ACCIDENT TREND ON NATIONAL HIGHWAY IN BANGLADESH

A Project and Thesis submitted in partial fulfillment of the requirements
for the Award of Degree of
Bachelor of Science in Civil Engineering

Submitted By

Md. Mushfiq Tasnim

(ID: 191-47-901)

Saikot Pull

(ID:191-47-956)

Md Sohanur Rahaman

(ID:191-47-980)

Dolon kumar podder

(ID:191-47-975)

DEPARTMENT OF CIVIL ENGINEERING

DAFFODIL INTERNATIONAL UNIVERSITY

September 2022

The project entitled **"ACCIDENT TREND ON NATIONAL HIGHWAY IN BANGLADESH "**submitted by Md. Mushfiq Tasnim (ID: 191-47-901),Saikot Pull (ID: 191-47-956),Md Sohanur Rahaman (ID:191-47-980),Dolon kumar podder (ID:191-47-975), has been accepted as satisfactory in partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering on 10th September 2022.

BOARD OF EXAMINERS

Khondhaker Al Momin
Supervisor
Department of Civil Engineering,
Daffodil International University

Dr. Mohammad Hannan Mahmud Khan
Chairman
Department of Civil Engineering,
Daffodil International University

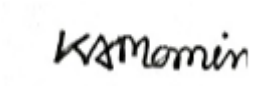
Kazi Obaidur Rahman
Member (Internal)
Department of Civil Engineering,
Daffodil International University

Md. Imran Hasan Bappy
Member (Internal)
Department of Civil Engineering,
Daffodil International University

Dr. Mohammad Mokhlesur Rahman
Member (External)
Deputy Secretary
Ministry of Textiles and Jute
Govt of Bangladesh

APPROVAL

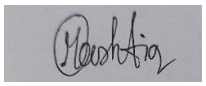
This is to certify that this project and thesis entitled **"ACCIDENT TREND ON NATIONAL HIGHWAY IN BANGLADESH"** is done by the following students under my direct supervision and this work has been carried out by them in the Department of Civil Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering. The presentation of the work was held on 10th September 2022.



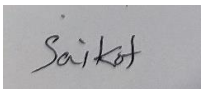
Khondhaker Al Momin
Supervisor and Senior Lecturer
Department of Civil Engineering
Faculty of Engineering

DECLARATION

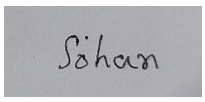
This is to certify that this project and thesis entitled **"ACCIDENT TREND ON NATIONAL HIGHWAY IN BANGLADESH"** is done by the following students under my direct supervision and this work has been carried out by them in the Department of Civil Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering. The presentation of the work was held on 10th September 2022



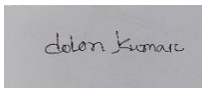
Md. Mushfiq Tasnim
ID: 191-47-901



Saikot Pull
ID: 191-47-956



Md. Sohanur Rahaman
ID: 191-47-980



Dolon Kumar Podder
ID: 191-47-975

ACKNOWLEDGMENT

At first, we want to thank almighty God. All praise goes to Almighty God who gives hardworking capability and patience, which guided us to success, which make us possible to complete this thesis successfully. We worked for this thesis under the supervision of our respected teacher Khondhaker Al Momin, Senior Lecturer Department of Civil Engineering, Daffodil International University. For his wonderful consistent guidance, constructive criticism and invaluable assistance and suggestions, inspiration, encouragement we have been able to finish our thesis successfully. Many people helped us in various ways. We are also thanking them from our heart.

Finally, we would like to thank our parents who given us tremendous inspiration and supports. Without their financial and mental supports, we would not be able to complete our study.

DEDICATION

Dedicated To Our Family Members

ABSTRACT

Now a days, the highest priority problem in the transportation sector in poor nations is pedestrian accidents and the resulting deaths. About 1.25 million people per year are killed on the world's roadways, and about half of all road traffic fatalities are sustained by walkers, cyclists, and motorcyclists, as stated in the WHO status report on road safety in 2015. According to the data, Bangladesh is among the most accident-prone nations in all of South Asia.

Throughout the time under consideration, "Since 2008, accidents have been declining, and 2012 seems to be the bottom. In 2008-2012, there were 52% fewer highway accidents. Accidents declined from 2013 to 2015, then rose in 2015. 16 percent of 787 occurrences occurred in 2006 and the fewest in 2014. (6%).

Most accidents happen in locations without intersections, which is interesting 3174 out of 5040 accidents occur in areas without intersections. Second is "other" (16.4%). 6% of all vulnerabilities are "Tee-Junctions." Cross-and-staggered-junctions and railroad crossings have the fewest accidents.

To reduce accidents in the future, the next decade, developing nations like Bangladesh will see a startling spike in traffic accidents and fatalities, according to a worldwide estimate. Because of this, ensuring passenger safety is a major obstacle due to a lack of trained personnel and enough funding in the transport safety sector. Improvements to the design of intersections, including channelization, traffic islands, dividers, and so on, ought to be carried out. It is essential to make appropriate improvements to access controls, the road surface, the highway shoulder, cross-sections, sight distances, alignments, traffic signs, traffic signals, road markings, traffic calming devices, and lighting

TABLE OF CONTENTS

List of Tables

List of Figures

CHAPTER 1

INTRODUCTION

1.1. Background:

The highest priority problem in the transportation sector in poor nations is pedestrian accidents and the resulting deaths. About 1.25 million people per year are killed on the world's roadways, and about half of all road traffic fatalities are sustained by walkers, cyclists, and motorcyclists, as stated in the World Health Organization's Global status report on road safety in 2015 . According to the data, Bangladesh is among the most accident-prone nations in all of South Asia.

Approximately 2,800 or more accidents take place annually in Bangladesh, as documented by the country's police-reported road traffic accident database. Due to under reporting, the true number of accidents is always greater than the amount in the police database. According to data, pedestrians in Bangladesh are the most at risk group on the road.. Approximately 46% of all accidents, happened on national highways. Nearly one-fifth (18%) of all accidents occurred on a local street, while nearly one-fourth (14%) occurred on a highway outside of a major metropolitan area.

According to data collected by Bangladesh Police HQ, pedestrians account for almost 70% of all traffic fatalities between the years 1993 and 2000.The national highway (N8) connecting Dhaka, Mawa, Barisal, and Patuakhali is one of the busiest roads in the country and the site of a disproportionately high number of fatal crashes. Consequently, the protection of pedestrians is a top priority along this path. Traits of N8 route pedestrian accidents are the topic of this research.

In poor and middle-income nations, pedestrians make up a substantially larger percentage of road traffic accident mortality than they do in high-income ones. Due to the country's low rate of motorization, walking is a major form of transportation in Bangladesh. Pedestrians. The National Road Safety Council reports that pedestrians being struck by cars accounts for 51.4% of all traffic accidents in 2001 (National Road Safety Council Annual Report, 2001). According to data compiled by the Bangladesh Road Transport Authority (BRTA), between 1999 and 2008, a total of 35,105 accidents occurred, resulting in 13,516 fatalities (53% of the total number of individuals killed in road collisions during that time period. Involvement of pedestrians in traffic accidents is a major contributor to both economic and human suffering.

1.2. Present State of the Problem:

Thousands of drivers and passengers are killed or critically injured every year in accidents on Bangladeshi highways. These occurrences also have a huge economic impact due to the costs of replacing or repairing damaged vehicles and infrastructure. Crashing is the scariest accident. Most deaths occurred at intersections. 16 percent of all 787 BUET incidents happened in 2006, according to the ARI. 504 accidents occur annually.

1.3. Objectives of the Study:

The initial objective of this research is to analyze accidents by making use of data pertaining to mishaps that occurred on trains. Researchers will be able to use this to better understand the state of transportation safety in Bangladesh.

1. In order to get an understanding of the most probable factors that lead to collision-type rail incidents, a comprehensive literature analysis was carried out.
2. Collecting and conducting research on the relevant accident data pertaining to Bangladesh's national highway.
3. To determine the many kinds of accidents and what causes them, as well as to look into transportation infrastructure.
4. to investigate the ways in which ancient and new forms of technology may be used to improve the current situation.
5. to provide the Bangladeshi authorities with guidance on various approaches for the prevention of collisions.

1.4. Organization of the Thesis:

This thesis consists of four chapters inclusive of this chapter.

Chapter-1, an effort has been made to provide a thinking about the history of the research and on the relevance of the study. a lot of effort has been put into this. After then, a short discussion was had on the objectives and parameters of the investigation..

Chapter 2, we will examine previous research that is relevant to the main topic of our investigation. Having a better understanding of the significance and prerequisite nature of transportation safety will be facilitated by this review. On the subject of national highway accidents in Bangladesh, a comprehensive literature assessment was conducted. The review covers topics such as accident features, classifications, factors, kinds, causes, prevention, prior studies, and certain definitions that are important.

Chapter 3, we give an overall study of the accidents that occurred on Bangladesh's national highways. It comprises the technique for collecting data on national highway accidents, the limitations of the data, an analysis of national highway accidents, the most important conclusions from the study, and some suggestions.

Chapter4, presents the general analysis of the national highway accident statistics as well as the significant conclusions from the study.

Chapter5, we provide our findings and suggestions for further research. In this chapter, we also go through several studies for more research that should be done.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction:

Every day, hundreds of people are killed or wounded due to traffic accidents throughout the globe. Men, women, and children who commute on foot, by bike, or by car, or who go out into the community to play or on a lengthy journey, never know whether they will arrive at their destination or return home safely. Thousands of individuals every year spend weeks in hospitals after major wrecks; many of them never return to their previous levels of independence in terms of living, working, or playing.

2.2. LITERATURE REVIEW:

According to a worldwide estimate, over the course of the next ten years, emerging nations like Bangladesh would suffer a concerning rise in the number of people killed and injured in traffic accidents. In the lack of the necessary transport safety personnel and resources, finding solutions to safety issues presents a difficult and time-consuming task [4].

The world's least developed nations are home to around 40 percent of all automobiles yet account for 86 percent of all road deaths [7]. In emerging nations, the demand for transportation is quickly expanding as a result of fast economic expansion, rising per capita disposable income, and increasing urbanization.

Because of this, the number of automobiles that can be found on the highways of emerging nations is likewise growing at a fast rate. It is estimated that the yearly growth rate in developing nations is between 16% and 17%, which will result in a doubling of the vehicle fleet over the next five years [7]. This feature, together with the large number of two- and three-wheeled motor vehicles in the area and the relatively young age of the bulk of the population, are important contributors to the catastrophic road accident fatalities that have occurred. These observations are particularly pertinent with regard to Bangladesh [7].

If the pace of expansion continues as it is, it is anticipated that the total number of automobiles in the nation would increase by a factor of two during the next 10 years. Another aspect of road transportation in Bangladesh is the complexity of the road environment with mixed traffic. Road designs in Bangladesh are not adequate for mixed traffic norms [8], thus this adds to the difficulty of the road environment.

In Bangladesh, excessive speeding, overloading, and unsafe passing by motor vehicles are the primary contributors to traffic fatalities and injuries. Accidents on the road are

caused by a number of factors, one of the most significant of which is the uncontrolled coexistence of non-motorized and motorized traffic on the same route. Frequent accidents that cost lives and cause sorrow and sadness to the families of the victims are also caused by a lack of awareness on the part of drivers as well as irresponsible driving practices [4]. In other words, the problem of road safety has become one of the most important challenges for the authorities in Bangladesh who are in charge of regulating transportation and enforcing traffic laws.

