types of vehicles involved in accidents. It is seen that 25% of the involved vehicles were buses. 19% of the involved vehicles were heavy trucks. 10% of the vehicles were motor cycles. The rest of the involved vehicles were of mixed types.

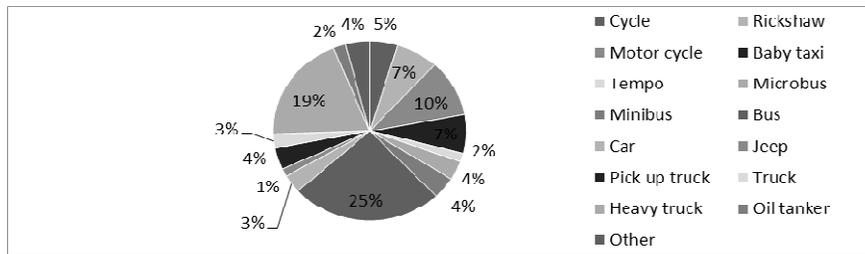


Figure 19: Distribution of different types of vehicles involved in accidents

3.3.3 Distribution of Involved Vehicles for Each Police Station

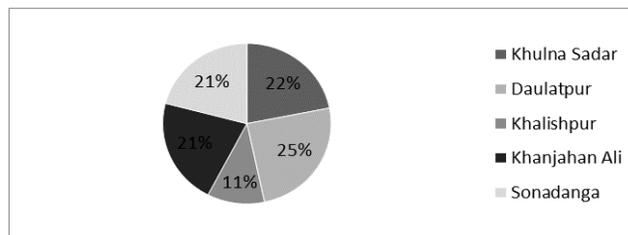


Figure 20: Distribution of involved vehicles for each police station

The distribution of involved vehicles for each police station is shown in Figure 20. It was found that the maximum number of vehicles (25%) was involved in accidents in Daulatpur while the minimum number of vehicles (11%) was involved in accidents in Khalishpur.

3.3.4 Involvement of Vehicles by Junction Type

The involvement of vehicles in accidents for each type of junction is shown in Figure 21. It can be observed that nearly half (48%) of the vehicles were involved in accidents in places where there were no junctions. 12% of the vehicles were associated with T-junctions, whereas 11% of the vehicles were associated with crossings.

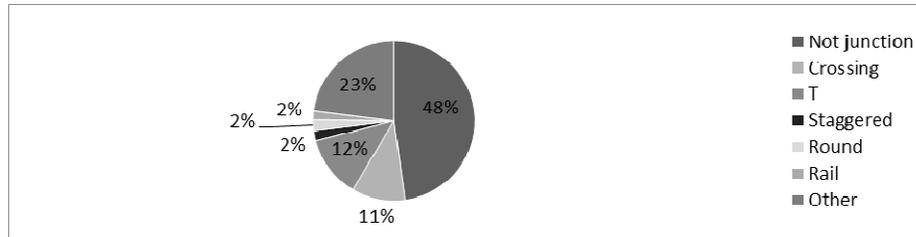


Figure 21: Involvement of vehicles by junction type

3.3.5 Involvement of Vehicles by Collision Type

The involvement of vehicles in accidents for each type of collision is shown in Figure 22. It is seen that the maximum number of vehicles were involved in accidents due to collision with pedestrians (32%). 24% of the vehicles were associated with rear end collisions. 16% of the vehicles were associated with head on collisions, whereas 12% of the vehicles were associated with sideswipes.

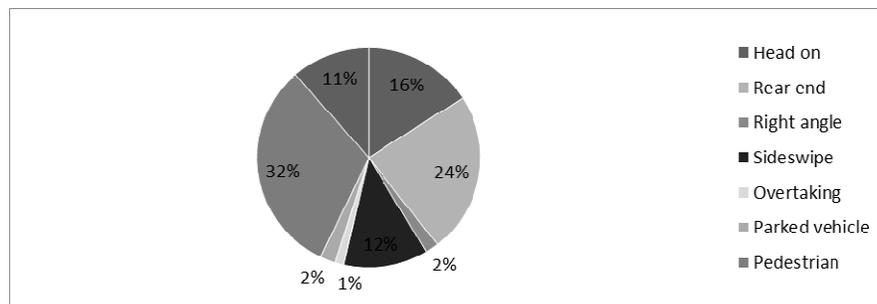


Figure 22: Involvement of vehicles by collision type

4. CONCLUSIONS

Based on the findings of this study, it can be concluded that a total of 481 accidents occurred during the years 2000-2013 in Khulna Metropolitan City. About 64% of the accidents were fatal. Pedestrians were the most vulnerable in road accidents as pedestrian accident was found to be the largest amount having 41%. The vehicles liable for accidents were buses (25%) and heavy trucks (19%). 32% of these vehicles collided with pedestrians. It should be noted that only the most serious accidents were reported to the police. Many of the accidents remained unreported. Therefore, the provided data are not quite exact.

The analysis revealed that pedestrians are the worst victim of accidents. It is mainly due to the conflicts between pedestrians and vehicles, excessive speed, careless driving and poor road visibility. To improve pedestrian safety, the authorities should take steps to reduce conflicts, enforce the limiting speed and improve the road visibility. Hazardous intersections and mid-blocks increase accidents, which can be minimized by providing round humps to slow down the fast moving vehicles, installing a good signal system, preventing U-turns, eliminating the irregular stopping of autorickshaws at intersections and installing road dividers to prevent lane changing activities, introducing raised hump with vertical post or sidewalk etc.

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