

**THE EXISTING & EMERGING FACTORS OF ROAD ACCIDENT AND ITS
FEASIBLE SOLUTIONS THROUGH COMPREHENSIVE STUDY IN THE CONTEXT
OF BANGLADESH**

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Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled “**THE EXISTING AND EMERGING FACTORS OF ROAD ACCIDENT AND ITS FEASIBLE SOLUTIONS THROUGH COMPREHENSIVE STUDY IN THE CONTEXT OF BANGLADESH**”, submitted by ***MD. SHAHRIAR FERDOUS***, ***MD. SAHADAT HOSSAIN*** and ***MD. SABBIR HOSSAIN BHUIYAN*** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation will be held on 31th January 2021.

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ABSTRACT

Bangladesh is progressing day by day in every sector, but the negative side is that it's increased rate of Road Accident (RA). It is a big alarming issue and loss for our developing country. If we compare the overcrowded population of this country to our road and transport infrastructure, it can be seen that it is not sufficient. For this reason, unintended road accidents are constantly happening, and its victims are people from all walks of life. According to Bangladesh Jatri Kalyan Samity (PWAB) everyday more than 21 people loses their lives in RA in Bangladesh (2019). No research or study can prevent road accidents unless the proper actions are taken. There are a bunch of existing factors which are directly impacting RA in Bangladesh. Uneducated drivers, defective vehicles, weak traffic management, people's lack of knowledge, unregulated speed, road and its geometric inadequacy, lack of political will, law and order compliance, location type, weather, time etc are the factors that have an effect on RA. The objective of this paper is to uphold the key and causative factors of RA and to provide viable solutions with pragmatic propose model through comprehensive study based on RA datasets of NIRAPAD SARAK CHAI (NISCHA) (from 2012 to 2019) and various newspapers, online articles, various research papers in between the year (2000 to 2019) to mitigate RA in Bangladesh.

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CHAPTER 1

Introduction

1.1 Introduction

Destruction rate of Road Accidents (RA) is becoming fearsome over the past few years. It has become a national disaster in the context of a developing country like Bangladesh. High mortality and injury rates are hampering economic growth and poverty reduction in this country. According to the World Bank report, annual RA deaths per capita in Bangladesh are twice the average rate for high-income countries and five times that of the best performing countries in the world [1]. In a study of the World Health Organization (WHO) estimates of annual death casualty in road accidents range from 2,538 to almost 10 times, which is between 20,736 and 21,316. It is also shown in this study that between 1990 and 2017, the rise in the per capita fatality rate of RA in Bangladesh was three times higher than in the South Asian Country [1].

RA has been a big fatality for Bangladesh, which is the key cause of death for all ages of people. Today, more people suffer from road accidents than from HIV and AIDS, tuberculosis or diarrhea diseases.

According to the Accident Analysis Review Center (ARI) of BUET on the fatality rate of road Bangladesh has a very high road fatality accident Rate with official figures for more than 60 deaths for per 10,000 motor vehicles as compare to USA is 2, in the United Kingdom it is 1.4 and 3.3 in the New Zealand [1].

Every day, approximately 220 people are permanently injured and seriously affected by road accidents and it is found that RA in Bangladesh is the second major cause of permanent disability [1].

In the year of 2018 two students were killed when a speeding bus ploughed into a bus stop on Airport Road, Dhaka. The main explanation for this crash was that the driver raced with another bus to pick up passengers when he drifted on the pavement, killing the two students and wounding 12 others, after causing this unexpected accident the biggest student movement, relative to previous years, had taken place all over the country since this unforeseen accident.

The United Nations expressed its concern for the safety of Bangladeshi children and young people in the protests and our government had taken some steps after the student movement, but the speed of implementation has been very slow and not effective. This outcome from the government indicates that there is far more incompetence on the part of the government to take the appropriate steps and actions. This is one of the RA scenarios in Bangladesh and there are many more RAs in many parts of Bangladesh that do not even hit the media.

Analyzing several studies and all the data sets of RAs (2012-2019) in Bangladesh shows that there are several emerging factors that are common and continuous in any road accident. Some of them have a direct and indirect effect on RA, but all of these groups are intensely involved in RA. It is true that throttling a road accident in Bangladesh is complicated, will take time and effort, but not impossible.

Bangladesh would need an investment USD 7.8 billion (BDT 659,224,332,000) over the next ten to minimize road fatalities by 50% [1].

The UN goal was to reduce RA by 50 % by 2020, but this goal will never be reached unless people are made aware of it and proper actions are taken. So, it is indeed quite important to discover the basic and key problems and to find the best solutions for RA to resist this fatality, as it takes many lives of all ages that this unforeseen condition might also be faced by us.