The traffic highway system is more complicated in metropolitan locations, where a mixed user environment predominates, and more perceptual demands are imposed on the individuals who are driving on those roadways. Urban intersections, particularly signalized ones, which are problematic locations and have been identified as among the most hazardous locations on the roads and which account for a substantial portion of traffic accidents, are a particular cause for concern. This is because urban intersections have been found to be among the most hazardous locations on the roads. The diversification of the traffic, the plying of modes with variable speeds, and the varied amounts of time needed for maneuvering all contribute to the complexity of the crossroads in the cities of Bangladesh [9].

2.2.1:Traffic Accident Trends in the Context of Bangladesh:

In Bangladesh, a nation with a total land area of 1, 47, 570 square kilometers and a population of 152 million people, there are about 1.6 million motorized cars and maybe more than 3 million non-motorized vehicles. Road accidents in Bangladesh result in an annual death toll of around 4,000 people and an additional 5,000 people being injured [3].

Since the nation gained its independence in 1971, the length of its paved road network has increased substantially, going from 3,000 kilometers to nearly 55,000 kilometers [4]. The movement of goods and people by means of roads is an enormously significant contributor to Bangladesh's economy. Spending on transportation accounts for around 12% of the Gross Domestic Product (GDP) and 20% of the yearly budget for development [5]. Furthermore, the transportation industry accounts for 9.4% of the total employment in the country. Every year, it is estimated that the country suffers a loss of over $600 million due to traffic accidents, which is equivalent to roughly 2% of GDP [3].

Paved highways connect all divisional headquarters and seaports to the capital, and there is a high degree of road connection in rural regions. The capital is also accessible via paved roadways. In point of fact, Bangladesh has one of the greatest road densities throughout all of Asia [4]. However, the network is characterized by maintenance regimes that are inefficient and under-funded, which is the cause of the urgent need for

rehabilitation in many portions of the network at this time. The handling of traffic is subpar, which results in the network's entire capacity not being used to its maximum potential. Measures that can help manage traffic at a low cost and improve safety may help prevent expensive investments in new roadways. In recent years, ever more better roads have been built, which has increased both the speed of transit and the frequency with which people travel. At the same time, there has been an increase in the frequency of automobile accidents. The rise in both the volume of traffic and the average speed of vehicles on the roadways has made it more dangerous for pedestrians and rickshaw drivers. The economic and social costs of road accidents, injuries, and deaths are eating away at the advantages roads provide to the economy, which in turn is being eroded. The death rates associated with road transport are much higher in Bangladesh than those associated with inland water transport and railroads [5]. This is the conundrum that faces us when it comes to roadway transportation: on the one hand, it offers benefits, but on the other hand, it consumes precious land and results in high accident rates.

2.2.2: Accidents on National Highways in Bangladesh

The percentage of total accidents that occur on different kinds of roads is as follows: 38 percent occur on national highways, 12 percent occur on regional roads, 15 percent occur on feeder roads, and the remaining 35 percent occur on other types of roads, including city streets. The comparative distribution of accidents, deaths, and total road lengths for the various kinds of roads is shown in Figure 2. The percentage of accidents and deaths that occur on national roads is far greater than any other known place, coming in at 56 percent and 61 percent respectively. It should come as no surprise that reducing the number of accidents that occur on Bangladesh's national roads should be the major focus of efforts to improve the country's overall road safety condition. Accidents are strongly concentrated on few stretches of the national roads, showing that they are susceptible to site-specific interventions, as was discovered by a more extensive investigation of accident distribution. This facet has been investigated in further depth in order to discover regions that have a disproportionately high number of deaths and accidents. The frequency of collisions, measured in terms of accidents per kilometer, was analyzed on the national highway network in order to locate the factors that contribute to a high accident concentration [10].

2.2.3: Accident classifications:

It is highly necessary to have a common categorization of traffic accidents in order to guarantee that various authorities and organizations that are engaged in reporting, research, investigation, enforcement, etc. will be able to acquire uniform data.

a) The Most Fundamental Division

According to the severity of the accident

(i) Fatalities
(ii) Injuries (Grievous and Simple Injury)
(iii) Damage to solely the property

The combination of the deadly accident and the injury accident is referred to as a "casualty" accident.

Accidents may be further broken down into categories such as urban and rural accidents, accidents at intersections, and accidents at connecting points.

There is a categorization system that is broken up into four parts in the UK:

(i) Fatal (ii) Serious Injury (iii) Slight Injury (iv) Not Injured

In certain parts of Australia, the reporting of any and all injuries, including those that do not need medical attention, is mandatory. This results in a three-part classification:

(I) Fatal (ii) Injury (iii) Non-injury
b) Classification of the Details
According on the kind of impact that occurred, an accident might be categorized as:
(I) Running off the road
(i) hit an item,
(ii) not hit anything

(ii) Driving on the road without colliding with anything, flipping over, or other 9

A collision on the road with

- a pedestrian
- another vehicle, or both (in transport or parked)
- The train on the railroad
- Bicycle
- Living creature
- Permanent fixture
- Unknown item

Again, a collision between cars may be categorized as an angle collision, a rear-end collision, a sideswipe collision, and so on. All of the categories that were just discussed are taken into account in this investigation.

2.2.4:Accident factors:

A road accident takes place due to a combination of several contributing factors including.

1. Human factors.

2. Vehicular factors.

3. Road and roadside factors.

4. Environmental factors.

5. Enforcement and educational factors.

2.2.5: Some major accident factors in developing countries:

Berger and Mohan (1996) summarized some major factors or characteristics, which contribute to high rates of motor vehicle injuries in low-income countries. These factors are-

1. a lot of children and young people living there.

2. People and cars are often close to each other.

3. Roads are used to sell things, to play, to walk, and to drive cars.

4. A variety of vehicles going at different speeds.

5. Cars don't have standard safety features (e.g. seat-belts, brakes etc.)

6. There are a lot of vehicles that don't have engines.

7. Cars that haven't been taken care of well.

8. People used vehicles longer than they were supposed to.

9. People ride in cars that are too full.

10. Dirty trucks are often used to transport workers and supplies.

11. Tires don't last long.

12. Wheel bearings, brake pads, and steering systems made of cheap materials.

2.2.6: Review of the previous studies on 'Road Accidents' in Bangladesh:

Studies have been done on the causes, types, and safety problems of road traffic accidents in Bangladesh. These studies have been presented in the form of a thesis, journal, report, paper at conferences or workshops, etc. This discussion is based on some very interesting studies that have already been done.

Elahi (1986): Examined the frequency and causes of accidents on the Dhaka-Mymensingh, Dhaka-Narayanganj, and Dhaka-Chittagong national roads in Bangladesh. The investigation was conducted with the geometry of the roadways in mind. The severity and prevailing trend of accidents were determined by analyzing the data gathered.

The research found that insufficient shoulder and pavement width are major contributors to traffic mishaps. One contributing reason is the short viewing distance. On the basis of the regularity with which incidents occurred, he pinpointed twenty spots along the roadways. According to his research, the rate of rise in accidents was 14% per year on average between 1979 and 1984.

There were three times as many daytime accidents as nighttime ones. In the dry season, accidents tend to be rare. The research then recommended preventative measures to lower the accident incidence in certain areas.

Banik (1987) Utilizing data collected from 1982–1985, this study investigated the location, pattern, and severity of accidents that occurred on the Dhaka–Aricha highway. Based on the number of accidents, 23 high-risk areas were identified within the research region.

His research revealed that bridge approaches accounted for 35% of accidents, road linkages for 34%, and road junctions for 25%. More over a third (36%) of all accidents include several vehicles colliding, whereas 29% involve a single vehicle leaving the road and/or impacting a fixed object, and 27% involve a single vehicle striking a pedestrian.

He looked at how accidents varied by hour, day, and month, as well as by the types of cars involved. As a solution, he proposed adjusting the shapes of roads and removing hazards from the lanes**.**

Samad (2003) Found high-accident areas on the Dhaka-Chittagong route and studied their accidents in detail. The Jatrabari–Kanchpur Bridge along the roadway was chosen. The research analyzed accident statistics and patterns to determine the most pressing accident categories that should be targeted by future efforts.

The study's findings were.

- **i.** From January 1998 through December 2001, this stretch of roadway had a total of 356 accidents. The majority, 66%, of accidents took place on links, while 34% happened at or near junctions.
- **ii.** fatal accidents account for 49%, injuries for 39%, and property loss for 12%.
- **iii.** There were 54.21 percent of accidents involving pedestrians. It was also shown that rear-end collisions were an accident.Daytime hours saw a greater number of accidents than other times of day
- **iv.** About 40% of accidents included buses, followed by 30% involving trucks, and 9% involving minibuses.
- **v.** The "Principal Component Analysis" (PCA) approach was utilized to assess the involved road environment in order to look for potential accident hotspots. There were five areas classified as high-accident for accidents.

Underpasses at the level of the approaching road, grade-separation for non-motorized traffic, the construction of a foot-path, grade-separated bus-stops, and channelization of traffic at intersections were all suggested as accidents to lower the accident risk at the black-spots identified by the study.

Chowdhury et al. (2012) research conducted at Faridpur Medical College Hospital between January and June 2011 on the effects of locally-made makeshift three-wheelers called "Nasimon" and "Karimon" on road traffic accidents. Out of a total of 468 patients hospitalized to the hospital over that time period, they determined that 56 (12%) were victims of RTA by 'Nasimon' and 'Karimon. The vast majority of patients (41, 73.21%) were male, the most serious injuries (24, 42.86%), occurred in those aged 21 to 30 years old, and the majority of victims (33, 58.93%) were from poor socioeconomic backgrounds. The majority of casualties (31, 55.36%) were people riding as passengers on the 'Nasimon' or 'Karimon,' while the majority of accidents (46, 82.14%) occurred in metropolitan areas or on highways. The victims' injury patterns were typical of those seen in people who had been in car accidents. As you can see, the "Nasimon" and "Karimon" three-wheelers are completely unsuited for highway use and are operated in direct violation of the Bangladesh MotorVehicles Act (1983). They determined that in order to lessen the number of accidents on our nation's roads, law enforcement officials must keep a close eye out for these unlicensed and potentially dangerous cars on highways and in metropolitan areas.

2.2: Overview: The analysis of the relevant literature yielded several in-depth studies about the research on accidents.

In this chapter, we also spoke about the studies that were done in the past in Bangladesh on the subject of road accident. It has been observed that a great deal of importance has always been given on the safety of the nation's highways. It has come to light that there is a potential for conducting additional comparative research on the accident characteristics of the aforementioned three modes of transportation in Bangladesh. This would allow for the effective evaluation technique to be utilized in determining the justification of countermeasures and the change in accident pattern brought about by the implementation of safety schemes.

CHAPTER 3

METHODOLOGY

3.1. Introduction

The gathering of road accident documents takes a significant amount of time.. Accident records from 2006 to 2015 have been found to be useful and have been gathered. Road traffic accidents with casualties are causing great concern regarding communications within Bangladesh. It has long been recognized that the most effective means towards accident reduction lies in a systematic and scientific approach based on the use of accurate and reliable traffic accident data. Much of the accident information available in police files is all too often incomplete and therefore has not been utilized to the fullest extent.

3.2. Limitation of Data:

There is no other official government repository for crash statistics. The police headquarters is the sole source of this information for both ARI and BRTC. At the police department's central headquarters, a single individual is in charge of collecting, managing, and otherwise dealing with ARFs submitted by local police stations. This complicates the problem further.

In accordance with the competent personnel at Police Headquarters, it is extremely challenging to collect ARFs from all police stations. Police stations frequently fail to send out ARFs for the relevant month, or else send them out late.

As a result, the MAAP5 database at Police Headquarters would never match the data from the police stations where accidents were reported..

