"STUDY ON ACCIDENT TREND OF PEDESTRIAN CRASH IN DHAKA METROPOLITAN AREA"

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

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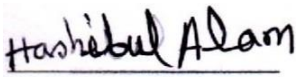
Declaration

This is to certify that the following students, who worked under my direct supervision, completed the project and thesis titled "**STUDY ON ACCIDENT TREND OF PEDESTRIAN CRASH IN DHAKA METROPOLITAN AREA"** in part to satisfy the requirements for the degree of Bachelor of Science in Civil Engineering. This work was completed in the laboratories of the Department of Civil Engineering within the Faculty of Engineering at Daffodil International University. The thesis's presentation took place on September 17, 2022.



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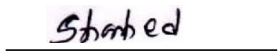

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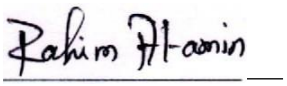

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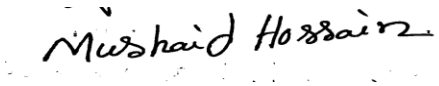

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Approval

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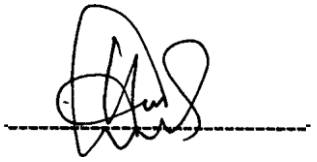

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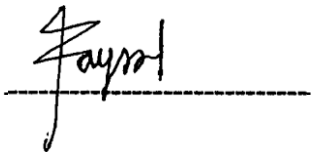

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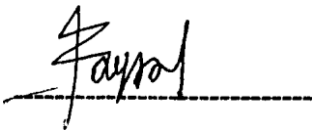

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DEDICATION

"In the name of Allah- The Gracious, The Merciful."

In Honor of Our Parents

ABSTRACT

The leading cause of death for young people in the world between the ages of 16 and 24 is motor vehicle accidents. Bangladesh ranks among the highest global rates of traffic fatalities. The capital city of Bangladesh, Dhaka, is also the most dangerous in consideration of both the overall number of collisions and fatal accidents. In our study total 2940 pedestrian accidents happened overall between 2006 and 2015. This has resulted in 2414 pedestrian fatal accidents overall.

In this context, the issue of road safety has emerged as one of the main concerns for Dhaka's traffic cops and transportation authorities. Determining the much more hazardous streets, the sufferers, and the pedestrian action in DMP (Dhaka metropolitan) road area. In Dhaka, which has a population of almost 22 million, road accidents are a big issue. Traffic accidents are more challenging in Dhaka city. The record for all traffic crashes over the past 10 years was given by the Accident Research Institute (ARI) (2006–2015).

According to pedestrian activity, 85% of accidents happened when crossing the road, which suggests that unsafe crossing the road continues to be the leading cause of pedestrian accidents. Our study yielded an 82% death rate. Buses have the greatest accident rate of any type of vehicle, at 40%. Gender study shows that just 25% of female pedestrians have been involved in vehicle accidents, compared to 75% of male pedestrians.

Traffic law enforcement will gain from the study's ability to pinpoint the primary causes of pedestrian accidents and will put into practice some traffic laws requiring pedestrians to cross roads on foot across bridges. additionally, a clearly defined bus stop should be available to prevent frantic stops by vehicles. The situation and trends related to road safety in the DMP area have been thoroughly explored in this paper. Additionally, it highlights some current concerns and goals for improving road safety for pedestrian.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

1.1 Background:

Road transport benefits all nations and the general populace by promoting the flow of goods. along with people. It offers enhanced access to employment, business, industry, education, leisure, and Health services have a favorable impact on public health both directly and indirectly. However, increased vehicle traffic has had a significant negative effect on human welfare in the automobile accidents, physical activity loss, and negative health effects. Its motion is the impact of people and things on the economy, society, and environment damaging. automobile accidents that result in injuries and deaths are a serious concern worldwide, and current trends show that this is expected to continue for a long time. The prevalence of traffic accidents is becoming more recognized as a serious public health issue. Although death rates have steadied or decreased in many rising countries over the past few decades, it is clear that the epidemic of worldwide traffic accidents is still spreading in the majority of the world's regions. Each year, 1.35 million individuals lose their lives in traffic-related accidents, and 20 to 50 million people worldwide suffer injuries as a result of road traffic. The eighth-leading cause of death globally is now traffic accidents. More than half of all traffic deaths worldwide are caused by vulnerable road users, notably pedestrians, cyclists on pedals, and riders; pedestrians are regarded as the most dangerous road users (WHO, 2018)

1.2 Problem Statement:

It is examined the potential triggering variables of pedestrian safety related with jaywalking and mobile phone-induced distractions at crossroads in developing countries, despite the considerable literature on pedestrian crosswalk behavior and pedestrian safety. The majority of recent research have focused on how often pedestrians break traffic laws by crossing the road erratically (doing so at a red light or outside of a crosswalk). In underdeveloped nations like Bangladesh, the pedestrian walkway is typically seen to be crowded, unclean, and hazardous. As a result, people on foot are occasionally forced to walk in the street on the road.

People are generally aware of the dangers of jaywalking in most modern nations. Additionally, there are very few people who are indifferent to the risk of jaywalking while distracted by various cell phone-induced activities due to the seriousness of the repercussions. On the other hand, people in underdeveloped nations like Bangladesh lack understanding about jaywalking,

and pedestrians are frequently observed doing so while distracted by their mobile phones. Therefore, a combined analysis of pedestrians' safety perceptions regarding the risks of jaywalking and distracted jaywalking behavior caused by cell phones has been conducted in this study.

1.3 Objective of the study:

This study's goal is to pinpoint the features of accidents that happened on particular arterial road segments within the Dhaka Metropolitan Area.

1.To identify the accident trend of Dhaka metropolitan area for pedestrian action.

2.To determine the reason for the accidents in DMP area.

3.To find out how to make those roads safe from accidents.

1.4 Organization of the Thesis:

This thesis is divided into five chapters, including this one. At the introductory

Chapter-1, a strive has been made to supply a thinking about the heritage of the find out about and on the significance of the study. Then the targets and scope of the find out about have been mentioned briefly.

Chapter 2 The second chapter of this study explores the literature pertinent to its issue. Understanding the significance and necessity of traffic safety will be made easier by this review. Road accidents in DMP have been studied in great detail in the literature. The review includes definitions that are necessary as well as accident features, categories, factors, types, causes, and prevention.

Chapter 3 illustrates the study area and the methods of accident trend. On the one hand, we have recognized the traffic accident exaggerated in Dhaka city and also grasped the software MAAP'S goals and implementation.

Chapter 4 shows the analysis of the data which were gathered from Accident Research Institute (ARI).

Chapter 5 The study's conclusions and recommendations are outlined in this chapter, and recommendations for further research are also covered.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction:

Numerous people globally are murdered and wounded on roadways every day. There is never a guarantee that anyone traveling by foot, bicycle, or motor vehicle will arrive at their destinations or return home, whether they are headed to school or work, playing in the streets, or taking an extend journeys, safely. Each year, many of individuals require lengthy hospital stays due to severe many of them are unable to live, work, or play as they once did due to crashes.

2.2. Classification of Road Accidents:

Categories for accidents

For the various agencies/organizations involved in reporting, research, investigation, enforcement, etc., uniform classification of traffic accidents is crucial to achieving uniform data.

a) Accident severity-based primary classification: I Fatal (ii) Injury (Grievous and Simple Injury) (iii) Only property damage

Accidents that result in death or serious injury are collectively referred to as "casualties."

Accidents can also be divided into urban and rural accidents, intersection accidents, and link accidents.

There is a four-part classification in the UK:

(I)Fatal

(ii) Serious

(iii) Minor

(iv) Not Injured

In some Australian jurisdictions, all injuries—including those that don't need medical attention are classified in one of three ways:

(I) Minor Injury

(ii) Injury

(iii) Fatality

b) Classification in Detail

In terms of how the collision occurred, Accident types include:

(I)Running off the road

- ✓ Hit a target No thing

(ii) No traffic collision

- ✓ Reversing

- ✓ Other

(iii) Roadside collision

- ✓ Passenger
- ✓ A different automobile (in transport or parked)
- ✓ Train, railroad
- ✓ the bicycle
- ✓ Wildlife
- ✓ Fixed item
- ✓ Another item

Again, there are other types of collisions involving automobiles, including angle, rear-end, sideswipe, etc. In
All of the classes listed above are taken into account in this study.

2.3 Definition and types of road accident

2.3.1 Definition of road accidents: An incident that causes or has the potential to cause injury is referred to asana "accident." (Mohan and Berger, 1996) a collision involving at least one moving vehicle that happened on a road that is open to public traffic and resulted in either injuries, fatalities, or property damage.

2.3.2 Types of road accidents

- Crashing into other vehicles coming from nearby streets.
- Collisions involving moving automobiles turning in the other direction.
- Collisions from behind.
- Vehicles colliding with pedestrians.
- Head-on collisions (such as sideswiping) between cars moving in the same direction.
- Off-road driving by vehicles.
- Collisions with stationary objects off the road and car-parked-vehicle collisions.

2.4 Accident factors

A road collision occurs as a result of a combination of various contributing elements, such as

1. Human factors
2. Vehicular factors
3. Environmental aspects
4. Mechanical factors

2.4 .1 Human factors

Road users who may be at fault in an accident due to "human factors" include drivers, pedestrians, and passengers, among others.

✓Drivers

One of the most common road users to cause an accident is the driver. In order to drive safely, the driver's fitness is therefore crucial. Accidents are caused by a variety of factors, including driving at excessive speeds and in a hurry, negligence, breaking traffic laws, failing to perceive or interpret traffic conditions and traffic signs and signals, temporary effects from sleep deprivation, alcohol use, or other factors, among others. These are the things that contribute to drivers getting into accidents

✓Fast Speed Addictions

In general, drivers have a propensity to operate vehicles at speeds that may exceed design limits and result in hazardous situations. Over speeding may occur for a variety of reasons, including the desire to maximize profit, catch up on lost time, and a speed-crazed mentality.

✓ Distracted and Inefficient Driving

Driving is a skill that requires nearly all of your sensory faculties to be active at once in order to be successful. Driving efficiency is a result of both professional experience and educational background. Undisciplined drivers are more likely to be inefficient. He might not understand driving laws and regulations well enough or have the right attitude to recognize accident causes.

✓Age

Older drivers, those who are 60 years of age or older, typically drive slowly and have poor vision. Younger drivers, those between the ages of 16 and 25, have a tendency to drive too quickly and lack both experience and skill when operating a motor vehicle, particularly when they are involved in an accident (Esnizah, 2008).

✓Gender

According to certain reports, men are more likely than women to be involved in car accidents (Agbonkhose et al. 2013). Furthermore, although females are disproportionately more likely to be engaged in injury crashes than males, males are more sensitive to increased odds of having fatal crashes. Males are typically thought to be more susceptible to traffic risks because of this perception, as well as because of their participation in numerous activities including commuting to work and frequenting social venues like beerhalls and pubs (Al-Haji, 2005;

Agbonkhose et al. 2013). However, as more women participate in formerly male-dominated activities, this tendency is shifting and they are exposed to additional traffic risks (Al-Haji, 2005)

✓ Passing by

When a car is on the road, this is a typical occurrence. Overtaking safely does not violate the law or cause an accident. However, passing incorrectly or in situations where it is forbidden might be dangerous.

✓The Driver's Physical and Mental State

A driver must be in good physical and mental health to do his job. Drivers who have trouble integrating information and have poor perception are more likely to be in accidents. Continuous driving, especially at night, can lead to fatigue and loss of attention. Older drivers may struggle in situations requiring quick decisions because of reduced eyesight and data analytical abilities.

✓ People on foot

The main causes of pedestrian casualty on roadways include ignorance of road use, traffic laws and regulations, breaking the law, and recklessness when using the route. Accidents are also brought on by inadequate pedestrian infrastructure.

To promote safe travel, pedestrian infrastructure like sidewalks, crosswalks, specific pedestrian barriers, pedestrian refuge islands, tunnels, and overpasses should be correctly constructed.

✓Travelers

Accidents can occasionally be caused by the actions of the people riding in the cars. Characteristics of passengers that may contribute to accidents include interfering with the driver, making noise, laughing, and diverting the driver's attention, projecting their bodies outside the vehicle, entering or exiting moving vehicles from the wrong side, giving drivers unexpected instructions, etc.

2.4.2 Vehicle Elements

Road accidents may occur as a result of the state and features of the cars. Accident reduction in industrialized nations has been significantly aided by advancements in automotive design, occupant protection, and vehicle maintenance. However, especially when cars are locally produced or assembled, the safety design of automobiles in underdeveloped countries occasionally falls behind that of developed countries. The fleet of vehicles is often older and has a large number of foreign-imported automobiles.

The following are a few of the more typical vehicle factors that contribute to accidents, according to Hoque (2003):

✓Vehicles Physical aspects

- Speedometer, Windshield, Mirror, Brakes, and Wiper

Vehicles Tires that are worn out, combining radial and cross-ply tires, incorrect tire pressure, and other circumstances Bumper \Vehicles Indicator lights, headlights, red lights, defective taillights, dirty lights, a loose steering wheel, and a faulty horn are examples of communication factors.

Vehicles Sitting arrangement, roof handrail, frame, stair connection, engine cover are some modification factors.

Vehicle loading variables

Overhang and overload

2.4.3 Environmental Factors

The following environmental factors have an impact on road safety: 15 - The flow of traffic and its attributes, such as mixed traffic, composition, speed, etc. Driving is dangerous when there are unfavorable weather conditions including mist, haze, sleet, dust, smoke, or heavy rain. Additionally, the road's surface could turn slick and cause vehicle skidding, which could lead to a lot of accidents.

2.4.4 Mechanical Factors

A complete or partial input/output power loss is a power failure.

Due to a low-quality metal part, an engine or machine component may be broken or damaged.

Engine or machine fire outbreak brought on by a cooling issue or spark

Explosion: a result of extreme pressure or an uncontrollable circumstance

Fuel quality and availability might cause the engine to stall.

Mechanical mismatch brought on by a broken timer or other mechanical issue

Shaft, gear, coupler, belt, or chain failure; linkage failure

System leaks, such as those in hydraulic power systems that use pressured air or fluid

age-related reasonable wear and tear

Failure of the mechanical, electrical, or electronic control system

Failure of an electrical component or printed circuit board can cause a circuit or program to malfunction.