So, what are the best solutions and actions that can resist RA in real life?

That is to discover the factors which are the main reason for RA with the best implementable project to endure these factors of RA. There is no doubt that it is important to foresee a road accident which has been done in many previous studies, but it is much more important to know the reasons for a RA and its solution through practical work in real life.

This study would enable the Government and the Public Administration to recognize the issues and the best way to fix traffic accidents on the roads through comprehensive study of RA. It will discuss the issues of the factors: why and how this happens and what is the best way to deal with it, it will address how efficiently the traffic police, drivers, passengers and pedestrians can play their personal role in avoiding RA through our proposed model.

1.2 Objective

The Specific objectives of this study are as follows:

- To make a comparative accident analysis by using available accident data between different types of roads in Bangladesh.
- Accident classification or types.
- To determine the main and continuous factors of RA in the context of Bangladesh.
- To find out the feasible solutions with respect to these factors.
- To make a propose model

1.3 Motivation

We are motivated by the awakening of the people of the country during the student movement of 2018 and became involved in road safety, and in 2019 a family member of ours died because of this RA. We've set a goal to find the best solution for RA, because this fatality is a tragedy that's going on and on and it's a huge unfortunate occurrence for people from all walks of life in the world. A lot of parents are losing their children, a lot of kids are losing their parents, maybe we can be next and Allah knows best.

Sometimes many people get permanently injured and seriously burdened and permanently disabled which is a big pain for their family members because many of them can't bear the medical cost and the patient cost. Often a lot of people are chronically wounded and deeply burdened and permanently disabled, which is a huge pain for their family members because many of them cannot afford the treatment expenses and costs of the patient. Often, they have to sell their property for the care of the injured person, and if he or she died after care, it's going to be a huge loss, because they're selling something for the sake of medication.

1.4 Rationale of the Study

There is no doubt that a great deal of work is being done on road safety and related work. But in our work, we will try to maintain the main factors behind the causes of the RA, make a detailed examination of it, and include the most likely best means of resisting the RA.

It is very important to discover the problems of RA at the present time, because if we cannot locate the main cause of RA, we will not be able to find the best solution.

1.5 Research Questions

- Are there proper Data sets that we have collected?
- Is this Data reliable to do this study?
- Are the factors proper to discover the problem?
- Can we find the best solutions to resist RA?
- Are the solutions better to implement in real life in the context of Bangladesh?

1.6 Research Outcome

- ✓ This study will give a clear explanation for finding the main problems
- ✓ It will give the feasible solutions to resist RA
- ✓ The solutions will be actionable to implement
- ✓ To get understand the accident types and its feasible best solution
- ✓ It will help the Government as well as the administration to find out the problems and solution
- ✓ Traffic police will benefit from this to control traffic by best way
- ✓ Other researchers will get benefit to do their research on RA

1.7 Layout of the Report

In chapter 1, it has discussed the main theme of this study. It has also discussed the main objectives of doing this research, the motivation, rationale of the study, research questions and expected outcome in brief.

In chapter 2, we have discussed the related works on this topic.

In chapter 3, we have shown all the data related to RA.

In chapter 4, we have analyzed the factors based on the data.

In chapter 5, we have discussed feasible solutions, recommendations with a project model that can help to prevent RA.

CHAPTER 2

Background

2.1 Introduction

In this chapter, we will discuss the research papers that have carried out similar work. There are several papers in which authors have highlighted a variety of factors and their recommended solutions, sometimes the work is for particular highways, divisions / districts in Bangladesh and sometimes for Bangladesh itself for road safety. All the authors have made their best efforts and have retained their suitable recommended solutions.

A question may arise that if all the writers have made their best efforts in their paper, then what extra work we have done to distinguish our papers from them?

The answer is, following are the themes that can distinguish our paper from them.

In our study:

1. We have given priorities to the factors of RA. Because there is not a single accident occurs without factors which are the main problems.
2. We have upheld the factors by segmentation, made it clear and have given comprehensive details of them, so that anyone could easily find the problems behind RA that is existing and emerging.
3. We have made the list of solutions from 5 points of view. So that anyone can easily understand the opinions and solutions from every walk of life related to RA.
4. We want to cut the severity of accidents and decrease the fatality rate by our proposed model or framework which is implementable.

2.2 Related Work

There are myriad studies of RA in the context of Bangladesh. But it is important for a paper to work with proper and specific data of causes behind RA. Because if anyone wants to find the best solution of RA, they have to go through the dataset which indicates the proper and specific problems. We have found some of the papers where authors had made their comprehensive study on RA.