3.3. Data Collection:

The study was conducted and evaluated by the Accident Research Institute (ARI) at the Bangladesh University of Engineering and Technology (BUET) using the MAAP5 software.

This research analyzed the number of traffic accidents that occurred in Bangladesh between 2006 and 2015.

3.3.1 Annual distribution of Road Accidents

Table 3.1: Annual distribution of Road Accidents

Year	Road Accidents Total	Percentage of accidents
2006	887	16
2007	858	15
2008	883	16
2009	577	10
2010	476	9
2011	412	7
2012	370	7
2013	409	7
2014	285	5
2015	412	7
Total	5569	100

3.3.2Annual distribution of Road Accidents by Severity

Table 3.2: Annual distribution of Road Accidents by Severity

YEAR	Fatal	Grievous	Simple Injury	TOTAL
2006	745	132	10	887
2007	741	101	16	858
2008	768	104	11	883
2009	514	59	4	577
2010	431	43	2	476
2011	373	33	6	412
2012	337	30	3	370
2013	379	29	1	409
2014	258	25	2	285
2015	368	32	12	412
TOTAL	4914	588	67	5569

3.3.3 Annual distribution of junction accident types (2006-2015):

Table 3.3: Annual distribution of accidents Annual distribution of junction accidents (2006-2015)

Year	Not At Junction	Cross	Tee-Junction	Staggered Junctions	Roundabout	Railway Crossing	Other	Total
2006	623	38	44	7	1	2	66	781
2007	531	37	54	9	0	1	156	788
2008	582	48	40	7	8	2	106	793
2009	341	25	44	6	2	1	108	527
2010	330	41	31	0	4	0	35	441
2011	264	29	27	7	6	3	26	362
2012	244	19	29	4	0	1	40	337
2013	188	15	31	4	4	2	140	384
2014	166	14	13	3	4	1	56	257
2015	184	59	23	2	5	0	97	370
Total	3453	325	336	49	34	13	830	5040

3.3.4 Distribution of accidents according to lighting condition:

Table 3.4: Distribution of accidents according to lighting condition

Year	Daylight	Evening	Night	Night Until	Total
2006	538	87	66	104	795
2007	580	81	72	60	793
2008	515	108	80	90	793
2009	317	71	69	72	529
2010	248	61	74	57	440
2011	199	57	71	35	362
2012	194	59	44	41	338
2013	248	63	22	21	354
2014	192	27	16	23	258
2015	210	70	61	37	378
Total	3241	684	575	540	5040

3.3.5 Accidents are distributed based on the type of road geometry.

Table 3.5: Accidents are distributed based on the type of road geometry

YEAR	Straight	Curve	Slope	Curve &Slope	Crest	TOTAL
2006	772	15	4	2	1	794
2007	754	24	3	4	4	789
2008	739	33	7	6	8	793
2009	503	16	3	6	1	529
2010	418	15	6	1	1	441
2011	343	15	3	0	0	361
2012	327	8	3	0	0	338
2013	367	13	1	2	1	384
2014	244	11	1	3	0	259
2015	339	24	6	5	2	376
TOTAL	4806	174	37	29	18	5064

3.3.6 Accidents are distributed according to road feature:

Table 3.6: Accidents are distributed according to road feature.

YEAR	None	Bridge	Culvert	Narrow	Speed Berker	TOTAL
2006	760	65	4	2	1	832
2007	754	56	3	4	4	821
2008	650	51	7	6	8	722
2009	490	45	3	10	1	549
2010	390	39	6	5	1	441
2011	343	35	3	0	0	381
2012	327	29	3	0	0	359
2013	367	25	1	2	1	396
2014	244	23	1	3	0	271
2015	239	16	6	5	2	268
TOTAL	4564	384	37	37	18	5040

3.3.7: Distribution of accident casualties according to casualty class

Table 3.7: Distribution of accident casualties according to casualty class

VEHICLE TYPE	Fatal	Grieve	Simple	TOTAL
Cycle	20	1	0	21
Rickshaw	4	1	0	5
M/Cycle	143	81	5	229
Baby taxi	40	50	3	93
Tempo	36	50	19	105
Microbus	169	80	4	253
Minibus	265	60	3	328
Bus	1454	355	25	1834
Car	188	131	3	322
Jeep	29	51	13	93
Pickup	125	80	4	209
Truck	236	50	4	290
H.T Truck	807	193	12	1012
Articulated	21	1	0	22
Oil Truck	15	2	0	17
Tract	15	1	1	17
Animal	4	0	0	4
Other	683	28	4	715
TOTAL	4254	1215	100	5569

3.3.8 Distribution of accidents according junction type:

Table 3.8: Distribution of accidents according junction type

VEHICE TYPE	Not At Junction	Cross	T-Junction	Staggered Junctions	Round about	Railway Crossing	Other	TOTAL
Cycle	17	2	1	0	0	0	1	21
Rickshaw	1	0	1	0	0	0	3	5
M/Cycle	121	8	11	4	0	0	45	189
Baby taxi	39	5	5	2	0	0	12	63
Tempo	25	6	4	0	0	0	7	42
Microbus	137	14	16	2	1	1	41	212
Minibus	190	29	24	1	8	1	46	299
Bus	1151	115	101	16	12	3	222	1620
Car	84	8	16	0	1	1	12	122
Jeep	21	1	4	0	0	1	6	33
Pickup	97	11	11	0	0	0	31	150
Truck	103	10	12	2	1	0	31	159
H.T Truck	614	74	66	12	6	4	130	906
Articulated	17	1	1	0	2	0	1	22
Oil Truck	12	2	0	1	0	0	2	17
Tract	8	0	2	0	0	0	6	16
Animal	2	0	0	0	0	0	2	4
Other	445	25	36	7	2	1	192	708
TOTAL	3884	311	311	47	33	12	971	5569

3.3.9 The distribution of accidents according to vehicle type at light:

Table 3.9: The distribution of accidents according to vehicle type at light

VEHICLE TYPE	Daylight	Dawn Dusk	Night Lit	Night Until	TOTAL
Cycle	14	0	3	4	21
Rickshaw	4	1	0	0	5
M/Cycle	253	65	7	9	334
Baby taxi	50	15	14	6	85
Tempo	32	5	5	2	44
Microbus	156	39	15	30	240
Minibus	227	55	45	25	352
Bus	1125	195	155	145	1620
Car	190	90	39	40	359
Jeep	20	5	5	3	33
Pickup	119	22	14	4	159
Truck	253	20	10	15	298
H.T Truck	540	121	150	169	980
Articulated	13	2	5	2	22
Oil Truck	12	2	1	2	17
Tract	13	2	0	1	16
Animal	3	0	0	1	4
Other	350	290	86	244	970
TOTAL	3374	929	554	702	5559

3.3.10 the distribution of accidents according to vehicle type in location

Table 3.10: The distribution of accidents according to vehicle type in location

VEHICLE TYPE	Urban	Rural	TOTAL
Cycle	10	11	21
Rickshaw	3	2	5
M/Cycle	190	254	444
Baby taxi	40	23	63
Tempo	19	35	54
Microbus	77	135	212
Minibus	133	166	299
Bus	769	1029	1798
Car	267	105	372
Jeep	10	23	33
Pickup	80	105	185
Truck	154	105	259
H.T Truck	385	521	906
Articulated	9	13	22
Oil Truck	6	11	17
Tract	5	11	16
Animal	2	2	4
Other	380	479	859
TOTAL	2539	3030	5569

3.4.11 Distribution of accidents according to traffic movement:

Table 3.11: Distribution of accidents according to Traffic Movement

VEHICLE TYPE	1-Way	2-Way	TOTAL
Cycle	3	18	21
Rickshaw	0	5	5
M/Cycle	23	350	373
Baby taxi	11	52	63
Tempo	11	40	51
Microbus	34	178	212
Minibus	50	274	324
Bus	280	1050	1330
Car	36	350	386
Jeep	8	35	43
Pickup	28	264	292
Truck	30	450	480
H.T Truck	151	564	715
Articulated	1	21	22
Oil Truck	1	18	19
Tract	3	13	16
Animal	1	3	4
Other	85	599	684
TOTAL	756	4284	5040

Chapter 4
DATA ANALYSIS

4.1 Introduction:

This chapter provides an overview of the facts series method of National high way accidents in Bangladesh, the issue of data, the assessment of National high way accidents data, the key conclusions from evaluation, and other related topics.

4.2 Data Analysis:

This research examines solely national highway traffic accidents reported to the ARI from January 2006 through December 2015. There were 5040 accidents recorded over this time period, and data about them is accessible from the sources. The causes of accidents are broken down into categories based on factors including the kind of vehicle involved, the road's geometry and features, the illumination, and other environmental factors.

4.2.1Annual distribution of accidents:

The study relied on a year's worth of data collected from around the country detailing traffic incidents on the nation's highways.

Table 4.1: Annual distribution of accidents

Year	Road Accidents Total	Percentage of accidents
2006	787	16%
2007	763	15%
2008	783	16%
2009	546	11%
2010	460	9%
2011	470	9%
2012	335	7%
2013	316	6%
2014	285	6%
2015	295	6%
Total	5040	100%

The number of accidents on National highways has been going down over the reference period, which is shown by the distribution of accidents by year. The number of accidents has been going down since 2008, and it seems to have finally bottomed out in 2012. Between 2008 and 2012, there were 52 percent fewer accidents on the National

Highway. There was a decline in accidents between 2013 and 2015, followed by an increase in accidents in 2015. Out of a total of 787 events, 16 percent happened in 2006 and the lowest number occurred in 2014. (6%). On average, 504 accidents happen each year.

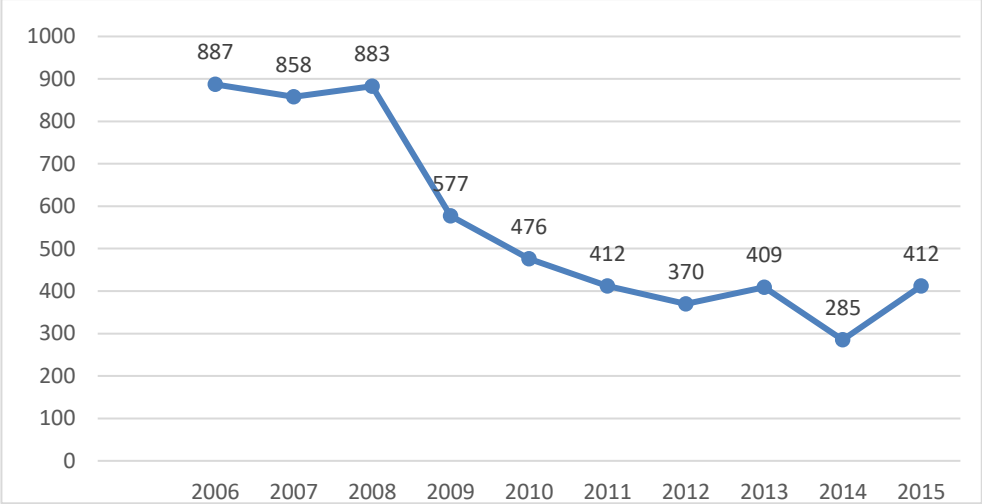


Figure 4.1: Annual distribution of accidents

According to the yearly distribution of road accidents, there seems to be a trend toward a decline in the total number of incidents that occurred over the time period in question. The number of people killed or injured in car accidents fell by almost half between the years of 2008 and 2012. According to the findings, out of these 5040 incidents, the highest number of accidents happened in 2006 (16%), while the lowest number of accidents occurred in 2014 (5%). On a yearly basis, there were around 504 accidents on average.

4.2.2 Annual distribution of Road Accidents by Severity:

In addition to records of accident frequencies, records of accident casualties have also been collected. They are accounted for on both an annual and overall basis..