2.5 An analysis of earlier research on "Road Accidents" in Bangladesh

Numerous research on Bangladesh's characteristics, road safety issues, and traffic accidents have been conducted and presented as theses, journals, reports, papers at conferences and seminars, among other formats. The discussion that follows is based on several outstanding earlier investigations.

1). Ahmed (2013) Automobile accidents are the world's top cause of mortality for young people between the ages of 16 and 24. One of the highest global rates of traffic deaths is in Bangladesh. Dhaka, the capital of Bangladesh, is also the city with the highest risk of accidents in terms of both total accidents and accident rates. In total, 2,720 accidents occurred between 2007 and 2011. 1,481 fatal pedestrian accidents, including 1,562 pedestrian fatalities and injuries, have been caused by this. Given this situation, one of the main transportation problems is the problem of road safety. Traffic police and inspectors in Dhaka. This study's objective is to identify the most dangerous roads, the number of fatalities, and the precise reasons of traffic accidents.

2). Sohel Mahmud et al., (2014) Traffic accidents continue to result in a significant and rising number of fatalities and severe injuries, particularly in developing nations like Bangladesh, despite significant advances in international traffic safety efforts. The sustained decline in traffic deaths in developed nations has been ascribed to concerted efforts across a variety of fields, including efficient coordination, community engagement, thoroughly researched road safety measures, best practices, and improved resource allocation. With approximately 50 fatalities per 10,000 on-road motor vehicles, Bangladesh has one of the highest rates of road accident fatalities. This essay attempts to demonstrate in detail the scope and consequences of traffic accidents using data from both the global and national scales, with a focus on regional variation. This information demonstrates the severity of the current road traffic injury issue and suggests that, in the absence of prompt action, it will only become worse. The elements that contribute to accident generation in interactions with the road environment, other vehicles, and road users are also briefly discussed in this document, which also describes some target-oriented priority activities to stop these recurrent losses.

3). Anjuman et al., (2007) Nearly 16,000 people worldwide pass away from injuries each day. For every person who passes away, thousands more suffer injuries, many of which have long-term effects. People of all ages and socioeconomic backgrounds are impacted by injuries, which happen in all nations and locations. However, the severity of the issue varies

significantly by age, sex, region, and financial level. Road traffic accidents claim the lives of an estimated 1.2 million people each year, and another 20 to 50 million sustain injuries. However, a developing nation like Bangladesh is more severely affected by this issue of traffic accidents and the harm and deaths they cause. This article examines the potential causes of road traffic accidents in Bangladesh in light of all the available information.

4).(Mahmud, 2011) Road accidents are a worldwide tragedy, and Bangladesh, like many other nations, experiences significant annual losses as a result of these accidents. The frequency of accidents and fatalities on the roads are growing over time due to the increase of motorization, urbanization, and hence the number of road users. It is necessary to have accurate and logical accident rates and accompanying patterns in order to comprehend or evaluate the issue appropriately. In Bangladesh, there were 62 motor vehicle fatalities per 10,000 registered vehicles in 1985, but there were only 45 in 2007. The decline in this mortality rate is even more dramatic when taking into account on-road motor vehicles rather than registered motor vehicles, going from 98 in 1985 to 56 in 2007, and the latter should be better indicators of the real situation. The country's population doubled between 1971 and 2007, and with some interstitial changes, the number of accidents and fatalities rose from 1.14 to 3.87 and from 0.41 to 2.98 per 100,000 people, respectively. Between 1999 and 2004, the number of accidents and fatalities per 100 million vehicle kilometers declined by 49.08 percent and 42.77 percent, respectively. Using police reported accident data, an effort has been made in this study to assess the rate of road traffic accidents and mortality trends in terms of overall numbers, vehicle population, population, road length, and vehicle kilometer.

5).Hoque (1981) conducted research on road accidents in the Dhaka Metropolitan Area with the goal of locating and analyzing high accident areas. He reached some significant findings from the police department's reported and recorded accident data from January 1997 to June 1980, with the following being the important ones:

i. Of all accidents reported, 7% resulted in fatalities, 40% in personal injuries, and 53% in property damage. form of property harm.

ii. Intersections and mid-blocks both saw a 47 percent and 53 percent accident rate respectively.

iii. The most accidents occurred between the hours of 9 AM and 12 PM and 1 PM and 3 PM. 75 6 percent 5 percent of accidents were not accidents, whereas 19 percent happened at night mentioned.

iv. Monday and Tuesday had the most accidents in August.

v. The top four junctions and 19 mid blocks where accidents happened most frequently were noted.

Hoque noted the following contributing reasons for frequent collisions at intersections:

i. Insufficient capacity at intersections

ii. Through-lane issues due to slow-moving vehicles frequently occupying the left lanes.

iii. Cars making a right turn but blocking the through lanes.

iv. Driveways and curbside parking near intersections

v. Insufficient visual ranges, small turning circles, and a lack of auxiliary lanes all increase the risk of accidents.

Hoque identified different roadside risks and downsides using photographs and actual site observations. He made suggestions for how to make the identified hazardous sites safer. He offered suggestions for the road as well.

6). Banik (1987) Using accident information from 1982 to 1985, it was possible to identify accident-prone areas, accident trends, and accident severity and features on the Dhaka-Aricha route. Based on the frequency of accidents, 23 accident-prone areas were found within the research region.His investigation revealed that of all accidents, 35% happened at bridge approaches, 34% happened at road linkages, and 25% happened at road intersections. 36 percent of crashes involve multiple vehicles, 29 percent involve a single car leaving the road and/or hitting a stationary object, and 27 percent involve a single vehicle striking a pedestrian.He also looked at other aspects of incidents, such as the involved vehicles and hourly, daily, and monthly variations. He advised several corrective actions, such as bettering the geometry of the roads and removing impediments from the right-of-way.

7).Islam (1996) used records from January 1993 to June 1995 to examine traffic accidents in the Chittagong Metropolitan Area. In order to suggest some potential low cost technical remedies to reduce crashes and the casualties they cause, he analyzed the accident factors and high accident 23 sites.

The following are the study's principal conclusions.

i. Crash Characteristics: Of the 522 recorded accidents that occurred during the course of the study, 217 (42%) were fatal, 255 (49%) resulted in personal injuries, 46 (8%), in property damage, and the remaining 4 (1%), in accidents of undetermined severity.

- It was discovered that 48 percent of all accidents happened in the middle of a block, and 52 percent occurred near intersections.
- 43 percent of accidents involved a pedestrian being hit by a car. 12 percent of the collisions included a single car, and 45 percent involved multiple vehicles.
- Hazardous areas were found at 12 junctions and 10 mid-blocks.

- The three most common accident types—pedestrian accidents, rear-end collisions, and head-on collisions accounted for around 76 percent of all accidents.

8).Ahmed (2002) examined the Savar Thana accidents on the Dhaka-Aricha motorway.
The following are some of his conclusions. From 1997 to 2002, there were 210 traffic accidents in the study region.
ii. Accidents with 1.46 percent fatalities, 23.41 percent minor injuries, and 75.12 percent property damage.
iii. There were found to be five trouble sites.
iv. Accidents involving pedestrians and rear-end collisions were the most common categories. representing 77.63 and 14.28 percent of all accidents, respectively.
v. 65.03 percent of accidents happened during the day, and 34.97 percent happened at night.
He suggested a few inexpensive engineering solutions for intersections and mid blocks.

9).Aufuzzaman (2003) analyzed the features of incidents that happened on the five selected Dhaka arterials, including I Darussalam-Mirpur 10 (ii) Mohakhali Rail Crossing. Chowrasta Moghbazar (iii) Bus stop in Gabtali, Nilkhet Mohr (iv) for the years 1996 to 2001, Abdullahpur bus stand, Mohakhali Rail Crossing, Pressclub, and Motijheel. Among his study's key conclusions are:
i. Of 1847 accidents that occurred on the five selected arterials, pedestrian hits (39.5 percent) and rear-end collisions were the most common collision types (32.54 percent).
ii. Motorized vehicle involvement was 77.96% while non-motorized vehicle involvement was 22.04%.
iii. The severity of accidents in the study ranged from deadly (37.19%), grievous (40.06%), simple (10.18%), and collision (13.22%).
iv. Overall, 28.64 percent of accidents happened at intersections and 71.36 percent happened on links. The outside regions arterials had a higher rate of link accidents than the inner ones.
v. The most common types of transportation for accident victims were baby taxis (21.39 percent), rickshaws (16.4%), cars (12.67 percent), big trucks (11.75%), and minibuses (9.1 percent).
He offered various improvement steps based on the accidents' recognized features, such as providing the relevant Dhaka Metropolitan Police employees with the appropriate training.
ii. A provision for follow-up casualties, even for one month, should be included in the accident report form.

10).Muniruzzaman (2004) attempted to represent the accident circumstances and assess the effectiveness of the safety measures built along the Dhaka-Aricha highway, between the years 1990 and 2003. Both "before" and "after" data were gathered. following the completion of safety improvement projects along this highway.
Findings from the examination and evaluation of traffic accident recording and reporting
The following is a summary of safety measures:

i. A total of 1922 accidents occurred, of which 60% resulted in fatalities and 28% in serious injuries. only 7% were straightforward, and 5% of accidents caused property damage.

ii. About 70% of accidents happened during the day, and 30% happened at night.

iii. Heavy trucks and minibuses/buses are engaged in 45.6 percent and 31.6 percent of accidents, respectively.

iv. Accidents involving pedestrians were the most common, accounting for56.3% of all reported accidents

v. In this study area, head-on (1.54) and hit object (1.42) type accidents had the lowest death indices, while overturned incidents (2.1) had the highest.In order to further enhance the safety condition along the roadway, he provided a number of site-specific recommendations findings of the research.

11).Ahmed and Ahmed (2012) based on data for the years 2007 to 2011, investigated the features of the automobile accidents that occurred in Dhaka. The article concentrated on a few particular parameters. The study made recommendations for the road accident data gathering and management system in Dhaka based on the findings.

12).Harmeen and Islam (2011) Road Accidents: Contemporary Context and Policy Matters in Bangladesh was published as a paper. This essay discusses the current state of road safety as well as some current concerns and goals for solving the issue. It planned to concentrate on how big vehicles and their drivers are involved in traffic incidents, as well as their behaviors and attitudes. This article also covered accident data, significant contributing factors, and advice.

13.(Anowar, 2007) Traffic accidents not only destroy automobiles and property, but they also kill people and create countless pains and hardships for the victims' loved ones. Road accidents are rising alarmingly fast in Bangladesh, and this rate is reached at red lights.as a direct result of the population's rapid growth, a signal for pedestrians, urbanization and motorization Road safety is consequently rapidly declining as a result of this, and By worldwide standards, the issue is turning out to be very serious. In order to identify the main causes, factors, and types

of pedestrian accidents so that appropriate intervention procedures or countermeasures can be suggested in order to reduce such accidents, this paper aims to provide a broad overview of some characteristic features of pedestrian traffic accidents and related safety problems on Mirpur arterial for the last eight years. Additionally, efforts were made to assess the existing pedestrian facilities' state by field observation.

2.6. Definitions of some related terms:

Casualty:

A casualty is a person who is killed or wounded as a result of an accident.

Class of Casualty:

Casualty class is the level of harm a participant in an accident has incurred.

accident. It can be grouped into:

Fatal or dead:

A person is considered a casualty if they have passed away within a year of an accident as a result of wounds they received there.

Grievous injury:

A person who has spent one night or more in the hospital being treated for injuries is referred to as a grievous injury casualty.

Minor injury:

Casualty is a term used to describe an accident victim who suffered minor injuries but was not taken to the hospital. It can also refer to an accident victim who was hurt and received medical attention, but not overnight.

Accident Severity:

The most serious casualty class any of the people involved in the accident suffered is the definition of accident severity. There is no information provided regarding the quantity and severity of injuries sustained by other accident participants or the number of automobiles involved.

CHAPTER 3

DATA COLLECTION AND METHODOLOGY

3.1 Introduction

It took a lot of time to gather statistics on traffic accidents. The Accident Research Institute (ARI), BUET, Bangladesh Road Transport Authority (BRTA), Local Government Engineering Department (LGED), and Roads provided statistics on traffic accidents. long with Dhaka Metropolitan Police, Highways Department (RHD) (DMP). data on accidents of the time frame from January 2006 to December 2015 were accessible and gathered.

3.2 Study Area and Methodology

With a population of approximately twenty two million, traffic accidents are a major concern in Dhaka. This essay describes all the actions that must be made to ensure the safety of the public by emphasizing the causes and solutions to road accidents. To start, a key concern in Dhaka's overall road management issue has been highlighted as traffic accidents and ways to prevent them. Accident research institute (ARI) provided the data for all traffic accidents during the previous ten years (2006–2015). (DMP). Over a Ten-year period, data on all accidents that took place in Dhaka's 49 police stations were acquired. With this figure, the actual situation of recent ten-year road accidents is revealed, along with suggested remedies. After gathering the data, create bar charts, pie charts, line graphs, and tables using Microsoft Excel to illustrate the issues through their descriptions. This study focuses on the causes of road accidents as well as 10 years' worth of data on traffic accidents, analysis, and answers.