- Aktarul, Hasnath (2019) [3] in their paper they mainly gave their focus on the effect of the law abiding by pedestrians and drivers and the overall obligation for the traffic accident rules and they gave their recommendations for road safety. They have upheld factors reasoning behind RA and divide it into functional and geometric faults and where they said human causes are one of the main errors. Where 80% of pedestrian accidents happen in city roads and rest are in rural areas and the accident occurs in day time most. Light and non-motorized vehicles are often the main cause of road accidents and between 1998 -2015 about 4710 non-motorized vehicles was the reason behind RA. Overspeeding, not following traffic rules, roadway maintenance problems, reckless driving, blind curves, heavy load on vehicle, risky spots, carelessness of traffic police. They suggested to subtract unfit vehicles, make the proper signs and effective signal on the road, fix the speed limit, the vehicles which are of 10 years have to banned, good station and check post have to set up, driving license have to be free of corruption, black spot have to update, the illegal shops and stalls beside the road have to eradicate, have to check behavior and health of the driver, has to form the best law enforce.
- Khaled (2019) [38] in his study he shows several factors behind RA reasons which are Overspeeding, tendency to break the rules of traffic, lack of maintenance in the roadway, Inefficient driver, curve and risky spot of the road, heavy vehicle in the road accident, carelessness of the traffic police. He shows that an unfit vehicle is the main reason for RA and it has to be subtracted from road, improved footpath, road crossing, speed control device facilities must be ensured. It has to be built as a speed breaker and ensure cautionary signs on the road. It has to keep good maintenance of public and private vehicles with the help of the government. Blackspot should have to update time to time when any RA occurs.
- Banik, Chowdhury, Hossain, Mojumder (2011) [5] on their work they said there are some major factors behind RA, which are pedestrian road crossing fault, suddenly stopped vehicle, overtaking, save an animal or rough breaking, to give side to another vehicle, overloaded vehicle, rail crossing point, talking with phone while driving and driving in rough weather. Young drivers with less than 30 years of age or equal are not thinking of

the risk of the accident. Results, most young drivers fell more in the accident. Most drivers get tired and exhausted because a driver drives for more than 12 hours a day. As a result, he was involved in a road accident.

- S. M. Sohel Mahmud, Ishtiaque Ahmed, Md. Shamsul Hoque (2014) [6], they said in their work that some factors are responsible for the RA, among them the main factors are Road factors, vehicle factors, and human factors. They set some targets and tried to solve the problems. Their targets are-eliminate the collision on national highways, Improve Vulnerable Road User (VRU) safety, eliminate passengers fall down from vehicle accidents, 50 percent reduction in bus and truck collisions. They also talked about road and road environment improvement.
- Ahmed Sufian, Mahmud Khan, Ishtiaque Ahmed, Sababa Islam, Niloy Saha(2013)[7] on their work they reached some major factors are mechanical faults in vehicles like faults in breaks system, worn-out tires, fault designed roadway pattern, an excessive pothole in the wet season, absence of a proper hierarchy of road network, etc. Most of the accidents in our country happen when pedestrians cross the road because there is no protective shell around the pedestrians. As a result, they are more likely to be injured in an accident. A bad sign among some drivers is that one driver gets into an accident while driving because he has a competitive attitude with the other driver.
- Sohel, Shamsul (2011) [8] in their study they uphold some lackings in road safety of Bangladesh. Reporting of accidents, particular organizational weakness, lack of knowledge for the professional agency, appropriate resource limitations, lack of political support, wrong decision by the policy maker, lack of government and the private organization, inconsistent data recording system are the lacking for the road safety measures. So they have given their recommendations for road safety as well. These are political positive involvement efforts, road safety administrator's positive effort, adequate and necessary accident data storage, funding for road safety, different organizations conjoint support and so on.

2.3 Research Summary

So, it is visible that in every study myriad factor are contributing fatalities in RA and these factors are continuous in every RA. They have given their recommendations to make the road safe and also shown up the lacking behind this unexpected RA. It is clear in every study that, if the government and the administration don't take the proper and practical steps then RA and its destruction will not decrease.

2.4 Comparative Studies

Road Accident (RA) studies are one of the ways of helping a country from road accident severity and its destruction by giving the best, practical and logical solutions. It is very crucial to find out the problems and its solutions of RA for a country because without getting the proper indication anything can't be performed. There are many studies on the protection of RA in Bangladesh and these studies are very insightful. Sometimes these studies have been conducted for some highways, or divisions or districts, or a specific highway and sometimes for the context of Bangladesh. RA protection. In our study, we have talked about the several existing factors and here we have analyzed the accident data, RA articles from several newspapers and all the previous research studies to extract the existing factors, main problems and have tried to give feasible solutions with our proposed model. We have tried to make a best project model of solutions to cope with the accident severity and tried to show up a Data framework for the causing accident.