Table 4.2: Annual distribution of Road Accidents by Severity

YEAR	Fatal	Grievous	Simple Injury	TOTAL
2006	745	132	10	887
2007	741	101	16	858
2008	768	104	11	883
2009	514	59	4	577
2010	431	43	2	476
2011	373	33	6	412
2012	337	25	3	370
2013	379	29	6	413
2014	258	25	2	285
2015	368	32	12	412
TOTAL	4914	583	67	5569

Table shows that total 5569 casualties occurred in 5040 accidents during the study period. It is evident that average victims are more than respective accident numbers.1.6casualties occurred per accident on average. Per accident fatalities, grievous injuries and simple injuries were 1, 0.5 and 0.2 respectively**.**

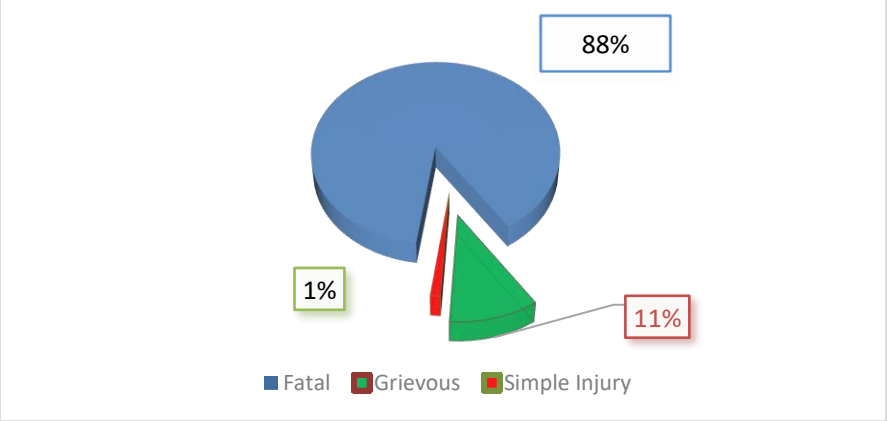


Figure 4.2: Annual distribution of Road Accidents by Severity (A)

The overall number of casualties from 2006 to 2015 comprised of 88 percent deaths, 11 percent serious injuries, and 1 percent minor injuries.

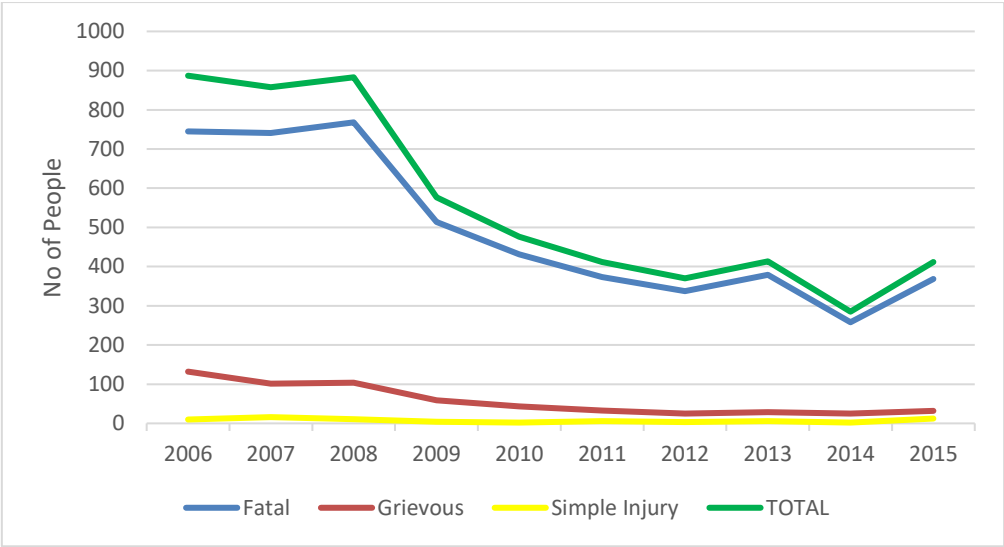


Figure 4.3: Annual distribution of Road Accidents by Severity (B)

Based on the distribution of fatalities between years, it seems that the overall number of casualties has been on a downward trend from 2008 to 2014. From 2008 to 2012, there was a 49% drop in the number of fatalities caused by road traffic accidents. It is reported to have reached its highest point in 2008 (16%) and its lowest point in 2014 (5%). It has been observed that the number of deaths accounts for a notably larger proportion of the overall number of casualties yearly. During the time period in question, the year 2008 had the most number of deaths (16%), while the year 2014 saw the fewest (5%). On average, fifty individuals lose their lives on our nation's highways each year. The year 2006 had the largest number of people who suffered serious injuries (23%), while the years 2012 and 2014 saw the lowest numbers (4%). On average, 59 persons had life-threatening injuries each year. The number of persons who were only hurt was at its highest level in 2007 (24%), while it was at its lowest level in both 2010 and 2014 (3%). On a yearly basis, an average of eight persons suffered injuries.

4.2.3: Annual distribution of junction accident types:

Table 4.3: Annual distribution of junction accidents Type

Year	Not At Junction	Cross	Tee-Junction	Staggered Junctions	Roundabout	Railway Crossing	Other	Total
2006	623	38	44	7	1	2	66	781
2007	531	37	54	9	0	1	156	788
2008	582	48	40	7	8	2	106	793
2009	341	25	44	6	2	1	108	527
2010	330	41	31	0	4	0	35	441
2011	264	29	27	7	6	3	26	362
2012	244	19	29	4	0	1	40	337
2013	188	15	31	4	4	2	140	384
2014	166	14	13	3	4	1	56	257
2015	184	59	23	2	5	0	97	370
Total	3453	325	336	49	34	13	830	5040

The fact that the majority of accidents take occur in areas with no junctions is an intriguing fact. According to Figure 4.4, almost 71% of accidents (3453 out of 5040) take place in areas where there are no intersections. The next category, "other," takes up the second spot (16%). Another sort of susceptible junction is called a "Tee-Junction," which accounts for 7% of all vulnerabilities. It is true that "Cross and Staggered-Junctions" and railroad crossings have the lowest rate of accidents overall (Figure 4.4)

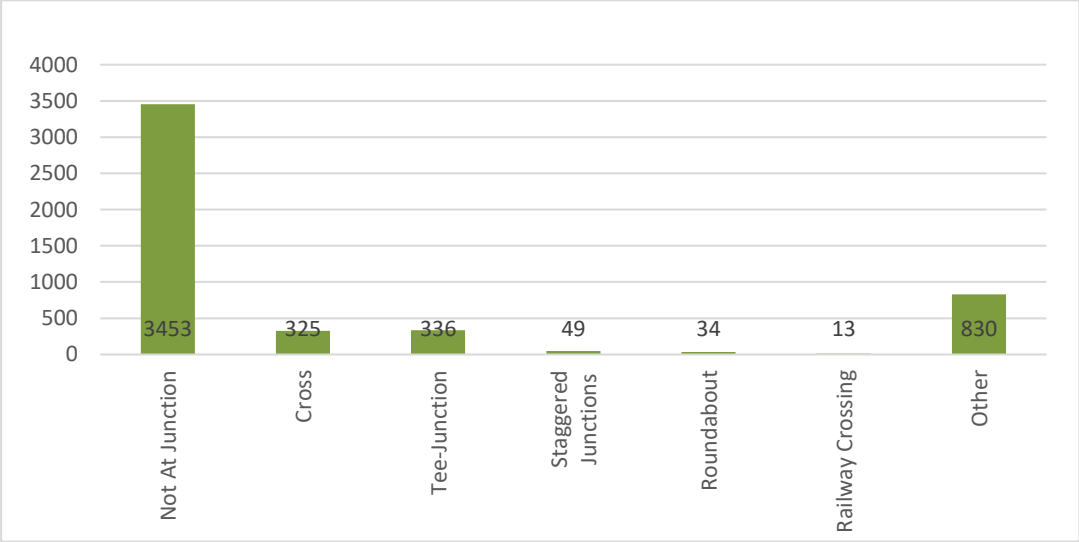


Figure 4.4: Annual distribution of junction accident types

4.2.4 Distribution of accidents according to lighting condition:

There are four different sorts of illumination circumstances that are taken into consideration: day, evening, night, till night when the road is lit, and night when the road is not lit. There is a correlation between the changing hours of day and night throughout the year and the increased risk of having an accident.

Table 4.4: Distribution of accidents according to lighting condition

Year	Daylight	Evening	Night	Night Until	Total
2006	538	87	66	104	795
2007	580	81	72	60	793
2008	515	108	80	90	793
2009	317	71	69	72	529
2010	248	61	74	57	440
2011	199	57	71	35	362
2012	194	59	44	41	338
2013	248	63	22	21	354
2014	192	27	16	23	258
2015	210	70	61	37	378
Total	3241	684	575	540	5040
%	64.3	13.6	11.4	10.7	100.0

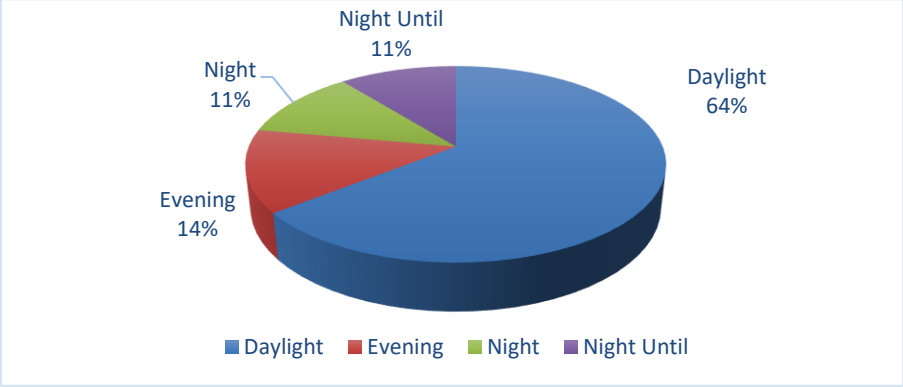


Figure 4.5: Distribution of accidents according to lighting condition

According to the statistics collected year by year, the majority of accidents that happened throughout each year took place during the day rather than at night. There were an average of 325 accidents that occurred throughout the day each year. The analysis found that daylight was the time of day with the highest number of accidents (64.3%). 13.6% accidents Were discovered to have happened in the early morning or late evening when there was less daylight. There were 10.7% more accidents that happened Night Until.

4.2.5 Accidents are distributed based on the type of road geometry.

Road geometry is a major factor in the quantity of traffic accidents happen. The geometry of the roads has a role in the frequency distribution of accidents.