3.3 Flow chart

Figure 3.3Methodology flowchart

3.4 Study area map

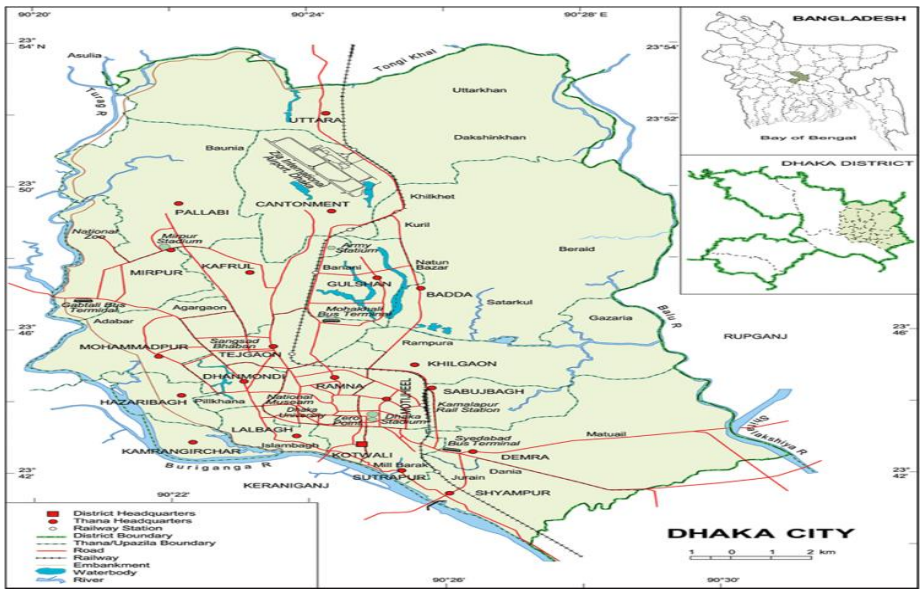


Figure 3.4 Dhaka city map

3.5. Problems Exaggerating Traffic Accidents of Dhaka City

In the DMP region, the following issues have been found to be among of the major causes of traffic accidents, particularly pedestrian collisions:

i. Poor and arbitrary use of footpaths

ii. Parking of cars along roads

iii. Retailers or Shops Located on Public Footpaths

iv. Inappropriate Zebra Crossing Use

v. Pedestrian Crossing Without Control

VI. Open Drain Slab on Footpath

vii. Road Filling and Cutting

viii. Road Damage

ix. Young and inexperienced drivers

x. Inappropriate Foot Over Bridge Use

xi. Informal Communities on Footpaths

3.5 Data collection:

During the study period, all the records from the Accident Research Institute (ARI, BUET) were gathered.

The data collection techniques used in this investigation are presented in this chapter. The accident data were gathered using the MAAP5 software, as was previously indicated in chapter 1. As a result, this chapter initially highlights the key capabilities of the MAAP5 software before summarizing how data was collected in the research locations.

3.5.1 Implementation Of MAAP In Metropolitan Dhaka

The National Road Safety Council (NRSC) of Bangladesh made a significant step in 1995 by recognizing the severity of the problem with road safety and the need for creating an all-encompassing, coordinated, and successful road safety policy. The Overseas Development Administration (ODA), the United Kingdom, and the World Bank committed to supporting the project to increase road safety in Bangladesh. A lengthy, manually-written accident report form had been offered in a previous project, but it was never put into use due to practical considerations. Instead, the World Bank requested that the UK Transport Research Laboratory's MAAP5 be taken into consideration. As a result, it was put into practice as a pilot project in three thanas of Metropolitan Dhaka's Northern Police Division in 1995. However, the most recent MAAP version, MAAP5, was introduced in 2003 to analyze accidents using through all over the Bangladesh.

3.5.2 The MAAP's goals

- Determine the traits or patterns of accidents.
- Putting dangerous locations or sites first.
- Aiding in the identification of suitable corrective measures, and
- A review of the safety measures taken.

3.6 Data prediction

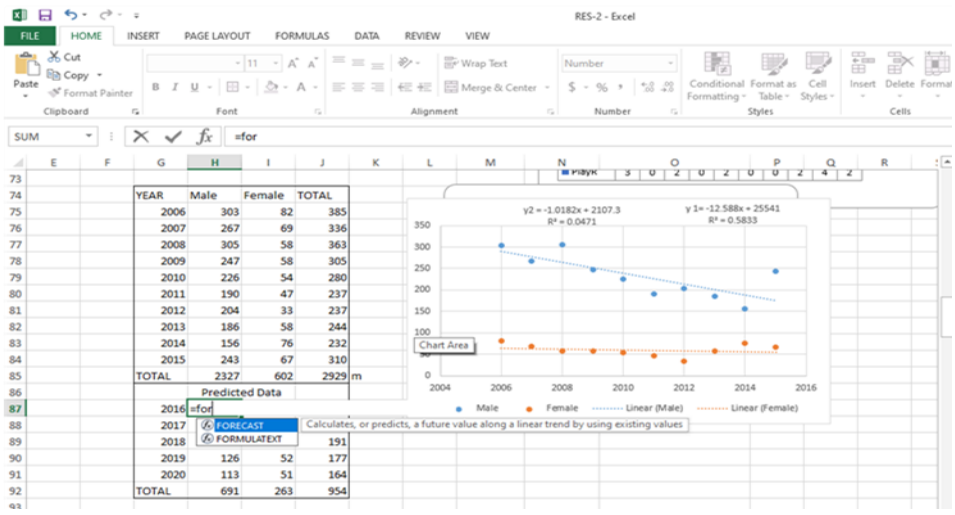


Figure 3.6: screen shot of excel regarding forecast formula

3.6.1 Forecast formula Execution

In this section we have showed execution of forecast formula in microsoft excel.

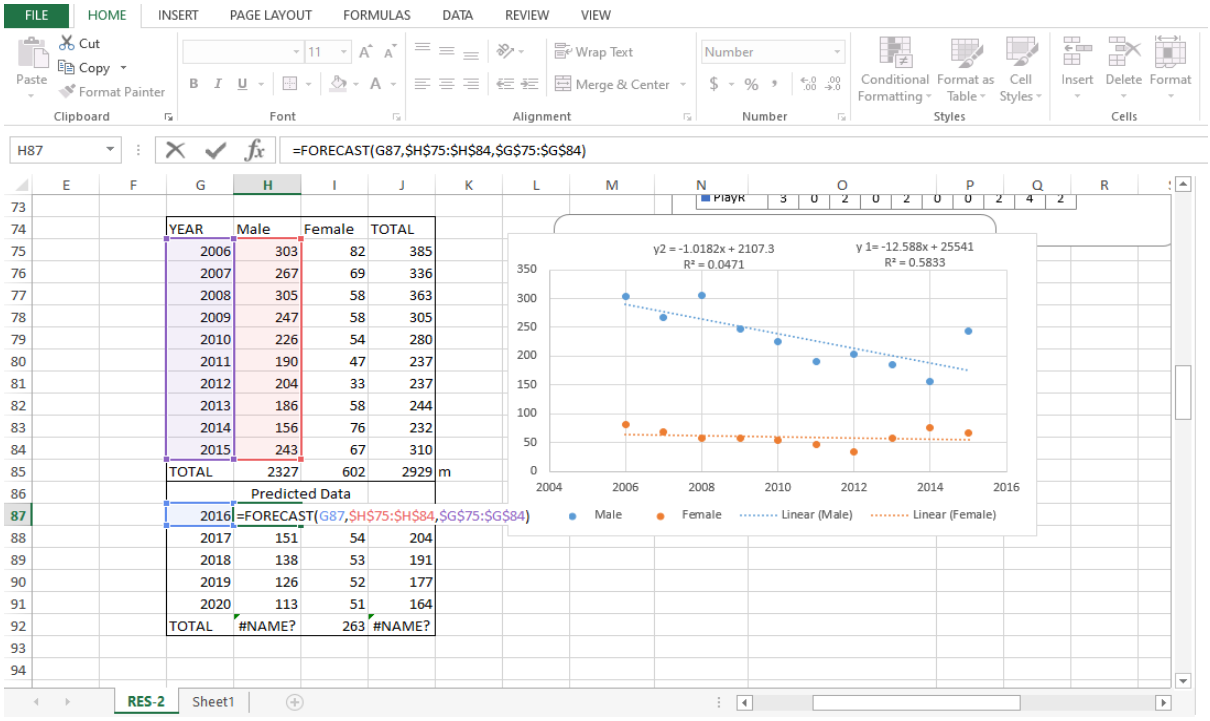


Figure 3.6.1 : screen shot of excel regarding forecast formula execution

3.7 overview

The chapter shows the study area and the methodology of accident trend, on the other hand we have identified the traffic accident exaggerating in Dhaka city and also understood the software MAAP'S goals and implementation . and we depicted regarding forecast method to predict the future Data .

CHAPTER 4

DATA ANALYSIS

4.1 Introduction

This chapter describes the method used to collect data on road accidents in Bangladesh, data limitations, data analysis, key conclusions from the analysis, and other topics.

4.2 Data Analysis:

This analysis only includes traffic incidents that were reported to the (ARI) from January 2006 to December 2015. During this time, 2940 accidents were reported according to the sources. The accidents are studied using a variety of variables, including Vehicle type, road surface, year, junction type, location, pedestrian action, and others.

4.2.1 Accident frequency distribution annually:

Annual data on road accidents from all throughout the nation were gathered to conduct the analysis.

Table 4.2.1 Accident frequency distribution annually:

Year	No. of	Percentage
2006	386	13.1
2007	336	11.4
2008	364	12.4
2009	306	10.4
2010	280	9.5
2011	237	8.1
2012	237	8.1
2013	244	8.3
2014	234	8.0
2015	316	10.7
TOTAL	2940	100

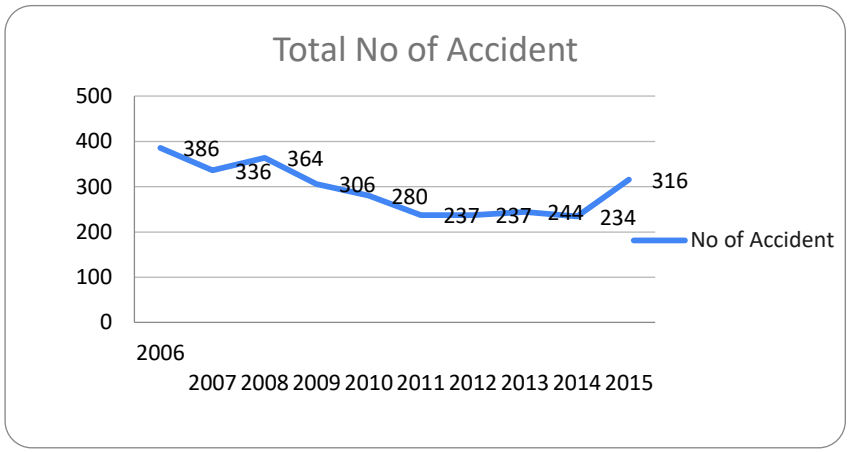


Fig:4.2.1 Accident frequency distribution annually

The yearly pattern of traffic accidents indicates that there were less accidents during the specified time period. Road traffic accidents have dropped by 18 percent between 2006 and 2015. According to the data, out of these 2940 accidents, the highest percentage came in 2006 (13.1%) and the lowest percentage occurred in 2014. (8 percent).Each year, there were 294 accidents on average. (figure:4.2.1)

4.2.2 Annual Casualty Distribution

Accident casualty data includes accident frequencies, fatalities, Grievous, Simple, and Collision records. They are presented annually and generally.

Table 4.2.2 Annual Casualty Distribution

YEAR	Fatal	Grievous	Simple	Collision	TOTAL
2006	314	72	0	0	386
2007	276	55	5	0	336
2008	288	64	12	0	364
2009	239	62	5	0	306
2010	234	43	3	0	280
2011	198	34	5	0	237
2012	210	22	5	0	237
2013	210	28	6	0	244
2014	196	32	6	0	234
2015	249	48	19	0	316
TOTAL	2414	460	66	0	2940
%	82	16	2	0	100

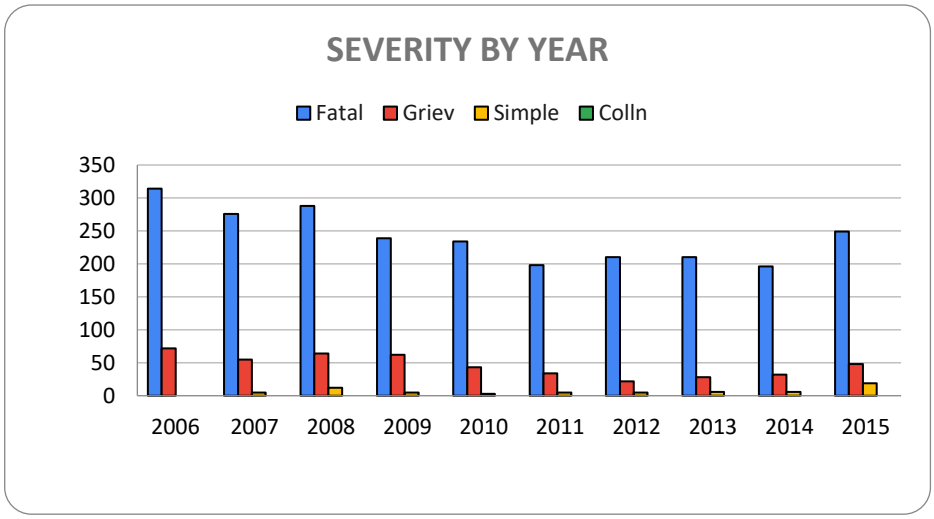


Figure: 4.2.2 Annual Casualty Distribution

Each year, the percentages of fatal accidents were higher than those with serious injuries. On average, 241 fatal accidents happened per year. Road accidents clearly result in a significant number of fatalities every year. The average number of accidents resulting in severe injuries, minor injuries, and collisions merely per year was 46, 7, and 0, respectively.