2.5 Challenges

There are two types of data collection systems that we need to rely on both public and private organizations. It was very difficult for us to gather the expected data for our research during this pandemic situation of COVID-19. We collected data of various types by communicating online with different organizations. We have collected data from various journals and research papers. We have checked all the collected data that we have collected and extracted all the required data that was supposed to work and it was challenging because it is very important to work with a proper and specific dataset.

CHAPTER 3

Accident Data and Methodology

3.1 Introduction

In this chapter we will show all the data sets of (2012-2019) of NISCHA and v various newspapers, online articles, various research papers in between the year (2000 to 2019) to mitigate RA in Bangladesh. We will uphold all the main data with the features which are impacting on RA in Bangladesh. We have said before in chapter 1 and 2 that, there are several factors that are impacting on RA in various cases. We will segment those data into several classes and will discuss them with the help of several research papers and articles which belong to RA causes in Bangladesh.

3.2 Data Collection Procedure

The Data collection procedure was quite hard for us in this pandemic situation. We were not able to collect the data physically going through various organizations such as DMP, ARI: BUET, BRTA and various private organizations. For this reason, we had made the decision to contact them via online and many of them did not pay any heed on our request and some of them suggest us to contact with them physically but due to this pandemic COVID-19 situation it was not possible for us to go physically on their places from ours district or native village because it is far away from the capital Dhaka. Among them only NISCHA helped us by giving their data online, so we are thankful to them. So, we collected data from various research papers, newspapers, online articles on RA and TV

3.3 Methodology

The following flowchart shows how we have proceeded to our research from the very beginning. It consists of data collection, data processing, data analysis, factor identification, solution identification and model generation.

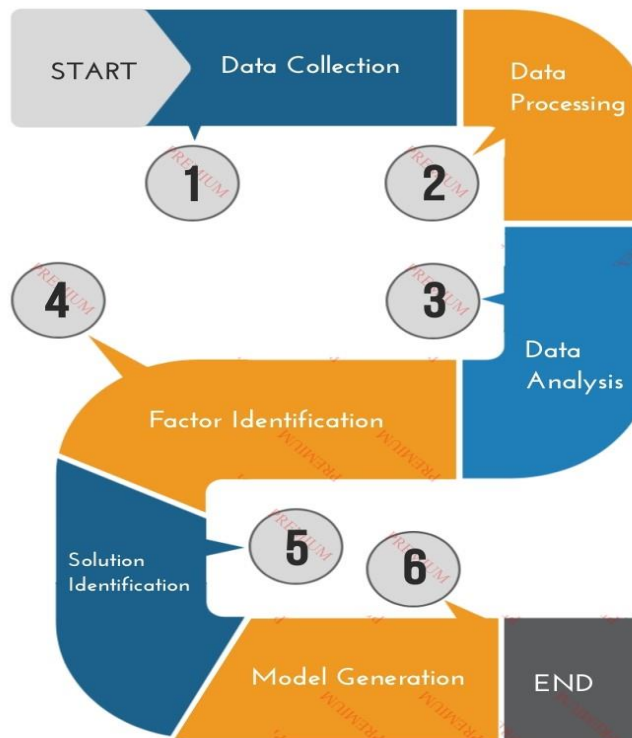


Figure 3.3.1: Flow Model of Methodology

3.3.1 Data Collection Plan

As we have discussed before that this data collection procedure was quite challenging for us because of the pandemic COVID-19 situation. It was not possible for us to go physically to collect the data. We have planned to collect the data online and the NISCHA helped us cordially, but that was not enough for doing research. So, we tried to collect them through media-TV, Newspapers and various articles and Alhamdulillah we got enough data to start with it.

3.3.2 Data Sources

1. NISCHA
2. Research Papers
3. Online Articles
4. Media-TV
5. Newspapers

3.3.3 Data Analyzing

1. We have done group discussions for analyzing and preparing it.
2. We have separated all the data according to its category.
3. After segmentation we have tried to find out the existing reasons for RA.
4. We have made some categories of people who are related to this RA through Media-TV, Newspapers, Online articles and doing study on the research papers.
5. According to these people's point of view we have tried to separate their problems and solutions.
6. We have also separated all the causing features and factors on RA from our sources and we have categorized the best solutions from the researchers, experts and all the people who are related in this field and also the general people's opinion from various Media-TV, Newspapers and online articles.