Table 4.5: Accidents are distributed based on the type of road geometry

YEAR	Straight	Curve	Slope	Curve &Slope	Crest	TOTAL
2006	760	65	4	2	1	832
2007	754	56	3	4	4	821
2008	650	51	7	6	8	722
2009	490	45	3	10	1	549
2010	390	39	6	5	1	441
2011	343	35	3	0	0	381
2012	327	29	3	0	0	359
2013	367	25	1	2	1	396
2014	244	23	1	3	0	271
2015	239	16	6	5	2	268
TOTAL	4564	384	37	37	18	5040
%	90.6	7.6	0.7	0.7	0.4	100

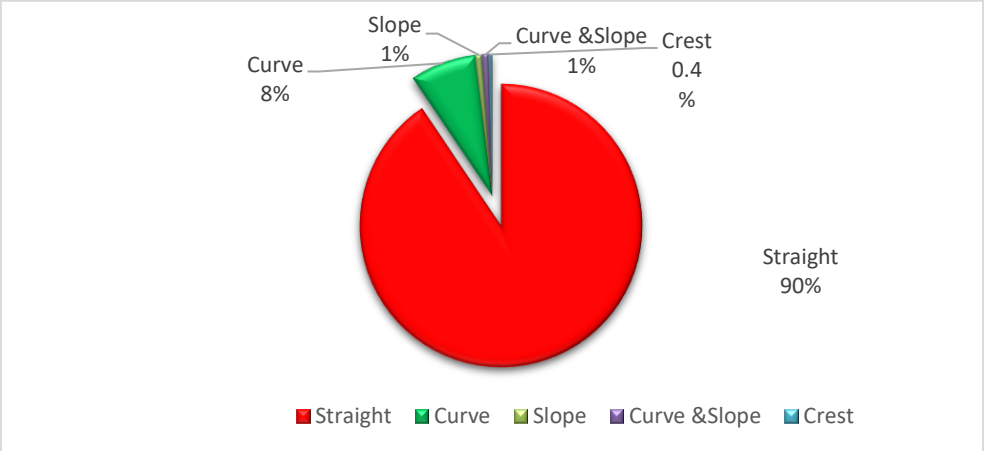


Figure 4.6: Accidents are distributed based on the type of road geometry

During the course of the investigation, the majority of accidents took place on roads that were straight. On a yearly basis, there were around 457 accidents that happened on roads that were straight. According to the findings of the research, the greatest number of accidents (90.6% total) happened on roads that were not curvy in any way. On winding roads, there were only 7.6% of the total accidents. Crests had the fewest number of accidents (0.4%) of any terrain type.

4.2.6 Accidents are distributed according to road feature:

A number of aspects of the highway all contribute in their own unique way to the frequency of traffic accidents. The chart below illustrates the breakdown of accidents according to each of them

Table 4.6: Accidents are distributed according to road feature.

YEAR	None	Bridge	Culvert	Narrow	Speed Berker	TOTAL
2006	772	15	4	2	1	794
2007	754	24	3	4	4	789
2008	715	33	7	6	8	769
2009	503	16	3	6	1	529
2010	418	15	6	1	1	441
2011	343	15	3	0	0	361
2012	327	8	3	0	0	338
2013	367	13	1	2	1	384
2014	244	11	1	3	0	259
2015	339	24	6	5	2	376
TOTAL	4782	174	37	29	18	5040
%	94.9	3.5	0.7	0.6	0.4	100

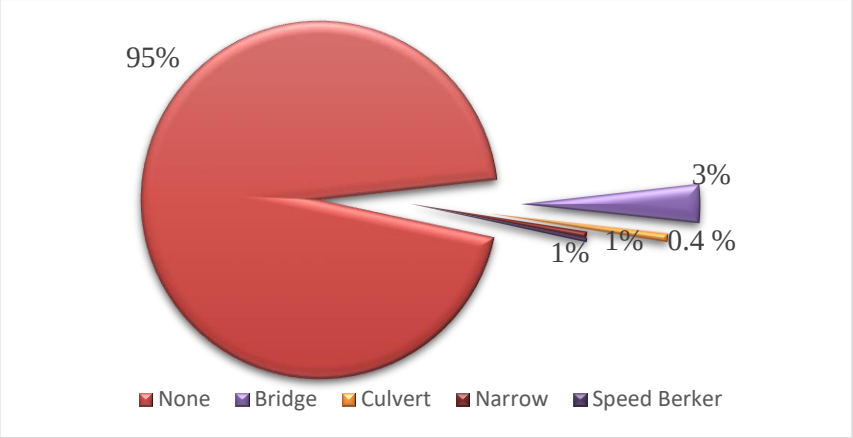


Figure 4.7: Accidents are distributed according to road feature

During the course of the research, the vast majority of collisions (94,9%) took occurred on roadways that lacked any kind of road feature. On the other hand, the presence of speed breakers reduced the number of accidents by 0.4%, while roads with bridges reduced the number of accidents by 3.5%, roads with culverts reduced the number by 0.7%, and roads with narrowing lowered the incidence by 0.6%.

4.2.7: Distribution of accident casualties according to casualty class:

Table 4.7: Distribution of accident casualties according to casualty class

VEHICLE TYPE	Fatal	Grieve	Simple	TOTAL
Cycle	20	1	0	21
Rickshaw	4	1	0	5
M/Cycle	143	81	5	229
Baby taxi	40	50	3	93
Tempo	36	50	19	105
Microbus	169	80	4	253
Minibus	265	60	3	328
Bus	1454	355	25	1834
Car	188	131	3	322
Jeep	29	51	13	93
Pickup	125	80	4	209
Truck	236	50	4	290
H.T Truck	807	193	12	1012
Articulated	21	1	0	22
Oil Truck	15	2	0	17
Tract	15	1	1	17
Animal	4	0	0	4
Other	683	28	4	715
TOTAL	4254	1215	100	5569
%	76.4	21.8	1.8	100.0

Casualty analysis suggests that in case of 23.6% casualties, casualty class was pedestrian, for15% casualties, casualty class was bus. Among 76.4% people died, 48%were other, 32% in bus and 4.1% on motor-cycle.

(Accident Research Institute - ARI, BUET)

4.2.8 Distribution According to types of vehicles accidents in Junction:

Table 4.8: According to types of vehicles accidents in Junction

VEHICLE TYPE	Not At Junction	Cross	T-Junction	Staggered-Junctions	Roundabout	Railway Crossing	Other	TOTAL
Cycle	17	2	1	0	0	0	1	21
Rickshaw	1	0	1	0	0	0	3	5
M/Cycle	212	56	11	15	0	5	45	344
Baby taxi	39	5	5	2	0	0	12	63
Tempo	25	6	4	0	0	0	7	42
Microbus	137	14	16	2	1	1	40	211
Minibus	190	29	24	1	8	1	46	299
Bus	1050	250	101	16	12	25	219	1673
Car	184	8	16	0	1	1	45	255
Jeep	21	1	4	0	0	1	6	33
Pickup	97	11	11	0	0	0	31	150
Truck	103	90	12	2	1	0	41	249
H.T Truck	614	74	66	34	6	4	130	928
Articulate	17	1	1	0	2	0	1	22
Oil Truck	12	2	0	1	0	0	2	17
Tract	8	0	2	0	0	0	6	16
Animal	2	0	0	0	0	0	2	4
Other	445	25	36	7	2	1	192	708
TOTAL	3174	574	311	80	33	39	829	5040
%	63.0	11.4	6.2	1.6	0.7	0.8	16.4	100

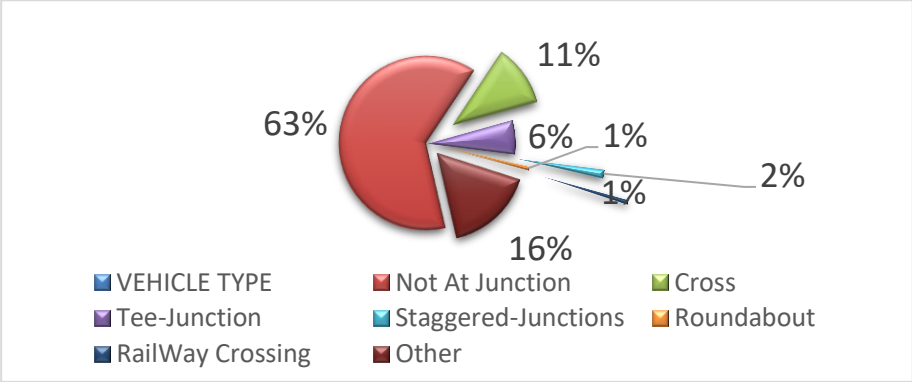


Figure 4.8: According to types of vehicles accidents in Junction

The fact that the majority of accidents take occur in areas with no junctions is an intriguing fact. According to Figure 4.4, almost 63% of accidents (3174 outof 5040)

take place in areas where there are no intersections. The next category, "other," takes up the second spot (16.4%). Another sort of susceptible junction is called a "Tee-

Junction," which accounts for 6% of all vulnerabilities. It is true that "Cross and Staggered-Junctions" and railroad crossings have the lowest rate of accidents overall

4.2.9 According to types of vehicles accidents in light:

Table 4.9: According to types of vehicles accidents in light

VEHICLE TYPE	Daylight	Dawn Dusk	Night Lit	Night Until	TOTAL
Cycle	14	0	3	4	21
Rickshaw	4	1	0	0	5
M/Cycle	253	65	7	9	334
Baby taxi	50	15	14	6	85
Tempo	32	5	5	2	44
Microbus	156	39	15	30	240
Minibus	227	55	45	25	352
Bus	795	196	155	145	1291
Car	190	90	39	40	359
Jeep	20	5	5	3	33
Pickup	119	22	14	4	159
Truck	253	20	10	15	298
H.T Truck	350	121	150	169	790
Articulated	13	2	5	2	22
Oil Truck	12	2	1	2	17
Tract	13	2	0	1	16
Animal	3	0	0	1	4
Other	350	290	86	244	970
TOTAL	2854	930	554	702	5040
%	57	18	11	14	100

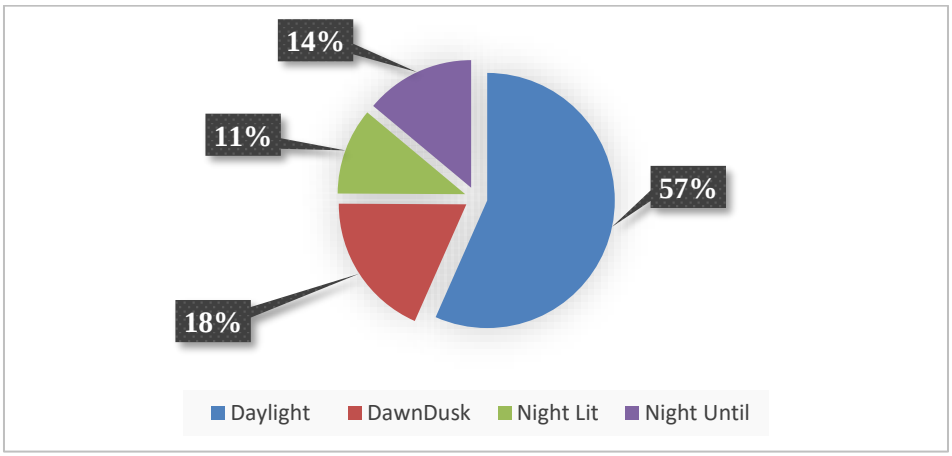


Figure 4.9: Accidents are distributed based on the type of road geometry

According to the yearly data, most accidents occur during daylight. In 27%Bus and 12.2% H.truck, daylight had the most incidents (57.3%). 14% of accidents occurred when there was less daylight. Night until Dawn accidents 14%

4.2.10: Distribution of accidents according to vehicle type in location

Table 4.10: Distribution of accidents according to vehicle type in location

VEHICLE TYPE	Urban	Rural	TOTAL
Cycle	10	11	21
Rickshaw	3	2	5
M/Cycle	190	254	444
Baby taxi	40	23	63
Tempo	19	35	54
Microbus	77	135	212
Minibus	133	166	299
Bus	569	950	1519
Car	267	105	372
Jeep	10	23	33
Pickup	80	105	185
Truck	154	130	284
H.T Truck	285	350	635
Articulated	9	13	22
Oil Truck	6	11	17
Tract	5	11	16
Animal	2	2	4
Other	360	495	855
Total	2219	2821	5040
%	56	44	100