During the research period, 82% of accidents were deadly. Accidents resulting in serious injuries accounted for 16% of all accidents, while minor injuries made for 2%. and there were no collision-related accidents. (figure:4.2.2)

4.2.3 Accident frequency distribution annually by junction type

Table 4.2.3 Accident frequency distribution annually by junction type

YEAR	No Junction	Cross-junction	T/Junction	Staggered	Roundabout	Rail crossing	Other	TOTAL
2006	278	32	47	2	3	0	1	363
2007	242	16	35	0	4	0	14	311
2008	239	28	52	0	2	2	28	351
2009	221	26	39	0	3	0	7	296
2010	197	23	37	0	1	1	2	261
2011	149	23	38	1	3	2	4	220
2012	151	25	32	2	1	0	14	225
2013	130	28	21	6	7	1	30	223
2014	110	29	35	3	9	1	21	208
2015	99	82	36	4	13	1	44	279
TOTAL	1816	312	372	18	46	8	165	2737
%	66	11	14	1	2	0	6	100

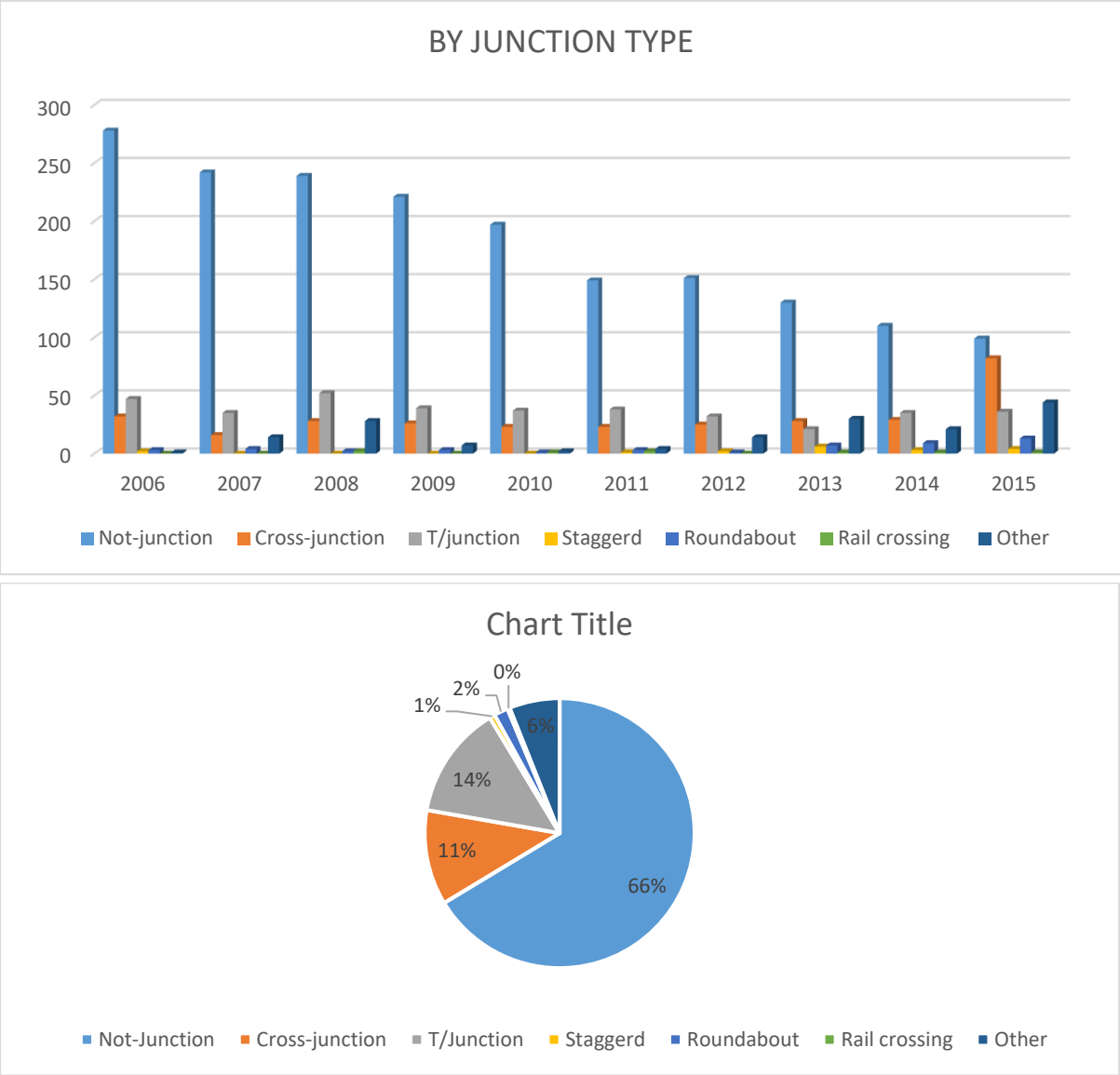


Fig: 4.2.3 Accident frequency distribution annually by junction type

The majority of accidents (66%) happened away from junctions. Accidents at various junctions are included in the remaining 34%. The junctions that were most prone to accidents were T junctions (14%) and cross junctions (11%). 37 and 31 each year T junctions and cross junctions saw the most accidents. fewer accidents happened at roundabout crossings (2%) and at staggered crossing only (1%),at other (6%) happened. (figure:4.2.3)

4.2.4 Accident frequency distribution annually by light

There are four different illumination scenarios taken into account: day, dawn/dusk, night with lighten roads, and night with unlighted roads. Day and night shifts throughout the year have an impact on accident frequency

Table 4.2.4 Accident frequency distribution annually by light .

YEAR	Day	Dawn/Dusk	Night with road lighten	Night with road unlighted	TOTAL
2006	202	45	114	2	363
2007	169	39	101	3	312
2008	195	33	112	9	349
2009	163	38	78	17	296
2010	120	42	80	19	261
2011	115	27	67	10	219
2012	116	37	66	6	225
2013	102	51	63	7	223
2014	100	37	58	13	208
2015	136	57	78	8	279
TOTAL	1418	406	817	94	2735

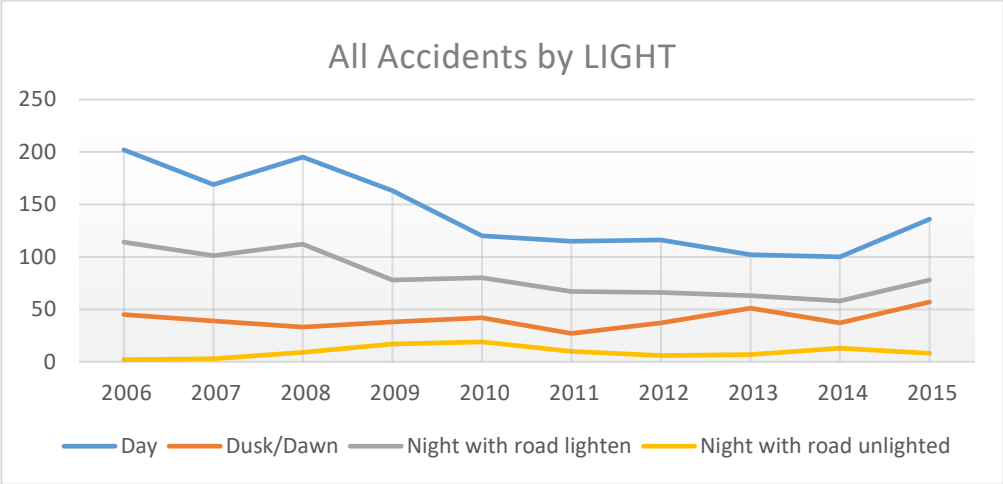


Figure: 4.2.4 Accident frequency distribution annually by light

Data collected over a whole year reveals that most accidents took place during the day rather than at night. Every year, there were 1418 incidents that happened in broad daylight.

The majority of accidents during the research period (52%) happened during the day. Accidents were observed to occur 15% of the time at dawn or dusk, when light levels were low. Similar numbers of accidents occurred at night when the road was lighten and unlighted (30% and 3%, respectively).(figure :4.2.4)

4.2.5 Accident frequency distribution annually by divider

Roads may or may not have dividers. Here, accidents are allocated in accordance with the divider**.**

Table 4.2.5 Accident frequency distribution annually by divider

YEAR	Yes	No	TOTAL
2006	311	74	385
2007	275	61	336
2008	301	62	363
2009	249	55	304
2010	211	69	280
2011	190	47	237
2012	166	70	236
2013	174	70	244
2014	180	54	234
2015	212	104	316
TOTAL	2269	666	2935
%	77	23	100

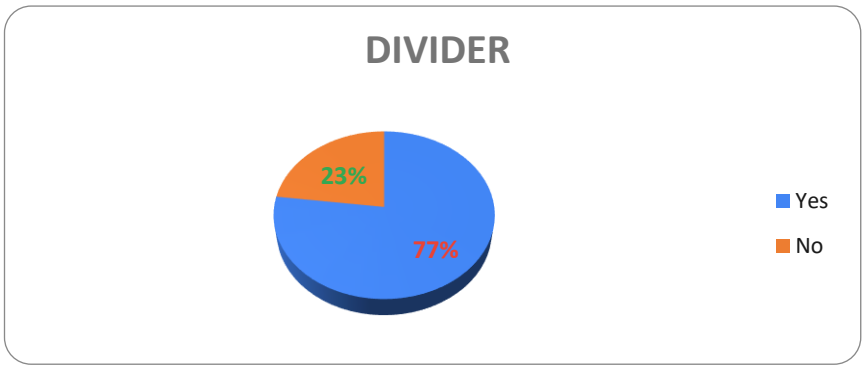


Figure: **4.2.5 Accident frequency distribution annually by divider**

According to data, 23% of incidents happened on roadways without dividers, whereas 77% happened on those with divider.it is seen that in 2006 there was 386 accidents occurred and that was the highest number of the accidents in this data.(figure:4.2.5)

4.2.6 Accident frequency distribution annually by pedestrian action

There are 5 pedestrian action such as none, cross, on road , edge, playing on road which effect the yearly road accident.

Table 4.2.6 Accident frequency distribution annually by pedestrian action

YEAR	None	Cross	On Road	Edge	Playing on Road	TOTAL
2006	31	269	1	81	3	385
2007	28	292	0	16	0	336
2008	17	334	3	7	2	363
2009	11	287	2	5	0	305
2010	13	252	1	12	2	280
2011	20	205	2	10	0	237
2012	10	214	6	7	0	237
2013	15	193	15	19	2	244
2014	7	180	10	31	4	232
2015	8	259	6	34	2	309
TOTAL	160	2485	46	222	15	2928
%	5	85	1.5	7.5	1	100

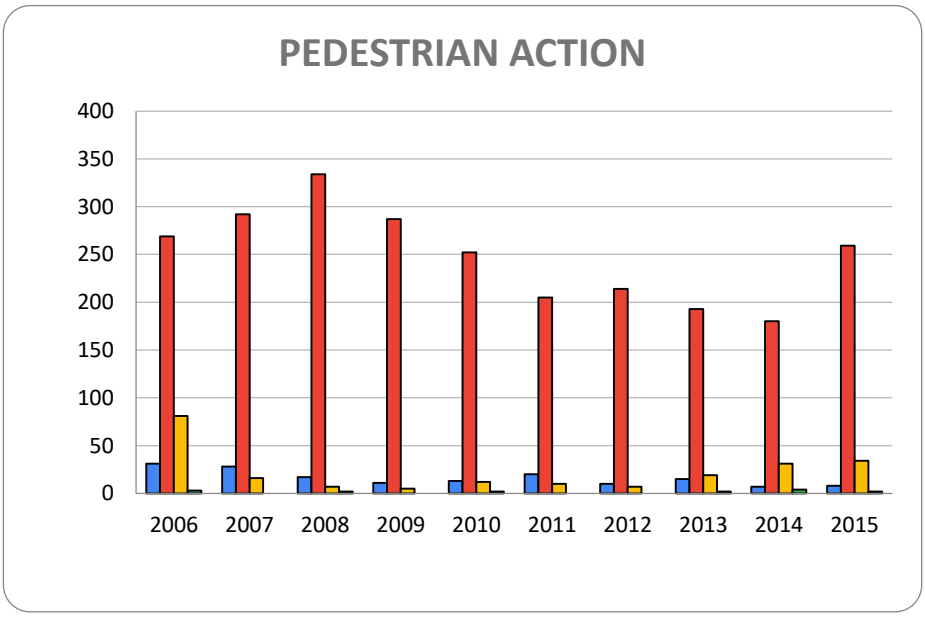


Figure: 4.2.6 Accident frequency distribution annually by pedestrian action

According to the table, the majority of accidents occurred in the cross, accounting for (85%) of all accidents; none occurred, on the edge; and playing on the road constantly results in holdings of (5%), (7.5%), and (1%).On average 248 accidents occurred in crossing on edge 22,on road 5 , at none 16, and playing on road 1 accident.(figure:4.2.6)

4.2.7 Accident frequency distribution annually by pedestrian gender

Data shows the pedestrian action according to pedestrian gender.

Table *4.2.7* Accident frequency distribution annually by pedestrian gender

YEAR	Male	Female	TOTAL
2006	303	82	385
2007	267	69	336
2008	305	58	363
2009	247	58	305
2010	226	54	280
2011	190	47	237
2012	204	33	237
2013	186	58	244
2014	156	76	232
2015	243	67	310
TOTAL	2327	602	2929

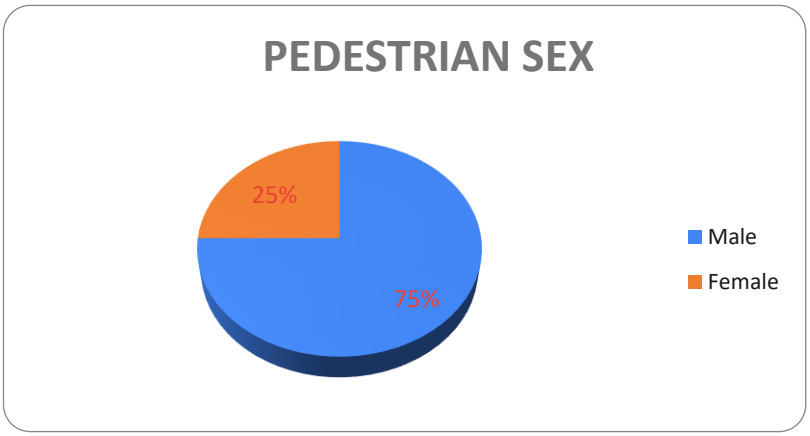


Figure: 4.2.7 Accident frequency distribution annually by gender

A gender analysis reveals that only 25% of women had vehicle accidents, compared to 75% of male pedestrians. (Figure:4.2.7)