3.4 Accident Data

From the data of NISCHA we can analyze that the number of road accidents in the country has increased a lot in the last two years compared to the last two years in 2019 which has reached alarming proportions. Uneducated and inexperienced drivers, defective vehicles, poor traffic management, unaware people, reckless driving, over speeding, defective roads, lack of political wellness, lack of law and its proper enforcement etc. can be identified as the root of RA.

YEAR	Number of road accident
2012	3333
2013	2750
2014	2713
2015	2626
2016	2316
2017	3349
2018	3103
2019	4702

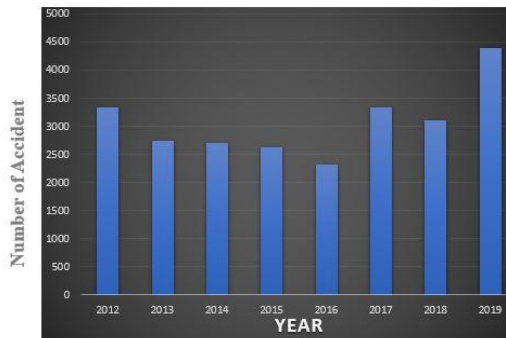


Figure 3.4.2: Number of Accident (Source: NISCHA)

It has also shown on their data that the number of deaths in the year of 2019 is 5227 where the number of deaths in 2018 was 4439. The number of deaths compared to last year is 788 more in this year. In the year 2017 the total death rate was 5645. The number of deaths rate compared to 2017 the number of death rate in 2018 was 23.36% less. Last year, in 2019, 15 percent more people were killed than in 2018.

YEAR	NUMBER OF DEATH
2012	5880
2013	5162
2014	6582
2015	5003
2016	4144
2017	5645
2018	4439
2019	5227

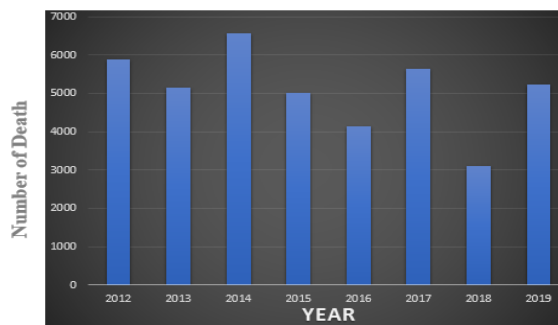


Figure 3.4.3: Number of Death (Source: NISCHA)

In 2019, 6953 people were injured in 4702 road accidents. In 2018, 7425 people were injured in 3103 road accidents, this year the number of injured is less than 472 people. The number of injured

is reported to be about 6 percent less this time than last year. The injured in many small accidents are treated locally and are not even published in newspapers. Many of them are paralyzed for life. Which could not be highlighted in this report.

YEAR	NUMBER OF INJURED
2012	18115
2013	7214
2014	10770
2015	6197
2016	5225
2017	7908
2018	7425
2019	6953

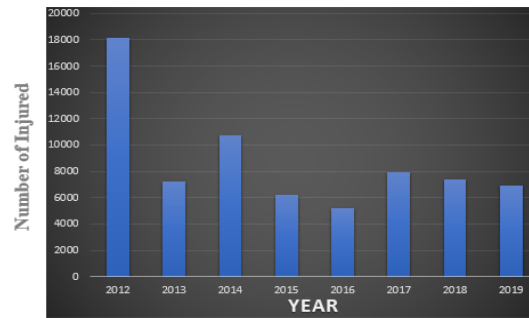


Figure 3.4.4: Number of injured (Source: NISCHA)

3.5 Human Data:

The figure: 3.5.5 shows that the age of drivers between 0-10 and 61-70 has less impact on RA. Drivers between the ages of 21-30 and 31-40 are more responsible for road accidents. Where the age between 11-20 has a visible impact on RA also [4], which shows that there are many unlicensed drivers including this age. This is totally illegal. They don't have the proper education and experience for the sake of proper driving. The age between 41-50 of drivers has also impacted on RA and the reason behind this is tiredness, negligence etc. [4]