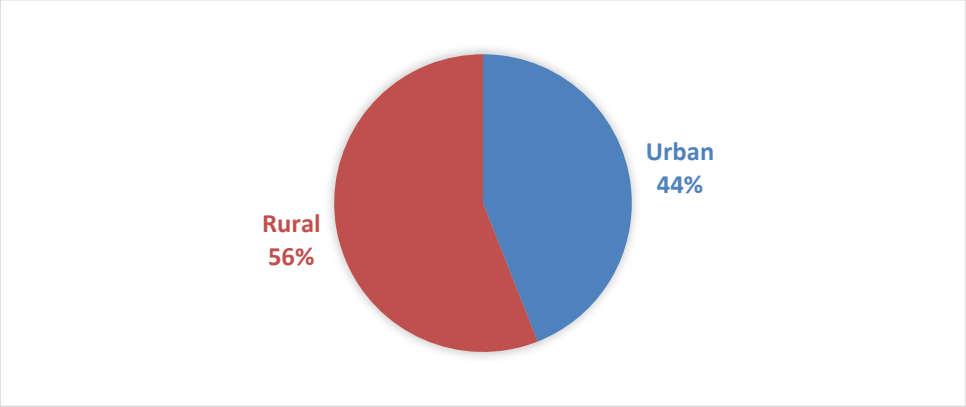


Figure 4.9: The distribution of accidents according to vehicle type in location

According to the yearly distribution of accidents in accordance with the kind of highway location, it was found that more accidents occurred on highways situated in rural regions than on roads located in urban areas. The number of accidents that

occurred annually on urban roads was 222, whereas the number of accidents that occurred annually on rural roads was 282. During the course of the research, rural roads were responsible for 56% of all accidents, while urban roads were responsible for 44%

4.2.11 Distribution of accidents according to traffic movement:

Table 4.11: Distribution of accidents according to Traffic Movement

VEHICLE TYPE	1-Way	2-Way	TOTAL
Cycle	3	18	21
Rickshaw	0	5	5
M/Cycle	23	350	373
Baby taxi	11	52	63
Tempo	11	40	51
Microbus	34	178	212
Minibus	50	274	324
Bus	280	1050	1330
Car	36	350	386
Jeep	8	35	43
Pickup	28	264	292
Truck	30	450	480
H.T Truck	151	564	715
Artic	1	21	22
Oil Truck	1	18	19
Tract	3	13	16
Animal	1	3	4
Other	85	599	684
TOTAL	756	4284	5040
%	15	85	100

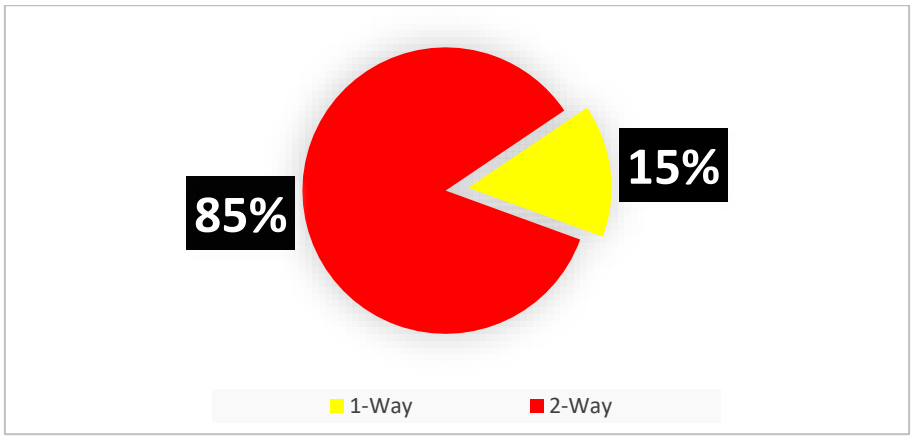


Figure 4.10: Distribution of accidents according to Traffic Movement

The number of accidents that occurred annually on 1way roads was 756, whereas the number of accidents that occurred annually on 2way roads was 4284. During the

course of the research, 2way roads were responsible for 85% of all accidents, while 1way roads were responsible for 15.

4.4 Overview:

This chapter analyzes road traffic accident statistics to examine the risk and safety of Bangladesh's main means of travel. This research analyzes traffic accident traits and patterns despite data restrictions.

CHAPTER 5

Result &Discussion

5.1. Introduction:

In this study the comparative analysis has semiconductor diode to the invention of many vital findings. Transportation engineering, planning, and management ought to rate each public safety and operational effectiveness as their prime priorities. Automobile collisions impose a big financial and emotional price on society, additionally to the lot of obvious physical prices. a radical system that has an information of traffic accidents Associate in Nursing an acceptable analysis of the info will facilitate build vital strides toward reducing the quantity of accidents that occur. During this analysis, the present state of road safety and its progression throughout national roadways square measure compound in nice detail. Additionally to the present, it highlights sure fashionable considerations and prime priority within the effort to deal with the difficulties close road safety.

5.2 Major Findings of the Study:

I. The number of accidents has been going down since 2008, and it seems to have finally bottomed out in 2012. Between 2008 and 2012, there were 52 percent fewer accidents on the National Highway. There was a decline in accidents between 2013 and 2015, followed by an increase in accidents in 2015. Out of a total of 787 events, 16 percent happened in 2006 and the lowest number occurred in 2014. (6%). On average, 504 accidents happen each year.

II. Total 5569 casualties occurred in 5040 accidents during the study period. It is evident that average victims are more than respective accident numbers 559 casualties occurred per accident on average. Per accident fatalities, grievous injuries and simple injuries were 1%, 0.5 and 0.2 respectively.

III. It seems that the overall number of casualties has been on a downward trend from 2008 to 2014. From 2008 to 2012, there was a 49% drop in the number of fatalities caused by road traffic accidents. It is reported to have reached its highest point in 2008 (16%) and its lowest point in 2014 (5%). It has been observed that the number of deaths accounts for a notably larger proportion of the overall number of casualties yearly. During the time period in question, the

year 2008 had the most number of deaths (16%), while the year 2014 saw the fewest (5%). On average, fifty individuals lose their lives on our nation's highways each year. The year 2006 had the largest number of people who suffered serious injuries (23%), while the years 2012 and 2014 saw the lowest numbers (4%). On average, 59 persons had life-threatening injuries each year. The number of persons who were only hurt was at its highest level in 2007 (24%), while it was at its lowest level in both 2010 and 2014 (3%). On a yearly basis, an average of eight persons suffered injuries.

IV. The fact that the majority of accidents take occur in areas with no junctions is an intriguing fact. Almost 71% of accidents (3453 out of 5040) take place in areas where there are no intersections. The next category, "other," takes up the second spot (16%). Another sort of susceptible junction is called a "Tee-Junction," which accounts for 7% of all vulnerabilities. It is true that "Cross and Staggered-Junctions" and railroad crossings have the lowest rate of accidents overall.

V. According to the statistics collected year by year, the majority of accidents that happened throughout each year took place during the day rather than at night. There were an average of 325 accidents that occurred throughout the day each year. The analysis found that daylight was the time of day with the highest number of accidents (64.3%). 13.6% accidents Were discovered to have happened in the early morning or late evening when there was less daylight. There were 10.7% more accidents that happened Night Until.

VI. During the course of the investigation, the majority of accidents took place on roads that were straight. On a yearly basis, there were around 457 accidents that happened on roads that were straight. According to the findings of the research, the greatest number of accidents (90.6% total) happened on roads that were not curvy in any way. On winding roads, there were only 7.6% of the total accidents. Crests had the fewest number of accidents (0.4%) of any terrain type.

VII. During the course of the research, the vast majority of collisions (94,9%) took occurred on roadways that lacked any kind of road feature. On the other hand, the presence of speed breakers reduced the number of accidents by 0.4%, while roads with bridges reduced the number of accidents by 3.5%, roads with culverts reduced the number by 0.7%, and roads with narrowing lowered the incidence by 0.6%.

VIII. Casualty analysis suggests that in case of 23.6% casualties, casualty class was pedestrian, for15% casualties, casualty class was bus. Among 76.4% people died, 48%were other, 32% in bus and 4.1% on motor-cycle.

IX. The fact that the majority of accidents take occur in areas with no junctions is an intriguing fact. According to Figure 4.4, almost 63% of accidents (3174 out of 5040) take place in areas where there are no intersections. The next category, "other," takes up the second spot (16.4%). Another sort of susceptible junction is called a "Tee-Junction," which accounts for 6% of all vulnerabilities. It is true that "Cross and Staggered-Junctions" and railroad crossings have the lowest rate of accidents overall.

X. According to the yearly data, most accidents occur during daylight. In 27%Bus and 12.2% H.truck, daylight had the most incidents (57.3%). 14% of accidents occurred when there was less daylight. Night until Dawn accidents 14%.

XI. According to the yearly distribution of accidents in accordance with the kind of highway location, it was found that more accidents occurred on highways situated in rural regions than on roads located in urban areas. The number of accidents that occurred annually on urban roads was 222, whereas the number of accidents that occurred annually on rural roads was 282. During the course of the research, rural roads were responsible for 56% of all accidents, while urban roads were responsible for 44%.

XII. The number of accidents that occurred annually on 1way roads was 756, whereas the number of accidents that occurred annually on 2way roads was 4284. During the course of the research, 2way roads were responsible for 85% of all accidents, while 1way roads were responsible for 15%.

5.3 Conclusions:

The primary goal of this research is to identify accident and mortality rates and trends in a variety of methods, with a focus on those methods that are amenable to worldwide analysis.

Over the next decade, developing nations like Bangladesh will see a startling spike in traffic accidents and fatalities, according to a worldwide estimate. Because of this, ensuring passenger safety is a major obstacle due to a lack of trained personnel and enough funding in the transport safety sector.

Following is a list of significant inferences that may be drawn from the comparative study, which were arrived at as a result:

(i) Based on statistics, the number of accidents and deaths has been on an upward trend over the course of the years in the country. In the most recent few years, there has been an increase in fatality rates that are greater than those of the accident rates of years that correspond to those fatality rates.

(ii) Since 2008, accidents have been declining, and 2012 looks to be the bottom. In 2008-2012, there were 52% fewer highway accidents. Accidents declined from 2013 to 2015, but rose in 2015. 16 percent of 787 occurrences occurred in 2006 and the fewest in 2014. (6%). Annually, 504 accidents occur.

(iii) During the study period, Casualty analysis suggests that in case of 23.6% casualties, casualty class was pedestrian, for15% casualties, casualty class was bus. Among 76.4% people died, 48%were other, 32% in bus and 4.1% on motor-cycle.

(iv) It's interesting that most accidents occur in places without intersections. Nearly 63% of incidents (3174 out of 5040) occur in regions without junctions. “Other" follows at 16.4%. Tee-junctions account for 6% of vulnerabilities. "Cross and Staggered-Junctions" and railroad crossings have the lowest accident rate.

(v) According to the yearly data, most accidents occur during daylight. In 27%Bus and 12.2% H.truck, daylight had the most incidents (57.3%). 14% of accidents occurred when there was less daylight. Night until Dawn accidents 14%.

(vi) The number of accidents that occurred annually on 1way roads was 756, whereas the number of accidents that occurred annually on 2way roads was 4284. During the course of the research, 2way roads were responsible for 85% of all accidents, while 1way roads were responsible for 15%.

5.4.1 for improving highway safety

The following suggestions for enhancing road traffic safety may be proposed in light of the findings of an investigation into accidents that occurred on the nation's highways:.

(i) Strengthening institutional and professional capacity of all the concerned agencies, stakeholders, NGOs, private companies and organizations for the successful implementation of road safety measures.

(ii) The most common cause of traffic collisions was excessive speeding. Therefore, there should be a speed limit range that is enforced on highways. In addition to that, speed calming devices might be put in place. It is important to have a plan in place for regulating the speed limit in potentially hazardous regions.