4.2.8 Accident frequency distribution annually by vehicle type

Table 4.2.8 Accident frequency distribution annually by vehicle type

YEAR	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	TOTAL	%
Cycle	1	0	0	2	0	1	1	1	0	0	6	0.26
Rickshaw	0	0	0	0	0	1	1	1	0	1	4	0.17
Push car	0	0	1	1	0	0	0	1	0	0	3	0.13
Motorcycle	5	4	9	8	4	4	9	10	5	9	67	2.85
Baby taxi	11	9	5	6	2	4	5	2	2	3	49	2.08
Tempo	3	9	7	6	6	5	5	8	5	7	61	2.59
Microbus	17	7	9	17	10	6	11	6	9	9	101	4.30
Minibus	55	19	19	22	16	20	19	28	15	34	247	10.51
Bus	98	102	103	90	66	61	68	114	99	137	938	39.90
Car	28	22	29	27	31	19	16	14	12	11	209	8.89
Jeep	1	1	3	3	2	4	0	1	0	1	16	0.68
Pickup	13	3	4	4	7	3	9	4	12	11	70	2.98
Truck	3	1	1	1	4	1	5	11	15	8	50	2.13
Heavy truck	71	54	50	28	39	25	20	20	24	47	378	16.08
Articulate	3	2	1	0	0	2	0	0	0	1	9	0.38
Oil tank	2	0	0	1	0	0	1	1	1	0	6	0.26
Tractor	0	0	0	0	0	0	0	0	0	0	0	0.00
Animal drown	0	0	0	0	0	0	0	0	0	0	0	0.00
Other	43	20	8	7	13	10	15	5	12	4	137	5.83
TOTAL	354	253	249	223	200	166	185	227	211	283	2351	100.00

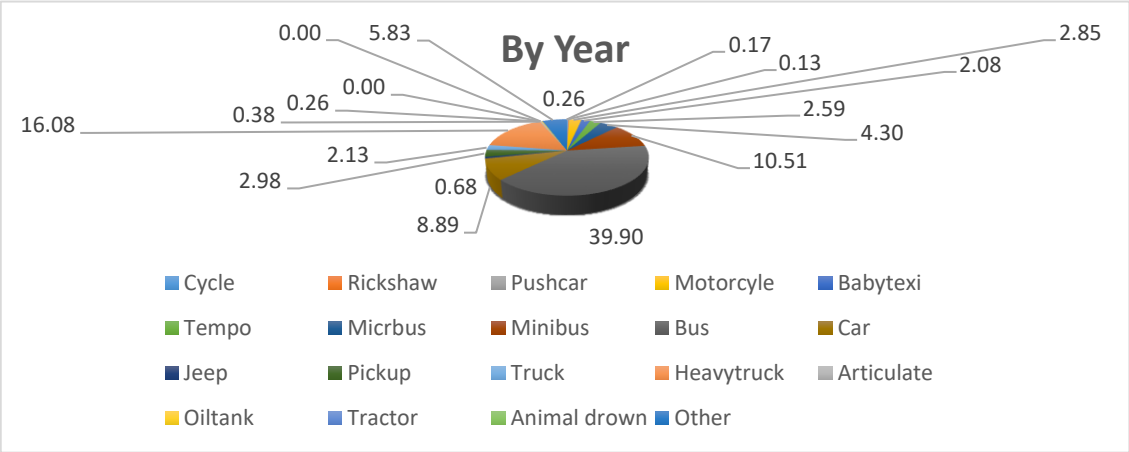


Figure:4.2.8 Accident frequency distribution annually by vehicle type

Based on the data ,from the figure:4.2.8- bus accidents accounted for 40% of accidents and 16% of heavy truck accidents most. In 2006 and 2015 hit the highest no of accidents 354,283 respectively.(Figure:4.2.8 **)**

4.2.9 Distribution of casualty by vehicle type

Table 4.2.9 Distribution of casualty by vehicle type

VEHICLE TYPE	Fatal	Grievous	Simple	Collision	TOTAL
Cycle	5	1	0	0	6
Rickshaw	4	0	0	0	4
Push car	3	0	0	0	3
Motorcycle	41	22	4	0	67
Baby taxi	34	12	3	0	49
Tempo	46	12	3	0	61
Micro bus	65	32	4	0	101
Minibus	193	49	5	0	247
Bus	788	135	15	0	938
Car	125	69	15	0	209
Jeep	8	7	1	0	16
Pickup	55	12	3	0	70
Truck	42	8	0	0	50
Heavy truck	337	39	2	0	378
Articulate	7	1	1	0	9
Oil tank	5	1	0	0	6
Tractor	0	0	0	0	0
Animal drown	0	0	0	0	0

Other	124	11	2	0	137
TOTAL	1882	411	58	0	2351

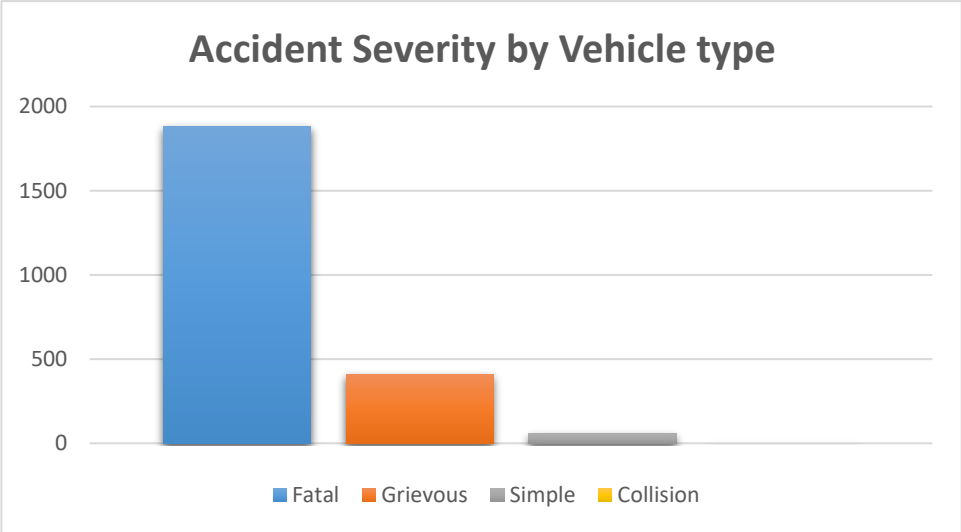


Figure: 4.2.9 Yearly distribution of casualty by vehicle type

Analysis reveals that 40% of fatalities occurred in bus-related accidents. 11% of minibus accidents and 16% of incidents involving big trucks resulted in fatalities. Total fatal instances were 1882, with 411 being grievous and 58 being simple.(Figure: 4.2.9)

4.2.10 Accident frequency distribution by junction type

On the roads, accidents can be seen based on the type of junction.

Table 4.2.10 Accident frequency distribution by junction type

VEHICLE TYPE	Not-Junction	Cross-junction	T/Junction	Staggered	Roundabout	Rail crossing	Other	TOTAL	%
Cycle	5	0	1	0	0	0	0	6	0.26
Rickshaw	3	0	0	0	0	0	1	4	0.17
Push car	1	0	0	0	0	0	2	3	0.13
Motorcycle	46	10	9	0	0	0	2	67	2.85
Baby taxi	27	4	11	0	1	0	6	49	2.09
Tempo	42	7	7	1	1	0	3	61	2.60

Microbus	67	10	15	1	0	0	8	101	4.30
Minibus	147	39	29	3	14	0	15	247	10.51
Bus	579	127	130	9	22	2	69	938	39.91
Car	139	20	29	0	2	3	16	209	8.89
Jeep	12	2	0	0	0	1	1	16	0.68
Pickup	51	5	10	0	0	1	3	70	2.98
Truck	32	7	8	1	2	0	0	50	2.13
Heavy truck	244	55	57	2	4	1	14	377	16.04
Articulate	7	1	1	0	0	0	0	9	0.38
Oil tank	5	0	1	0	0	0	0	6	0.26
Tractor	0	0	0	0	0	0	0	0	0.00
Animal drown	0	0	0	0	0	0	0	0	0.00
Other	97	4	25	1	0	0	10	137	5.83
TOTAL	1504	291	333	18	46	8	150	2350	100.00

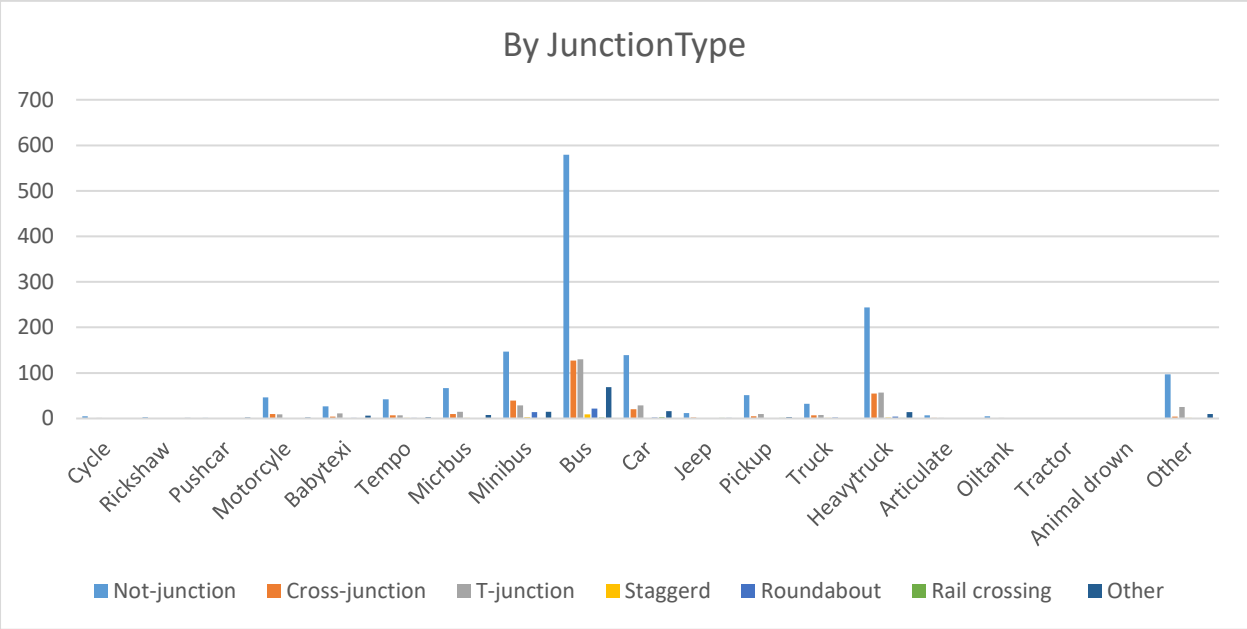


Figure: 4.2.10 Accident frequency distribution by junction type

Most incidents (64%) happened in areas without junctions. Accidents that happened at other junctions make up the remaining 36%. T junctions (14%) and cross intersections (12%) were the junctions that were most prone to accidents. At T junctions and cross junctions, respectively, 291,333 incidents happened in total and At rail crossings, fewer accidents happened (0.34%).(Figure: 4.2.10)

4.2.11 Accident frequency distribution by road feature

Road features have a significant impact on the frequency of traffic accidents.

Table 4.3.11 Accident frequency distribution by road feature

VEHICLE TYPE	None	Bridge	Culvert	Narrow	Speed breaker	TOTAL
Cycle	6	0	0	0	0	6
Rickshaw	4	0	0	0	0	4
Push car	2	0	0	0	0	2
Motorcycle	67	0	0	0	0	67
Baby taxi	48	0	0	0	0	48
Tempo	60	0	0	0	1	61
Microbus	99	1	0	0	0	100
Minibus	242	2	1	0	2	247
Bus	921	5	1	1	8	936
Car	206	2	0	0	0	208
Jeep	16	0	0	0	0	16
Pickup	67	1	1	1	0	70
Truck	47	2	1	0	0	50
Heavy truck	378	0	0	0	0	378
Articulate	8	0	0	0	1	9
Oil tank	6	0	0	0	0	6

Tractor	0	0	0	0	0	0
Animal drown	0	0	0	0	0	0
Other	133	2	0	0	2	137
TOTAL	2310	15	4	2	14	2345
%	98.5	0.6	0.2	0.1	0.6	

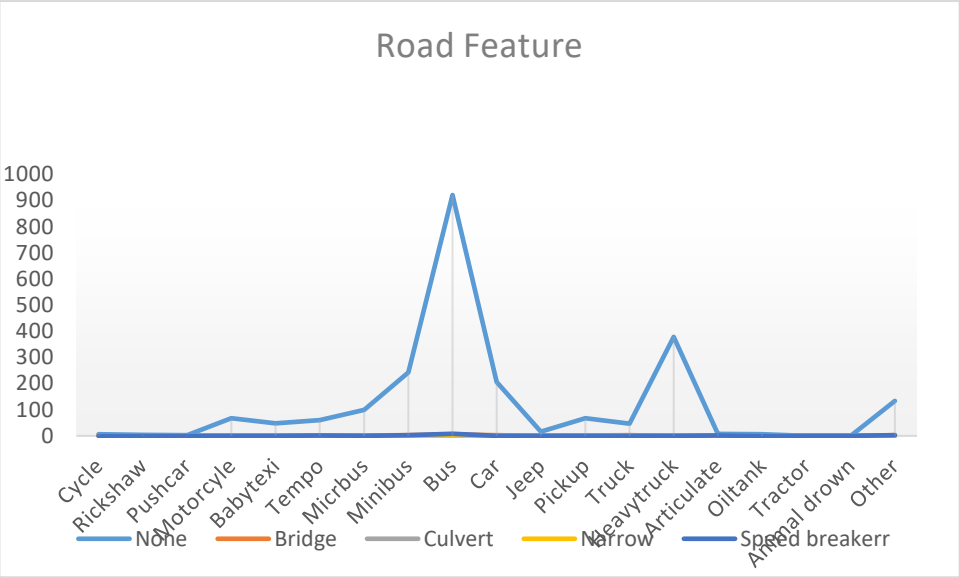


Figure: 4.2.11 Accident frequency distribution by road feature

Throughout the study period, straight roads saw the majority of accidents. On straight highways, there were 2310 accidents in total.

According to analysis, the majority of accidents (98.5%) during the research period happened on straight roadways. On bridge had accidents only 0.6% of the time. On culvert, there were the fewest accidents (0.2%). at speed breaker and narrow section got (0.6%),(0.1) accidents respectively.(Figure: 4.2.11)

4.2.12 Accident frequency distribution by seat belt/helmet worn or not

The frequency of traffic accidents impact whether or not a seatbelt or helmet is used.