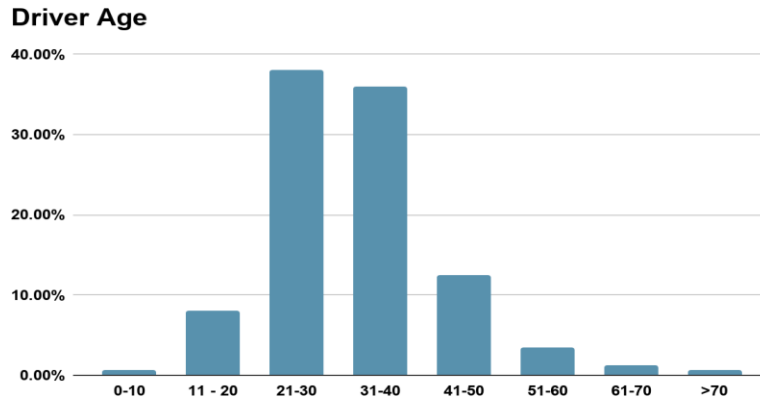


Figure 3.5.5: Accident rate comparison to driver age [4]

In figure 3.5.6 shows the education level of drivers in 2014-2016. Here, we can see there are primary level educated drivers which rate is 58%, High School level rate is 25%, S.S.C & H.S.C level education rate is 12% and the rest of 5% are others [9].

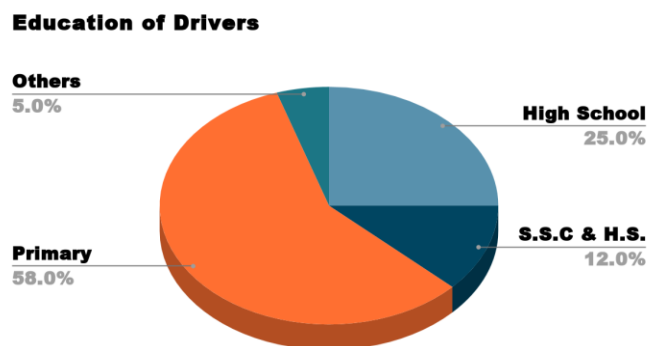


Figure 3.5.6: Education of driver [9]

In Figure: 3.5.7 it is visible that the alcoholic driver has suspected various times which had led them to RA. Suspected drivers' number was higher from the year 2002 to 2004 and the maximum was in the year 2003[4].

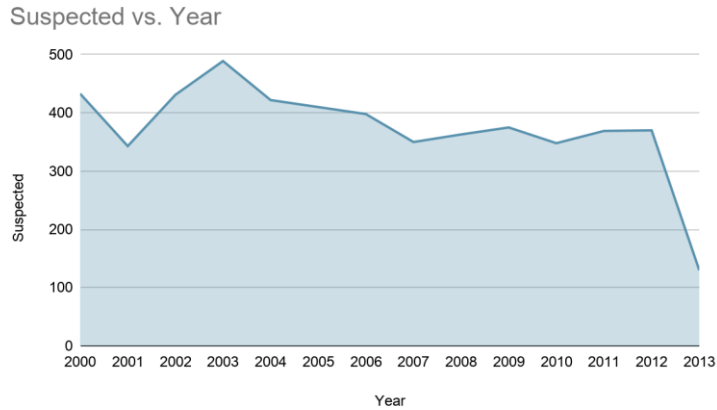


Figure 3.5.7: Accident fatalities due to alcoholic driver [4]

A survey [9] was made based on Dhaka to Aricha highway RA case study. In their paper they have mentioned the rate of drivers who use seat belts and who do not. Which we have upheld in Figure:3.5.8. It shows an example of the whole Country of the drivers and the figure: 3.5.9 shows the driving hours per day of a driver. Figure: 3.5.10 shows the rate of the drivers who talk on the phone while driving [9].