(iii) Improvements to the design of intersections, including channelization, traffic islands, dividers, and so on, ought to be carried out. It is essential to make appropriate improvements to access controls, the road surface, the highway shoulder, cross-sections, sight distances, alignments, traffic signs, traffic signals, road markings, traffic calming devices, and lighting.

(iv) There should be provisions made for equipment that prevent collisions. Wherever it is essential to do so, traffic control systems and junctions should be implemented. In our nation, the traffic lights are not kept in the best possible condition. They are stored away and not used. It is necessary to make preparations in order to activate and make use of the signals.

(v) Greater attention should be paid to the safety of roadways in areas with a higher incidence of accidents. The protection of those traveling on rural and interstate roadways should be a top priority. As human error is by far the most common cause of traffic accidents, drivers, pedestrians, and riders should all get adequate training on the laws and regulations that govern traffic.

(vi) Provisions for suitable pedestrian amenities such as safe crossings, treatments or building of sidewalks or footpaths, speed-breakers and foot-over bridges, elevated meridian lines, etc. shall be maintained. Through the use of appropriate channelization, pedestrians ought to be compelled to utilize the foot-over bridges or over-passes or underpasses.

(vii) It should be illegal to talk on a mobile phone while driving or crossing the street,and this prohibition should be enforced.

(viii) When the weather is severe, the driver of the vehicle should not operate the vehicle. Training on accident information, road safety, traffic regulations, marking, and traffic signs, among other topics, has to be organized for the drivers, the supervisors, and the assistants. It is important to minimize competition amongst automobiles when traveling the roads.

(ix) The provision of specific facilities, such as separate lanes, for non-motorized vehicles and the maintenance of dedicated lanes for buses shall be maintained. The technical inspection system that is used for examining and testing cars should be strengthened in order to assure compliance with vehicle standard and fitness standards.

(x) It is imperative that vehicles undergo appropriate inspections in order to prevent excessive loading. Plying roads should only be open to vehicles that have been adequately engineered.

5.4.2 Recommendations

The following recommendations may be made based on the findings of study for the improvement of National highway safety in Bangladesh:

I. **Accident data reporting and recording:** The paucity of data prevents a thorough examination. Optimizing the accident data collection system should prevent underreporting of accidents and casualties. Methodically recording accident data helps access technical knowledge. In all three modalities, authorities should use a common data collecting form with pre-requisite criteria. Many entities should gather accident data to increase quality and quantity. It's important to teach officers and workers who gather accident data and complete the Accident Report Form (ARF). Modern technology (GPS, GIS) is needed to record, evaluate, and improve accident-related issues.

II. **Engineering Aspects:**

1) Modifications to the geometry of the road network, including the installation of roundabouts at strategic locations.

2) To ensure the safety of pedestrians, we must provide and improve infrastructure including crosswalks, pedestrian bridges, buffer zones, elevated meridian lines, grade separation, and more.
3) Designated bus lanes and amenities (such as separate lanes) for non-motorized vehicles. Channelization, traffic islands, and other modifications to the layout of intersections.
4) Repairing and widening undersized and dilapidated roads, bridges, and culverts.
5) Access controls, highway surfaces, shoulders, cross-sections, sight distances, alignments, traffic signs, traffic signals, road markings, traffic calming devices, and lighting have all been enhanced.
6) To reduce speeds in potentially dangerous places.
7) Dealing with potentially dangerous highways, corridors, or other areas.
8) The most dangerous roadways should have frequent surveys of pedestrian traffic and average speeds conducted.

III. **Prioritization of safety measures:** Since National highway travel has been identified as the most perilous means of transportation, improving road safety should be a top priority for legislators right now. Allocating adequately amongst transportation sectors is essential for prioritizing security enchantment measures. It is important to establish the need of countermeasures and to look into the possibility of using a positive contrast approach to compare accident samples before and after the implementation of security procedures.

IV. **Educational Aspects:**

1) Proper training for law enforcement and other relevant personnel in traffic control, data collecting, and ARF completion.
2) Using new methods (such GIS instead of MAAP5) to examine and improve traffic-related problems.
3) Increasing public motivating initiatives that aim to improve and correct road user behavior through publicity and awareness campaigns.
4) Regularly creating and launching neighborhood-based road safety initiatives.
5) Promote road safety education in schools and create relevant resource materials for teachers.

6) Sixth, for road safety measures to be effectively implemented, bolstering the institutional and professional capacity of all relevant authorities, stakeholders, NGOs, private firms, and organizations.
7) Seventh, incorporate a road safety audit procedure into the roadway planning, design, and building stages.
8) Increased real and perceived police enforcement of laws and regulations is encouraged as a means of reducing risky behavior and infractions.
9) Advocate for measures to mitigate the dangers of long-distance travel on the part of drivers.

Emergency Response Aspects: Emergency response times and trauma care management that are optimized for effectiveness are crucial to reducing fatalities from traffic accidents. There has to be trained and employed trauma care specialists in every general hospital. It's important to set up specialized rehabilitation clinics in various locations

REFERENCES:

1. Study on transport safety perspectives in Bangladesh through comparative analysis of roadway, railway and waterway accidents http://lib.buet.ac.bd:8080/xmlui/handle/123456789/4833
2. Arora, S.P. and Saxena, S.C., (2006), "A Text Book of Railway Engineering", 7th edition, New Delhi, Ish Kapur.
3. Hoque, M. M. (2004). The Road to Road Safety: Issues and Initiatives in Bangladesh, Regional Health Forum, 8(1), 39-51.
4. Ministry of Communications, Planning Commission. (2008). Integrated MultiModal Transport Policy Final Draft, Prepared for the Council of Advisors, Government of the People"s Republic of Bangladesh.
5. National Road Safety Council, Ministry of Communications (Roads and Railway Division, Bangladesh Road Transport Authority. (2004). National Road Safety Strategic Action Plan (NRSSAP) 2002-2004, Bangladesh.
6. National Road Safety Council, Bangladesh Road Transport Authority, Ministry of Communications. (2011). National Road Safety Strategic Action Plan (NRSSAP) 2011-2013, Government of the People"s Republic of Bangladesh.
7. Hoque, M. M., McDonald, M., & Hall, R. D. (2001). Road Safety Improvements in Developing Countries: Priority Issues and Options. Proceedings of the Twentieth Australian Road Research Board (ARRB) Conference, Australia. Clean Air and Sustainable Environment (CASE) Project 60.
8. Najmul, H. A. (2003). Enforcement in Mixed Traffic Conditions in Bangladesh. In Benchmarking Road Traffic Enforcement for RS, Institute of Road Traffic Education New Delhi, India.
9. Anowar, S., Alam, M. D., & Raihan, M. A. (2008). Analysis of accident patterns at selected intersections of an urban arterial. Proceedings of the 21st ICTCT Workshop,Melbourne, Australia.
10. Hoque, M. M., Rahman, M. F., Ashrafuzzaman, M. and Sarkar, S. (2006a). Observational Studies of Hazardous Road Locations on National Highways in Bangladesh. Proceedings of 22nd Australian Road Research Board (ARRB) Conference.
11. Chowdhury, A.S.M.J., Alam, M.S., Biswas, S.K., Saha, R.K., Mandol, A.R., Rahman, M.M., Khair, M.A. (2012), 'Road Traffic Accidents by 'Nasimon' and 'Karimon'-A Study in Faridpur Medical College Hospital'
12. Muniruzzaman, S.M. (2004), 'Performance Evaluation of Road Safety Measures in Dhaka-Aricha Highway', M.Sc. Thesis, Department of Civil Engineering, BUET, Dhaka.
13. National Road Safety Strategic Action Plan (2014-2016), National Road Safety Council, Road Transport and Highways Division, Dhaka, Bangladesh.
14. Nury, A.H., Alam, M.J.B., Farzana, S.Z., Zafor, M.A. (2012), 'Study on Frequency Analysis of Sylhet City's Road Accident', International Journal of Engineering and Technology Volume 2 No. 4, April, 2012.

15. Ogden, K. W. (1996), 'Safer Roads: A Guide to Road Safety Engineering'.Avebury Technical, England.
16. BRTA (2007), 'National Road Traffic Accident report 2007', Bangladesh Road Transport Authority (BRTA), Dhaka.
17. Global status report on road safety, 2015, by World Health Organization (WHO).
18. Rabbi,H.E.2013. Modelling Critical Overturning Criteria for Single Vehicle Run-off-road Crashes for Bangladesh Context. M.Sc. thesis, Department of Civil Engineering, BUET, Dhaka, Bangladesh.
19. Uddin, F., Rahman, M. M., and M. A. Islam. 2015. Identification Of Hazardous Road Locations And Black Spots On Dhaka-Barisal National Highway, B.Sc. thesis, Department of Civil Engineering, University of Asia Pacifc, Dhaka, Bangladesh.

APPENDIX

APPENDIX-A

APPENDIX-B

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
পুলিশ হেডকোয়ার্টার্স, ঢাকা।

প্রজ্ঞাপন

নং-এস, আর, ও তারিখ ঃ

Police Act, 1861 (V of 1861) এর section 12 এ প্রদত্ত ক্ষমতাবলে মহা-পুলিশ পরিদর্শক, সরকারের পূর্বানুমোদনক্রমে, Police Regulations Bengal, 1943 এর নিম্নরূপ অধিকতর সংশোধন করিল, যথাঃ-

উপরি-উক্ত Regulations এর Volume II এর B.P. Form No. 34/Bengal Form No-403Q এর পরিবর্তে নিম্নরূপ Form প্রতিস্থাপিত হইবে, যথাঃ-

B.P. Form No. 34
Bengal Form No. 403Q

1. ACCIDENT REPORT NO.	**BANGLADESH POLICE** Register of Road Traffic Accident (REPORT FORM) [Regulation 254(b)]	3. THANA
2. FIR NO.		4. DISTRICT/MET. POL.

5. NUMBER OF VEHICLES INVOLVED	9. ACCIDENT SEVERITY F. Fatal Accident G. Grievous Accident S. Simple Injury Accident M. Motor Collision	DATE OF OCCURRENCE 11. DATE 12. MONTH 13. YEAR ...../...../.....
6. NUMBER OF DRIVER CASUALTIES		14. TIME OF OCCURRENCE
7. NUMBER OF PASSENGER CASUALTIES		Date Of Reporting
8. NUMBER OF PEDESTRIAN CASUALTIES	10. DAY	Time Of Reporting

15. JUNCTION TYPE 1. Not at Junction 2.  3.  4.  5.  6. Railway 7. Other	16. TRAFFIC CONTROL 1. No Control 2. Centreline 3. Pedestrian Crossing 4. Police Controlled 5. Traffic Lights 6. Police + Traffic Lights 7. Stop/Give Way sign 8. Other	17. COLLISION TYPE 1. Head On 2. Rear End 3. Right Angle 4. Side Swipe 5. Overturned Vehicle 6. Hit Object in Road 7. Hit Object off Road 8. Hit Parked Vehicle 9. Hit Pedestrian 10. Hit Animal 11. Other	18. MOVEMENT 1. 1-Way Street 2. 2-Way Street 19. DIVIDER ? 1. Yes 2. No

20. WEATHER 1. Fair 2. Rain 3. Wind 4. Fog	21. LIGHT 1. Daylight 2. Dawn/Dusk 3. Night (lit) 4. Night (unlit)	22. ROAD GEOMETRY 1. Straight + Flat 2. Curve Only 3. Slope Only 4. Curve + Slope 5. Crest	23. SURFACE CONDITION 1. Dry 2. Wet 3. Muddy 4. Flooded 5. Other	24. SURFACE TYPE 1. Sealed 2. Brick 3. Earth	25. SURFACE QUALITY 1. Good 2. Rough 3. Under Repair	26. ROAD CLASS 1. National 2. Regional 3. Feeder 4. Rural Road 5. City

27. ROAD FEATURE 1. None 2. Bridge ..... 3. Culvert 4. Narrowing/Restriction 5. Speed Breakers	28. LOCATION TYPE 1. Urban Area 2. Rural Area	OFFICE USE ONLY	29. XY MAP 30. X 31. Y	32. ROUTE 33. KM 34. 100m	35. NODE MAP 36. NODE 1 37. NODE 2

LOCATION
Name of City/Town/Village ..... Distance: ..... (km/m)

Name of Road ..... Between { Landmark 1 ..... Distance: ..... (km/m)
Landmark 2 ..... Distance: ..... (km/m)

JUNCTION ACCIDENT ONLY Name of SECOND Road ..... Distance: ..... (km/m)

LOCATION SKETCH Show site in relation to prominent landmarks such as KM posts, bridges or road intersections. Mark distances to the landmarks

COLLISION DIAGRAM SKETCH mark the position and direction of each vehicle and details of the road layout at the site of the accident

SUMMARY OF ACCIDENT

WITNESSES
1. Name & Address .....
2. Name & Address .....