Table 4.2.12 Accident frequency distribution by seat belt/helmet worn or not

VEHICLE TYPE	Worn	Not	TOTAL	%
Cycle	0	6	6	0.27
Rickshaw	1	3	4	0.18
Push car	0	3	3	0.13
Motorcycle	40	24	64	2.86
Baby taxi	1	48	49	2.19
Tempo	0	54	54	2.41
Microbus	4	94	98	4.38

Minibus	2	239	241	10.76
Bus	4	915	919	41.03
Car	11	181	192	8.57
Jeep	1	15	16	0.71
Pickup	3	67	70	3.13
Truck	1	48	49	2.19
Heavy truck	3	354	357	15.94
Articulate	0	9	9	0.40
Oil tank	0	6	6	0.27
Tractor	0	0	0	0.00
Animal drown	0	0	0	0.00
Other	1	102	103	4.60
TOTAL	72	2168	2240	100
%	3.2	96.8	100	

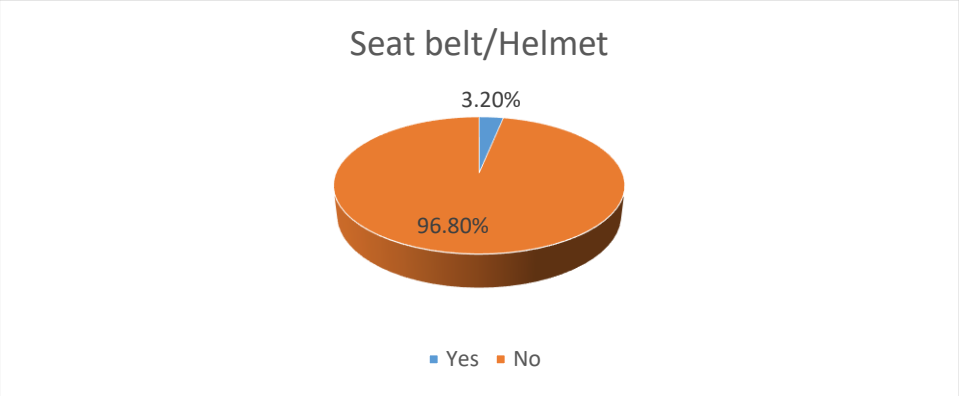


Figure: 4.2.12 Accident frequency distribution by seat belt/helmet worn or not

Majority of accidents (96.80%) that occurred throughout the study period happened when people did not wear seatbelt and helmet. Just only (3.20%) people worn seat belt and helmet.(Figure: 4.2.12)

4.2.13 Accident frequency distribution by pedestrian age

Here we can see the accident frequency by pedestrian age.

Table 4.2.13 Accident frequency distribution by pedestrian age

YEAR	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	TOTAL
0-5	57	9	13	3	8	6	4	5	8	4	117
6-10	16	8	19	12	8	9	12	12	8	4	108
11-15	19	23	14	13	15	4	13	14	5	13	133
16-20	31	25	18	23	19	16	24	33	21	32	242
21-25	41	39	39	28	28	18	21	18	24	34	290
26-30	52	50	54	40	43	33	19	45	38	49	423
31-35	33	26	47	43	32	37	32	43	19	43	355
36-40	33	49	58	57	32	31	24	25	25	39	373
41-45	21	41	36	40	36	29	30	14	29	25	301
46-50	23	18	26	18	17	16	21	12	34	28	213
51-55	18	20	13	8	10	17	14	8	9	11	128
56-60	12	13	10	12	10	15	9	8	5	20	114
61-65	8	9	7	3	13	2	5	2	3	4	56
66-70	9	5	7	3	6	4	5	4	4	0	47
71-75	3	1	0	1	2	0	2	1	0	1	11
>75	3	0	2	1	1	0	2	0	0	2	11
TOTAL	379	336	363	305	280	237	237	244	232	309	2922

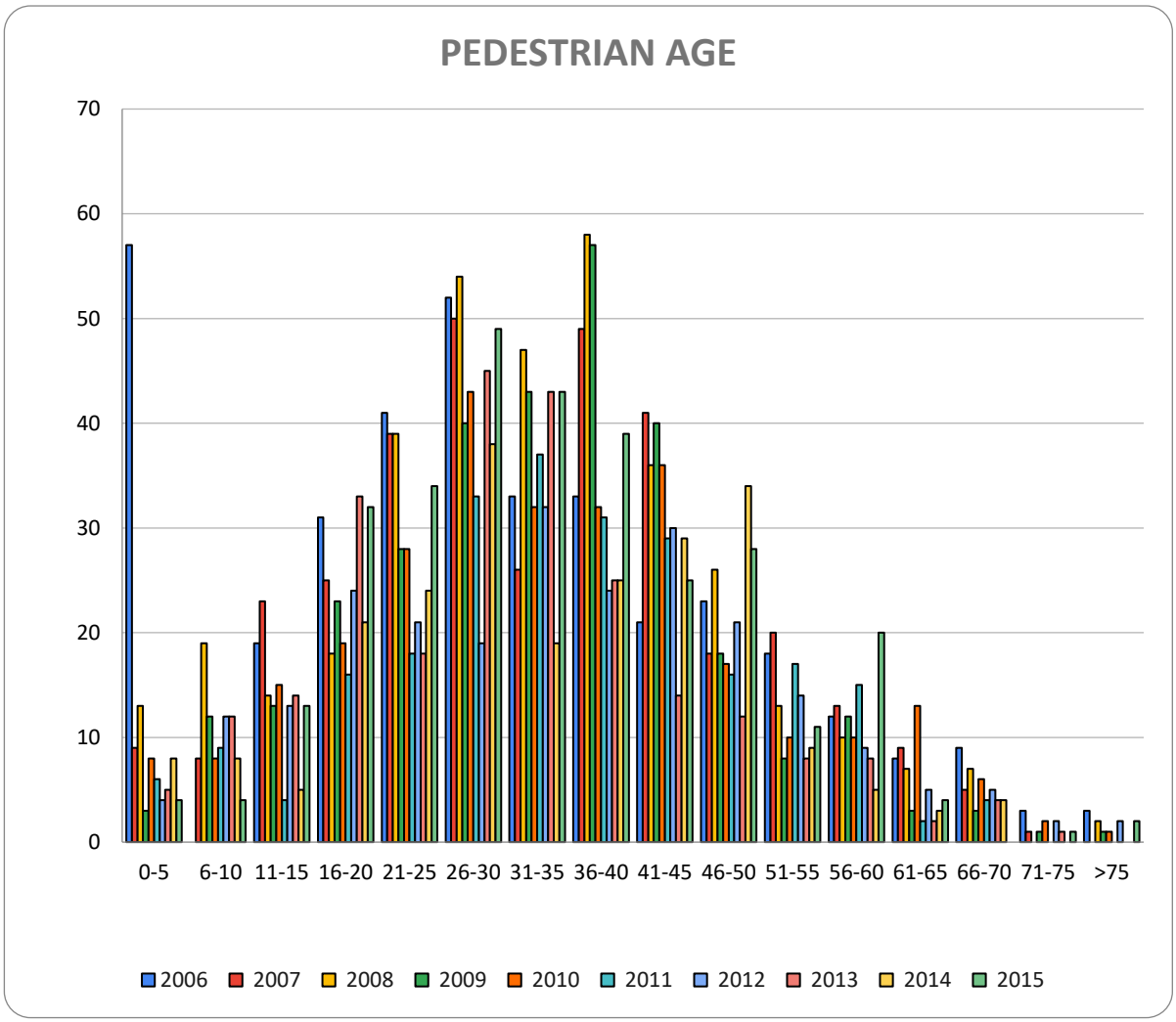


Figure: 4.2.13 Accident frequency distribution by pedestrian age

According to a study on casualty age distribution, 59% of all victims are between the ages of 21 and 45. 16 to 20 year olds make up 8% of the category of victims in traffic accidents, while 46 to 50 year olds make up 7%. Children under the age of 15 account for a sizable fraction (13%) of fatalities in traffic accidents (Figure: 4.2.13)

4.3 Linear regression

In order to represent the relationship between two variables one of which is considered an explanatory variable and the other a dependent variable linear regression involves trying to fit a linear equation to observed data. (2018) Handbook of Statistics

4.3.1 Predicted data of annual accident casualty

Table 4.3.1 Predicted data of annual accident casualty

YEAR	Fatal	Grievous	Simple	TOTAL
2006	302	61	0	363
2007	255	53	4	312
2008	280	60	11	351
2009	235	56	5	296
2010	218	41	2	261
2011	185	30	5	220
2012	201	19	5	225
2013	192	25	6	223
2014	170	32	6	208
2015	228	37	14	279
TOTAL	2266	414	58	2738
		Predicted Data		
2016	165	19	10	195
2017	154	15	10	180
2018	143	11	11	166
2019	132	7	12	151
2020	121	3	13	137
TOTAL	716	57	56	829

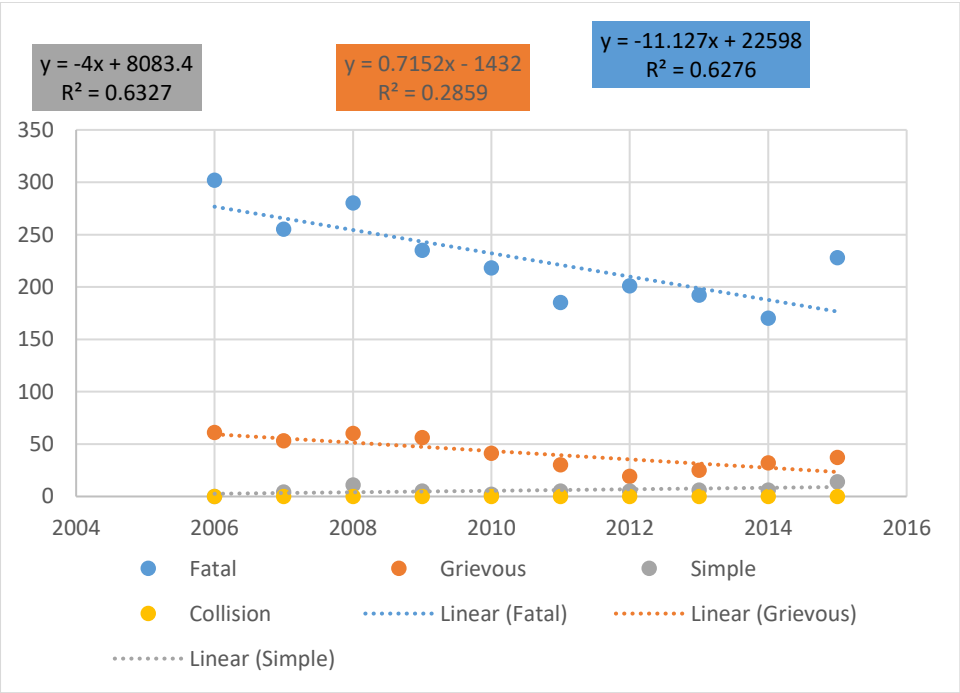


Figure :4.3.1 Linear regression of annual accident casualty

4.3.2 Predicted data annually by light

Table 4.3.2 Predicted data annually by light

YEAR	Day	Dawn/Dusk	Night with road lighten	Night with road unlighted	TOTAL
2006	202	45	114	2	363
2007	169	39	101	3	312
2008	195	33	112	9	349
2009	163	38	78	17	296
2010	120	42	80	19	261
2011	115	27	67	10	219
2012	116	37	66	6	225
2013	102	51	63	7	223
2014	100	37	58	13	208
2015	136	57	78	8	279
TOTAL	1418	406	817	94	2735
		Predicted Data			
2016	86	46	51	12	195
2017	75	47	45	12	180
2018	65	48	40	13	166
2019	55	49	34	13	151
2020	45	50	29	14	137
Total	325	241	200	63	829

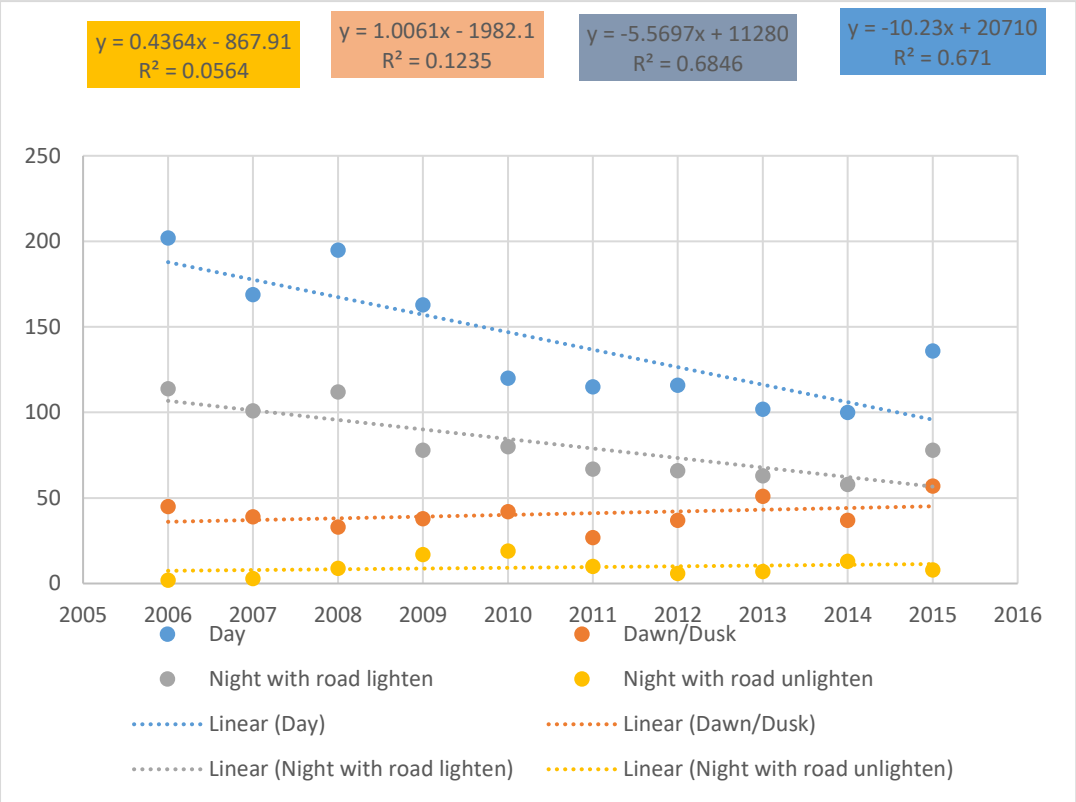


Figure :4.3.2 Linear regression annually by light

4.3.3 Predicted data of annual by Junction type

Table 4.3.3 Predicted data of annual by Junction type

YEAR	Not-Junction	Cross-junction	T/Junction	Staggerd	Roundabout	Rail crossing	Other	TOTAL
2006	278	32	47	2	3	0	1	363
2007	242	16	35	0	4	0	14	311
2008	239	28	52	0	2	2	28	351
2009	221	26	39	0	3	0	7	296
2010	197	23	37	0	1	1	2	261
2011	149	23	38	1	3	2	4	220
2012	151	25	32	2	1	0	14	225
2013	130	28	21	6	7	1	30	223
2014	110	29	35	3	9	1	21	208
2015	99	82	36	4	13	1	44	279
TOTAL	1816	312	372	18	46	8	165	2737
			Predicted Data					
2016	70	49	28	4	9	1	32	195
2017	52	52	26	5	10	1	35	182
2018	28	56	25	5	11	1	38	164
2019	11	59	23	6	12	1	41	153
2020	3	62	21	6	13	1	44	151
Total	164	278	124	26	56	7	189	844