Seat belt Uses

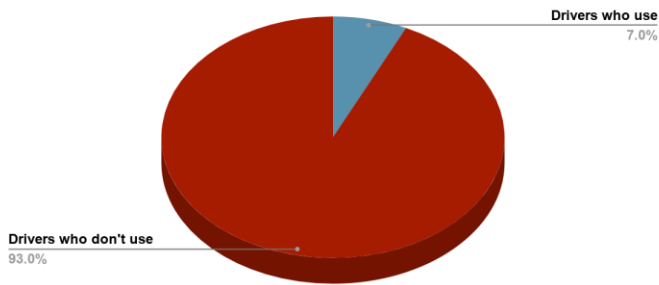


Figure 3.5.8: Seat belt uses

Driving Hours per day

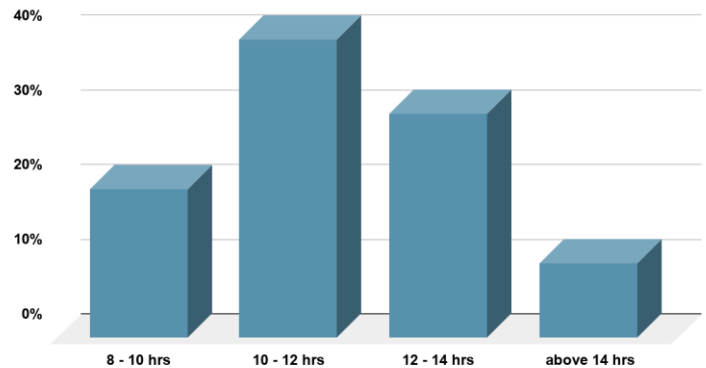


Figure 3.5.9: Driving hours per Day

Use the phone while driving

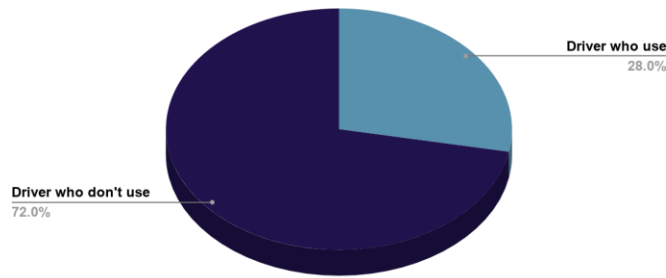


Figure 3.5.10: Driver using phone while driving [9]

3.5.1 License/Non-licensed Driver:

According to the NISCHA 2019 report the total number of heavy vehicles is 2,61,821 but driving licenses have been issued for 1,54,720. There are 1,07,101 heavy vehicle drivers who do not have a license. While the number of medium vehicles is 59,554, the number of drivers is 95,503, therefore the total number of medium drivers who do not have a license are 35,949. Moreover, the number of light vehicles is 7,26,048 where the number of light vehicle drivers is 19,21,928. That means an additional 11,95,880 light drivers who do not have a license. Many of them drive heavy vehicles.

A total of 12,31,829 additional drivers, both medium and light, are being misled into believing that there is a shortage of drivers without proper training.

3.5.2 Pedestrian Data:

From 2005 total number of pedestrians 2,31,091 were counted at 16 foot over bridge locations. Of these numbers of pedestrians, less than half (46.81%) of the pedestrians were found to use foot over bridges. And while the crossing facilities were not used by the larger half (53.19%) of people [14]. Despite the numerous Over bridges, they don't want to use, they prefer to cross the street [15].

Uses of Foot Over Bridge

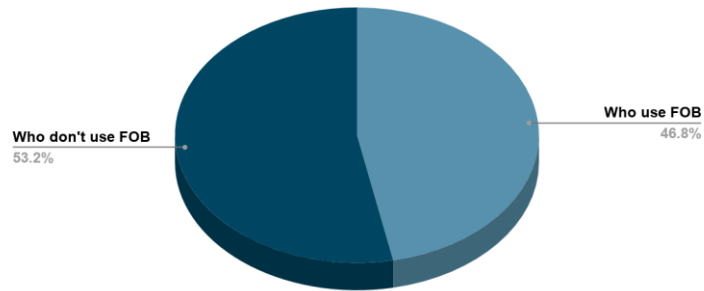


Figure 3.5.11: Uses of foot over bridge

3.5.3 Pedestrian Age:

The male pedestrian group between the age 15 and 49 years has the highest risk in road accidents which has shown in the report of the world bank. In this report it has upheld that, the pedestrian fatalities per 10,000 vehicles is 32.7%. The WHO has shown that children are facing road safety risk highly in Bangladesh [1].

In the year 1990 the Road fatalities were ninth leading cause among the age five to fourteen and by the year it has become four leading causes of death [1].

ROAD USER FATALITIES					
	Bangladesh	Bhutan	India	Nepal	Sri Lanka
Fatalities per 10,000 vehicles	102.1	16.7	13.0	40.0	7.1
Pedestrian fatalities per 100,000	4.4	0.5	1.5	-	5.0
Pedestrian fatalities per 10,000 vehicles	32.7		1.2	-	2.1

Table: 3.1 Road User Fatalities [1]

3.6 Vehicle Data

The above report provided by BRTA also shows that the number of buses in Bangladesh is 49,272. Of these, 992 bus accidents have been admitted. And the number of trucks is 1,51,784, of which 1,033 truck accidents. A total of 1,94,056 buses and trucks have caused 2,025 road accidents this year. The number of road accidents in the remaining 4 million vehicles is 2,677.