RECORDING OFFICER
Name/Rank ..... Date .....

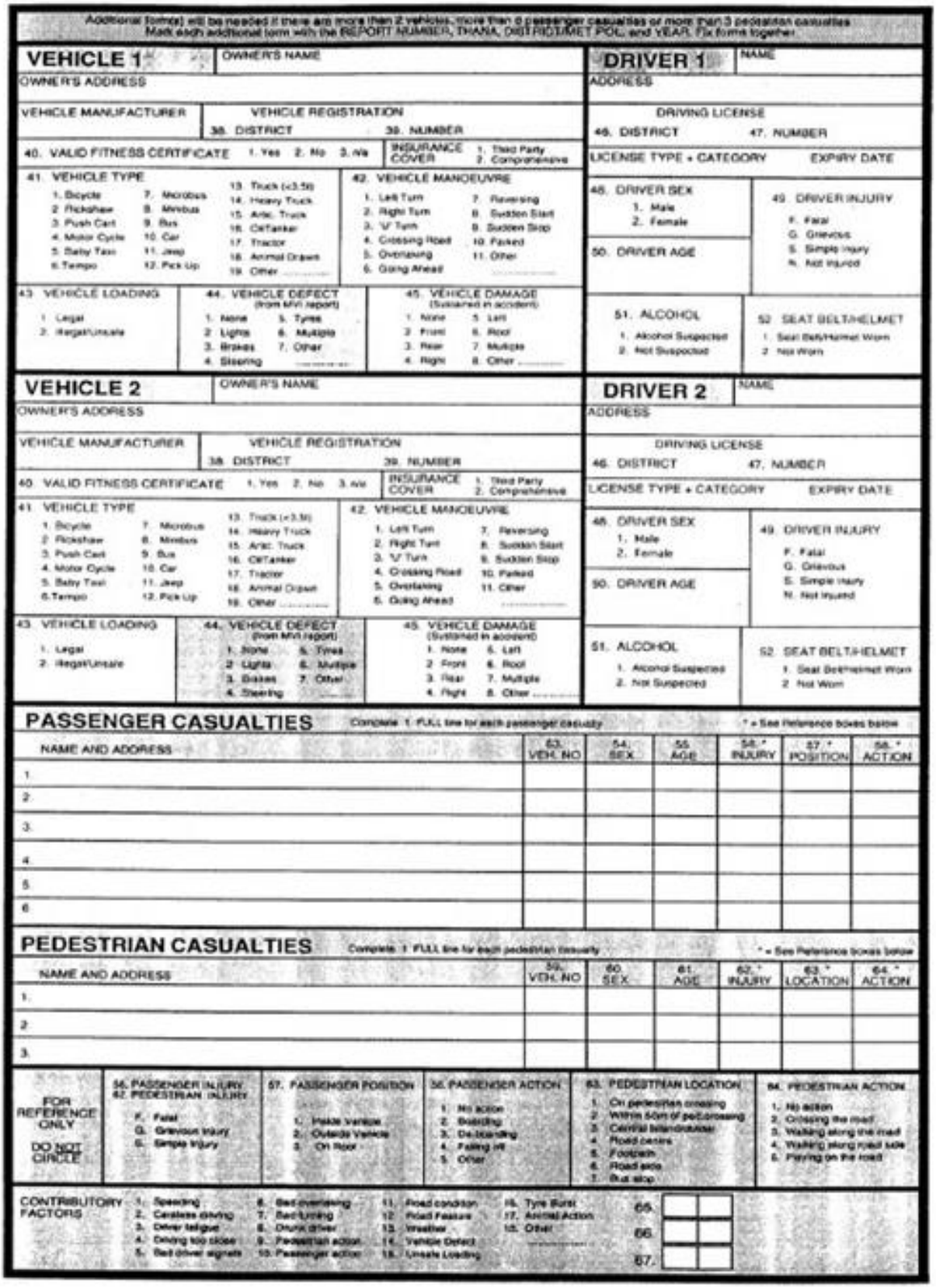
INVESTIGATING OFFICER
Name/Rank ..... Date .....

SUPERVISING OFFICER
Name/Rank ..... Date .....

SECTION OF LAW

STATUS OF CASE 1. Charge Sheet 2. Final Report 3. Under Investigation

Contd P/2



Additional form(s) will be needed if there are more than 2 vehicles, more than 6 passenger casualties or more than 3 pedestrian casualties.
Mark each additional form with the REPORT NUMBER, THANA, DISTRICT/MET POL and YEAR. Fix forms together.

VEHICLE 1 — OWNER'S NAME — OWNER'S ADDRESS

VEHICLE MANUFACTURER — VEHICLE REGISTRATION: 38. DISTRICT — 39. NUMBER

40. VALID FITNESS CERTIFICATE: 1. Yes 2. No 3. n/a — INSURANCE COVER: 1. Third Party 2. Comprehensive

41. VEHICLE TYPE
1. Bicycle 2. Rickshaw 3. Push Cart 4. Motor Cycle 5. Baby Taxi 6. Tempo 7. Microbus 8. Minibus 9. Bus 10. Car 11. Jeep 12. Pick Up 13. Truck (<3.5t) 14. Heavy Truck 15. Artic. Truck 16. Oil Tanker 17. Tractor 18. Animal Drawn 19. Other

42. VEHICLE MANOEUVRE
1. Left Turn 2. Right Turn 3. 'U' Turn 4. Crossing Road 5. Overtaking 6. Going Ahead 7. Reversing 8. Sudden Start 9. Sudden Stop 10. Parked 11. Other

43. VEHICLE LOADING
1. Legal 2. Illegal/Unsafe

44. VEHICLE DEFECT (from MVI report)
1. None 2. Lights 3. Brakes 4. Steering 5. Tyres 6. Multiple 7. Other

45. VEHICLE DAMAGE (Sustained in accident)
1. None 2. Front 3. Rear 4. Right 5. Left 6. Roof 7. Multiple 8. Other

DRIVER 1 — NAME — ADDRESS

DRIVING LICENSE: 46. DISTRICT — 47. NUMBER

LICENSE TYPE + CATEGORY — EXPIRY DATE

48. DRIVER SEX: 1. Male 2. Female

49. DRIVER INJURY: F. Fatal G. Grievous S. Simple Injury N. Not Injured

50. DRIVER AGE

51. ALCOHOL: 1. Alcohol Suspected 2. Not Suspected

52. SEAT BELT/HELMET: 1. Seat Belt/Helmet Worn 2. Not Worn

VEHICLE 2 — OWNER'S NAME — OWNER'S ADDRESS

VEHICLE MANUFACTURER — VEHICLE REGISTRATION: 38. DISTRICT — 39. NUMBER

40. VALID FITNESS CERTIFICATE: 1. Yes 2. No 3. n/a — INSURANCE COVER: 1. Third Party 2. Comprehensive

41. VEHICLE TYPE
1. Bicycle 2. Rickshaw 3. Push Cart 4. Motor Cycle 5. Baby Taxi 6. Tempo 7. Microbus 8. Minibus 9. Bus 10. Car 11. Jeep 12. Pick Up 13. Truck (<3.5t) 14. Heavy Truck 15. Artic. Truck 16. Oil Tanker 17. Tractor 18. Animal Drawn 19. Other

42. VEHICLE MANOEUVRE
1. Left Turn 2. Right Turn 3. 'U' Turn 4. Crossing Road 5. Overtaking 6. Going Ahead 7. Reversing 8. Sudden Start 9. Sudden Stop 10. Parked 11. Other

43. VEHICLE LOADING
1. Legal 2. Illegal/Unsafe

44. VEHICLE DEFECT (from MVI report)
1. None 2. Lights 3. Brakes 4. Steering 5. Tyres 6. Multiple 7. Other

45. VEHICLE DAMAGE (Sustained in accident)
1. None 2. Front 3. Rear 4. Right 5. Left 6. Roof 7. Multiple 8. Other

DRIVER 2 — NAME — ADDRESS

DRIVING LICENSE: 46. DISTRICT — 47. NUMBER

LICENSE TYPE + CATEGORY — EXPIRY DATE

48. DRIVER SEX: 1. Male 2. Female

49. DRIVER INJURY: F. Fatal G. Grievous S. Simple Injury N. Not Injured

50. DRIVER AGE

51. ALCOHOL: 1. Alcohol Suspected 2. Not Suspected

52. SEAT BELT/HELMET: 1. Seat Belt/Helmet Worn 2. Not Worn

PASSENGER CASUALTIES — Complete 1 FULL line for each passenger casualty — * = See Reference boxes below

NAME AND ADDRESS	53. VEH. NO	54. SEX	55. AGE	56.* INJURY	57.* POSITION	58.* ACTION
1.						
2.						
3.						
4.						
5.						
6.						

PEDESTRIAN CASUALTIES — Complete 1 FULL line for each pedestrian casualty — * = See Reference boxes below

NAME AND ADDRESS	59. VEH. NO	60. SEX	61. AGE	62.* INJURY	63.* LOCATION	64.* ACTION
1.						
2.						
3.						

FOR REFERENCE ONLY — DO NOT CIRCLE

56. PASSENGER INJURY / 62. PEDESTRIAN INJURY: F. Fatal; G. Grievous Injury; S. Simple Injury

57. PASSENGER POSITION: 1. Inside Vehicle; 2. Outside Vehicle; 3. On Roof

58. PASSENGER ACTION: 1. No action; 2. Boarding; 3. De-boarding; 4. Falling off; 5. Other

63. PEDESTRIAN LOCATION: 1. On pedestrian crossing; 2. Within 50m of ped.crossing; 3. Central Island/divider; 4. Road centre; 5. Footpath; 6. Road side; 7. Bus stop

64. PEDESTRIAN ACTION: 1. No action; 2. Crossing the road; 3. Walking along the road; 4. Walking along road side; 5. Playing on the road

CONTRIBUTORY FACTORS: 1. Speeding; 2. Careless driving; 3. Driver fatigue; 4. Driving too close; 5. Bad driver signals; 6. Bad overtaking; 7. Bad turning; 8. Drunk driver; 9. Pedestrian action; 10. Passenger action; 11. Road condition; 12. Road Feature; 13. Weather; 14. Vehicle Defect; 15. Unsafe Loading; 16. Tyre Burst; 17. Animal Action; 18. Other

65. 66. 67.

মোঃ ইলিয়াছিল হোসেন
অফিসার ট্রাফিক পরিদর্শক