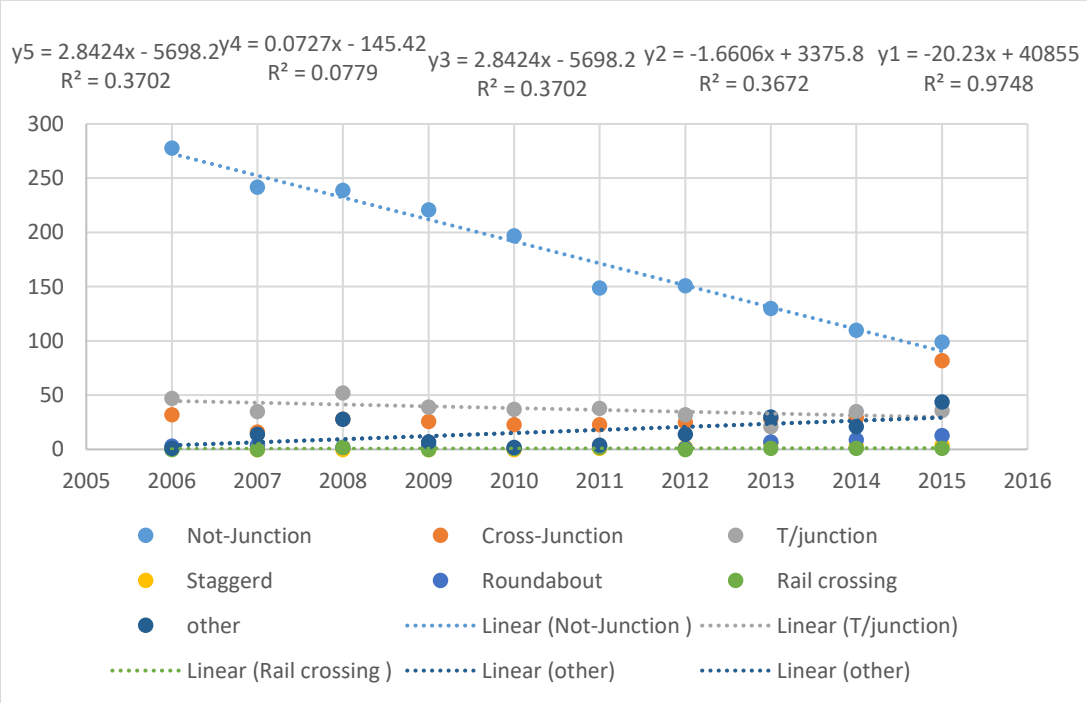


Figure :4.3.3 Linear regression annually by Junction type

4.3.4 Predicted data of annual by divider

Table 4.3.4 Predicted data of annual by divider

YEAR	Yes	No	TOTAL
2006	311	74	385
2007	275	61	336
2008	301	62	363
2009	249	55	304
2010	211	69	280
2011	190	47	237
2012	166	70	236
2013	174	70	244
2014	180	54	234
2015	212	104	316
TOTAL	2269	666	2935
	Predicted Data		
2016	145	76	221
2017	130	78	208
2018	115	80	195
2019	100	81	181
2020	85	83	168
TOTAL	575	398	973

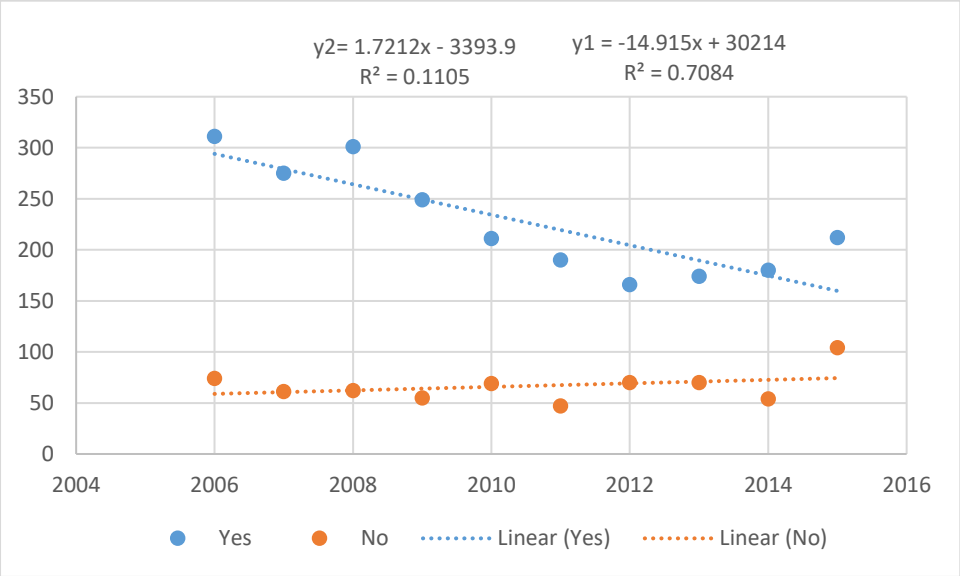


Figure :4.3.4 Linear regression of annual by divider

4.3.5 Predicted data of annually by pedestrian action

Table 4.3.5 Predicted data annually by pedestrian action

YEAR	None	Cross	On Road	Edge	Playing on Road	TOTAL
2006	31	269	1	81	3	385
2007	28	292	0	16	0	336
2008	17	334	3	7	2	363
2009	11	287	2	5	0	305
2010	13	252	1	12	2	280
2011	20	205	2	10	0	237
2012	10	214	6	7	0	237
2013	15	193	15	19	2	244
2014	7	180	10	31	4	232
2015	8	259	6	34	2	309
TOTAL	160	2485	46	222	15	2928
		Predicted Data				
2016	4	187	11	14	2.07	218
2017	4	176	12	12	2.17	206
2018	6	165	13	11	2.27	197
2019	3	153	14	9	2.38	182
2020	2	142	15	8	2.48	170
Total	18	823	66	53	11	972

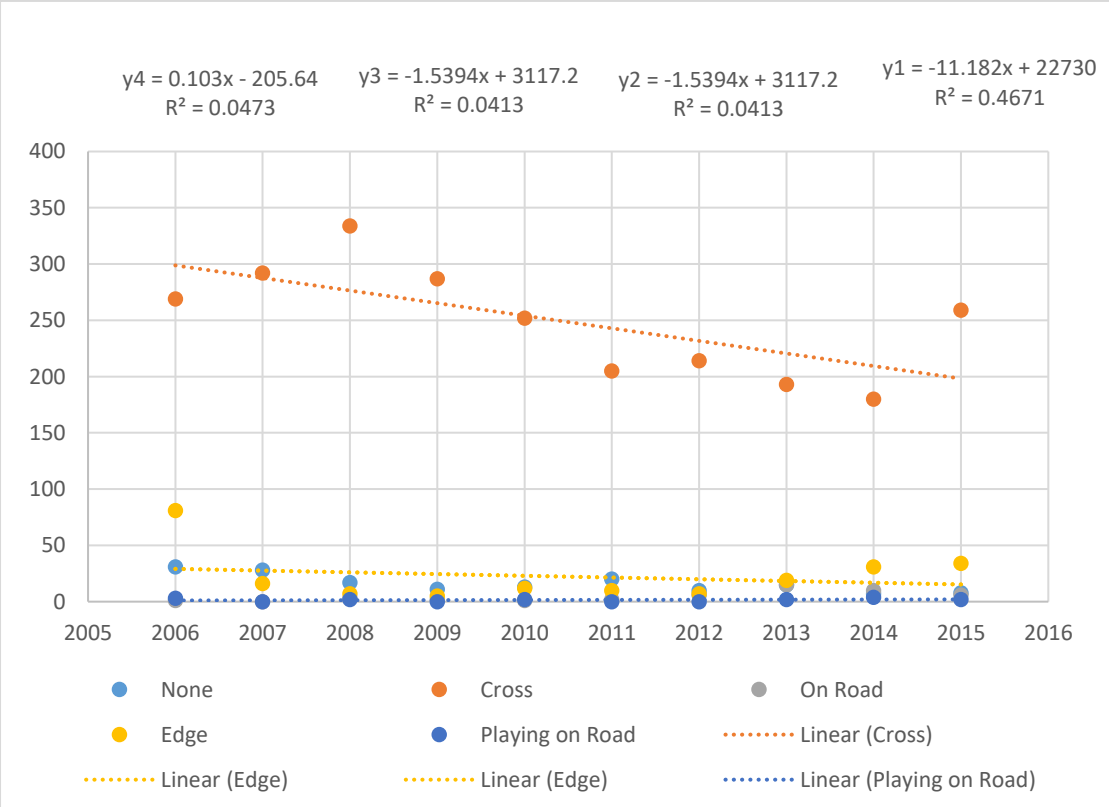


Figure :4.3.5 Linear regression of annual by pedestrian action

4.3.6 Predicted data of annual by gender

Table 4.3.6 Predicted data of annual by gender

YEAR	Male	Female	TOTAL
2006	303	82	385
2007	267	69	336
2008	305	58	363
2009	247	58	305
2010	226	54	280
2011	190	47	237
2012	204	33	237
2013	186	58	244
2014	156	76	232
2015	243	67	310
TOTAL	2327	602	2929
	Predicted Data		
2016	163	55	218
2017	151	54	204
2018	138	53	191
2019	126	52	177
2020	113	51	164
TOTAL	**691**	**263**	**954**

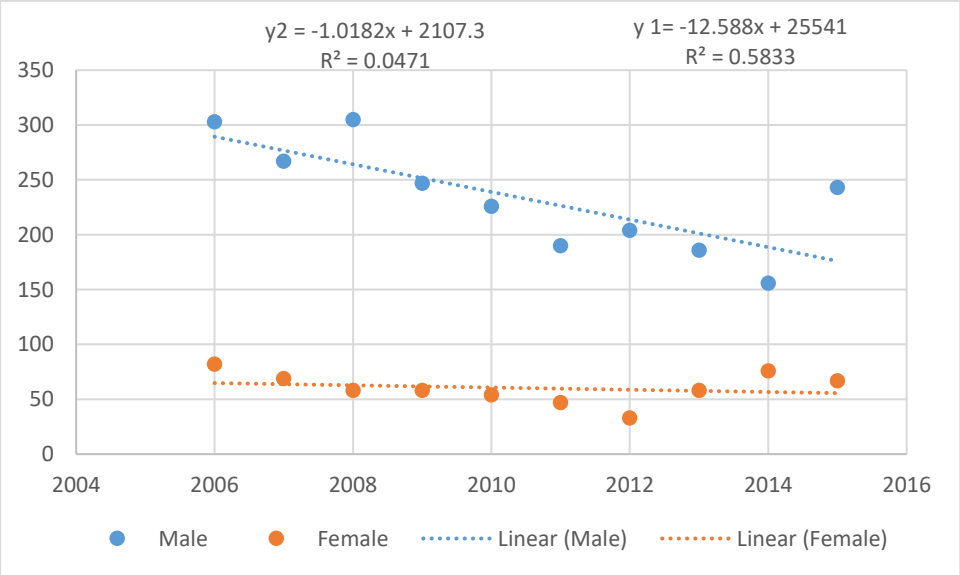


Figure :4.3.6 Linear regression of annual by pedestrian action

4.4 Overview

This chapter's analysis of traffic accident data determines how exposed and safe Bangladesh's main mode of transportation is. This analysis attempts to observe the characteristics of road accidents and their pattern despite some data restrictions. Here, the study's key conclusions are highlighted and used to analyze traffic accident data. and to predict the next 5 year’s data excel forecast has been used .

CHAPTER 5

DISCUSSION AND COLUSIONS

5.1. Introduction:

Several attempts have been undertaken in this study to evaluate the amount of coverage and the safety situation surrounding road accidents in DMP. The study was founded on the collected comprehensive data on traffic accidents and objective analysis. The study identified the accident features and tracked their mode-specific pattern. The next endeavor in this study was to do a mode analysis in terms of accident frequency, accident characteristics, severity, casualty, and other factors. The analyses' key conclusions are summarized in this chapter, along with suggestions for safety-improvement measures and future research in this area.

5.2 Major Findings of The Study:

I. According to the yearly pattern of traffic accidents, there were less accidents within the given time frame. Between 2006 and 2015, there was a 18 percent decrease in road accidents. The data show that of these 2940 accidents, the largest percentage (13.1%) and lowest percentage in (2014) with 8 percent . There were, on average, 294 accidents per year.

II. Each year, more fatal accidents occurred than those that resulted in serious injuries. 241 fatal accidents occurred year on average. Undoubtedly, a considerable number of fatalities occur each year as a result of traffic accidents. There were 46, 7, and 0 collisions with no injuries, minor injuries, and severe injuries, respectively, every year on average.

III. Total 66% of accidents occurred away from intersections. The remaining 34% includes collisions at various intersections. T junctions (14%) and cross junctions (11% of incidents) were the most dangerous intersections. T junctions and cross junctions respectively saw 37 and 31 incidents per year. Less accidents occurred at roundabout crossings (2%), only 1% at staggered crossings, and 6% elsewhere.

IV. The majority of accidents occurred during the day rather than at night, according to data gathered over a full year. There were 1418 instances that took place in broad daylight each year. Over the course of the study, 52% of accidents took place during the day. Low light conditions, such as those at dawn or dusk, were found to increase the likelihood of accidents by 15%. The percentage of accidents that happened at night on lighted and unlighted roads was 30% and 3%, respectively.

V. Data shows that whereas 77% of events occurred on roads with dividers, 23% occurred on those without. It can be observed that 2006 had the most accidents in this data at 386, which was the highest number ever.

VI. The table shows that the majority of collisions—85% of all collisions—took place in the cross; none occurred on the edge; and playing on the road frequently leads in holdings of (5%), (2%), and (1%).Crossing, on edge, on road 5, at none, and playing on road 1 all saw an average of 248 accidents per year.

VII. Only 25% of women were involved in automobile accidents, compared to 75% of male pedestrians, according to a gender analysis.

VIII. According to the data, heavy vehicle accidents made up 16% of all incidents, and bus accidents accounted for 40% of all accidents. The biggest number of accidents, 354,283, occurred in 2006 and 2015, respectively.

IX. According to analysis, 40% of fatalities were caused by accidents involving buses. Fatalities were reported in 16% of accidents involving large vehicles and 11% of accidents involving minibuses. 1882 fatal incidents occurred overall, of which 411 were serious and 58 were not.

X. The majority of events (64%) took place in places without intersections. The remaining 36% of accidents happened at other crossroads. The junctions that were most likely to be involved in accidents were T junctions (14%) and cross intersections (12%). 291,333 events total occurred at T and cross junctions, but just 0.34 percent of accidents occurred at rail crossing.

XI. Straight roadways experienced the majority of accidents during the research period. There were a total of 2310 accidents on straight highways. Analysis shows that 98.5 percent of the research period's incidents occurred on straight roads. Accidents happened on bridges just 0.6% of the time. Accidents occurred on culverts the least (0.2%). accidents occurred at the speed breaker and the narrow section in that order (0.6%, 0.1%).

XII. The majority of accidents that transpired throughout the research period (96.80%) involved people who were not wearing seatbelts and helmets. Only 3.20 percent of passengers wore a seat belt and a helmet.

XIII. A study on the age distribution of casualties found that 59% of all victims are between the ages of 21 and 45. In comparison to 46 to 50 year olds, 16 to 20 year olds make up 8% of the category of casualties in road accidents. 13% of fatalities in traffic accidents involve people under the age of 15, which is a significant fraction.

5.3 Conclusions

Following are some significant findings that have been drawn from the accident trend analysis:

(i) Speeding was the primary reason for road accidents. It has been determined that human factors contribute to accidents more than other components do.

(ii) It is demonstrated from the study that the number of accidents was the highest (13%) in the year 2006 and total resulting in 82% fatality from the 10 years data.

(iii) The majority of accidents (66%) happened away from junctions. But at T junction (14%) accidents happened which is most in junction type.

(iv) The pedestrian action shows that. the most accident occurred at time of road crossing with the (85%).

(v) According to analysis, 40% of fatalities were caused by accidents involving buses.

(vi) Only 25% of women were involved in automobile accidents, compared to 75% of male pedestrians, according to a gender analysis.

(vii) 52% of the accidents that occurred during the course of the study happened during the day. It has been discovered that low light circumstances, such as those at dawn or dusk, 15% enhance the chance of accidents.

(viii) The majority of accidents occurred on straight roads throughout the study period. On straight roadways, there were 2310 accidents in total. Analysis reveals that 98.5 percent of the events throughout the study period took place on straight roadways. Only 0.6% of accidents occurred on bridges. Culverts saw the fewest accidents (0.2%). In that order (0.6%, 0.1%), incidents happened at the speed breaker and the narrow portion.

5.4 Recommendations:

5.4.1 For improving pedestrian safety

Based on the results of the investigation of road accidents, the following suggestions for enhancing pedestrian safety may be made.

(i) **User friendly walkways must be provided;** they must be both safe and convenient. Additionally, it's critical to make sure that hawkers' invasion is well handled.

(ii) **Implementation and improvement of pedestrian crossings:** To encourage pedestrian use of signalized and other pedestrian facilities, build pedestrian railing or other obstacle types on the approaches and exits from those locations.

(iii) **Implementation of escalator in foot over bridge**: It is frequently observed that pedestrians do not cross bridges on foot. Because it is difficult to climb over those foot over bridges, most of the time people avoid using them. If we construct escalators in those foot over bridges and encourage people to utilize those foot over bridge.

(iv) **The availability of marked bus stops is important**: because according to our data, buses were responsible for 40% of accidents. In order to change the behavior of passengers, stops with appropriately constructed bus bays and passenger waiting areas should be placed at opportune times.

(v) **Traffic separation between vehicles and pedestrians:** Self-enforcing restrictive engineering measures To increase pedestrian safety, more thought should be given to guard rails similar to those in New Jersey.

5.4.2 Recommendation for Future study:

- We examined the pedestrian crash in small factor so that's why it is advised to examine by considering in large factor.
- Pedestrian crash is suggested to examine considering geometrical factor.
- Environmental factor is also a concern for crash so that factor ought to be considered.
- The study needs more high level calculation to analyses.
- Linear regression method could be used to predict future accidents by taking 20 years data.

REFERENCES

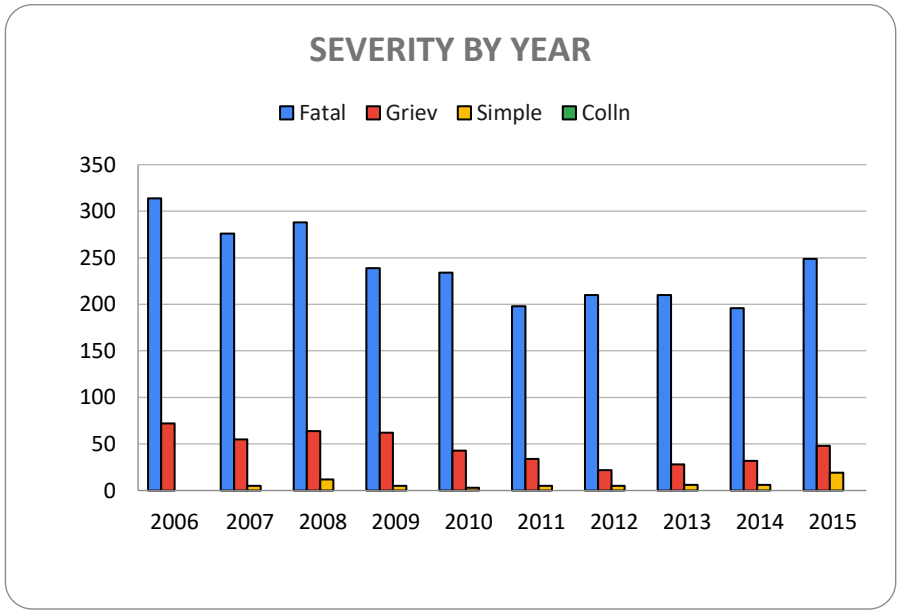
1. WHO. (2018). Global status report on road safety 2018. Geneva: World Health Organization.
2. Ahmed, B. (2013). Contemporary Issues and Priorities in Addressing the Road Safety Problems of Dhaka Metropolitan Area, Bangladesh. Journal of Bangladesh Institute of Planners, 6(December), 103–118.
3. Sohel Mahmud, S. M., Ahmed, I., & Hoque, M. S. (2014). Road safety problems in bangladesh: Achievable target and tangible sustainable actions. Jurnal Teknologi, 70(4), 43–49. https://doi.org/10.11113/jt.v70.3487
4. Anjuman, T., Hasanat-e-rabbi, S., Kawsar, C., & Siddiqui, A. (2007). ICME2007-AM-30 Road Traffic Accident: A Leading Cause of the Global Burden of Public Health Injuries and Fatalities. International Conference on Mechanical Engineering, 2007(December), 29–31.
5. Mahmud, S. M. S. (2011). Road accident trends in Bangladesh : A comprehensive study. 4th Annual Paper Meet and 1st Civil Engineering Congress, December 22-24, 2011, Dhaka, Bangladesh, December 2011, 978–984. http://www.iebconferences.info/
6. Hoque, M.M. (1981), 'Traffic accidents in Dhaka: A study on road safety', M.Sc. Engineering Thesis, Department of Civil Engineering, BUET, Dhaka.
7. Banik, G.C. (1987), 'Aspects of Road Geometrics in Relation to Traffic and Accidents – A Case Study of Dhaka-Aricha Road', M.Sc. Engineering Thesis, Department of Civil Engineering, BUET, Dhaka.
8. Islam, R (1996), 'A Study of Traffic Crashes in Chittagong City', M. Engineering Thesis, Department of Civil Engineering, BUET, Dhaka.
9. Sharmeen, N. and Islam, M.R. (2011), 'Road Accidents: Contemporary Scenario and Policy Issues in Bangladesh'. Joumal of Bangladesh Institute of Planners Vol. 4. December 2011, pp. 45-5-5. O Bangladesh Institute of Planners.
10. Raufuzzaman, M. (2003), 'Characteristics of Accidents on Selected Arterials of Metropolitan Dhaka', M. Engineering Thesis, Department of Civil Engineering, BUET, Dhaka.
11. Muniruzzaman, S.M. (2004), 'Performance Evaluation of Road Safety Measures in Dhaka-Aricha Highway', M.Sc. Thesis, Department of Civil Engineering, BUET, Dhaka.

12. Ahmed, B.(2012), 'Report On Traffic Accident Study In Dhaka City (2007- 2011)', Clean Air and Sustainable Environment (CASE) Project, Government of the People's Republic of Bangladesh.
13. Hoque, M. M., Alam, M. J. B. and Habib, K. M. N.(2003), 'Road Safety Issues and Initiatives in Bangladesh: The Context of Regional Significance', Proceedings of the Twenty-first Australian Road Research Board (ARRB) and the Eleventh Road Engineering Association of Asia and Australia (REAAA) Conference.
14. Anowar, S. (2007). Pedestrians Accident Rates : Alarming on Mirpur Arterial in Dhaka City , Bangladesh. 6(2003).

Appendix

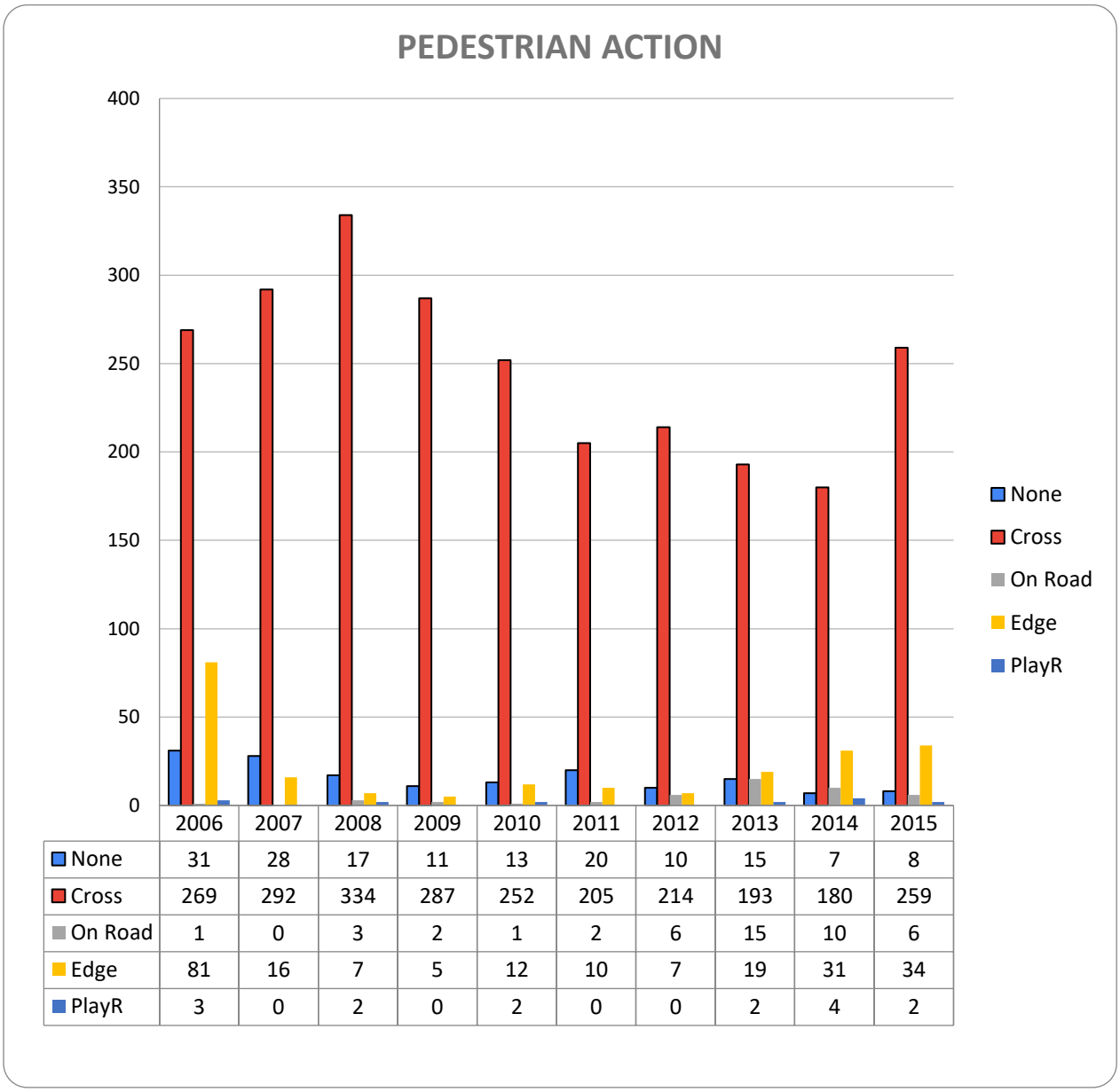
Traffic accidents (2006-2015)

Accident Severity	Number of Accidents	Percentage (%)
Fatal Accident	2414	82
Grievous Accident	460	16
Simple Injury	66	2
Total	2940	100



APPENDIX-B

Pedestrian Action (2006-2015)



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
None	31	28	17	11	13	20	10	15	7	8
Cross	269	292	334	287	252	205	214	193	180	259
On Road	1	0	3	2	1	2	6	15	10	6
Edge	81	16	7	5	12	10	7	19	31	34
PlayR	3	0	2	0	2	0	0	2	4	2

APPENDIX-C

Roadway Network of Bangladesh.