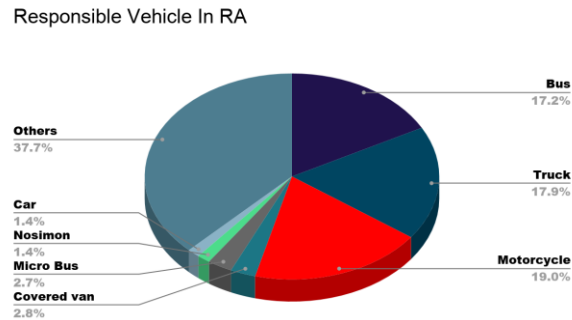


Figure 3.6.12: Responsible Vehicle in RA (Source: NISCHA 2019)

The number of drivers killed according to the type of vehicle:

Death Person	Death Number
Bus driver & helper	49
Truck driver & helper	72
Driver of microbus	21
Car driver	20
*1 Biker & pavilion	648
Pickup van driver	35
Covered Van	31
Others (trolley/tractor/Nosimon/ korimon/van/auto rickshaw/bi-cycle etc)	314
Total	1190

Table 3.2: 22% of the total deaths are drivers (Source: NISCHA 2019)

*[1] In 2019, the number of motorcycle accidents was 1098. The number of fatalities in road accidents in 2018 was 21 %, but in 2019 the figure fell to 19 %, which is 2 percent lower than in the previous year.

Licensed/Non-licensed Vehicle Classification:

No.	Vehicle Name	Vehicle No.	Vehicle Type	Total Vehicle	Issued Driving License	Without License
01	Bus	6184	Heavy Vehicle	2,61,821	1,54,720	1,07,101
02	Cargo-van	18,900				
03	Covered Van	63,349				
04	Special Vehicle	1,04,168				
05	Tanker	1,25,058				
06	Truck	3,63,018				

Table 3.4: Heavy Vehicle Classification

No.	Vehicle Name	Vehicle No.	Vehicle Type	Total Vehicle	Issued Driving License	Extra driver
07	Ambulance	6184	Light Vehicle	7,26,048	19,21,928	11,95,880
08	Human hauler	18,900				
09	Jeep(hard/soft)	63,349				
10	Micro bus	1,04,168				
11	Pick up (double/single/cabin)	1,25,058				
12	Private passenger car	3,63,018				
13	Taxi cab	45,371				

Table 3.5: Light Vehicle Classification

According to NISCHA the total number of heavy vehicles is 2,61,821 but driving licenses have been issued for 1,54,720. While the number of medium vehicles is 59,554, the real number of drivers is 95,503 on the street. A total of 35,949 medium drivers are added. Moreover, the number of light vehicles is 7,26,048. The number of light car drivers is 19,21,928. That means an additional 11,95,880 light drivers. Many of them drive heavy vehicles without a license.

No.	Vehicle Name	Vehicle No.	Vehicle Type	Total Vehicle	Issued Driving License
14	Delivery Van	30,641	Medium vehicle	59,554	95,503
15	Mini Bus	28,913			
16	Tractor	45,578	Others	70,686	921
17	Other vehicle	25,108			
18	Auto Rickshaw	2,91,685	Three-wheeler	3,12,460	68,866
19	Tempo	20,775			
20	Motorcycle	27,86,954	Two-wheeler	27,86,954	13,60,703

Table 3.6: Medium, Two and Three-wheeler and other Vehicles Classification

According to BRTA data, there are 27,86,954 registered motorcycles in the country and 13,60,703 licensed drivers. It appears that according to the BRTA data, 14,26,251 motorcyclists are illegally riding motorcycles with the tip of the law enforcement's nose and the BRTA, including the law enforcement, is looking at them fearlessly as if they have nothing to do.

Fitness of Vehicle:

According to the BRTA, more than 55,000 vehicles have not had their vehicle fitness certificate renewed for more than 10 years. A study by ARI in 2018 found that 369,100 vehicles were running on the road without any fitness certificate [16].

3.7 Road Data

According to the paper [2] the RA rate is much higher (Figure:12) where no junction is placed and it is also on the T-junction. In the matter of road surface (Figure:13) they had shown that three (Dry, Sealed, Good) types of surface are leading RA where sealed type roads cause maximum RA.

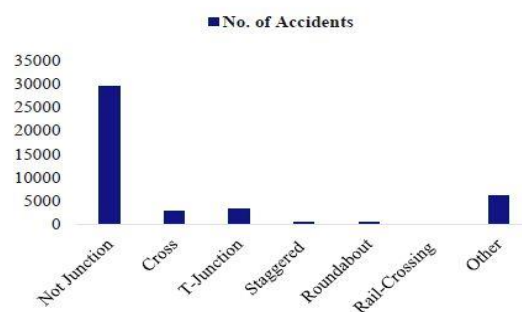


Figure 3.7.13: Accident in different junction (Source: ARI 2001-2015 and [2])

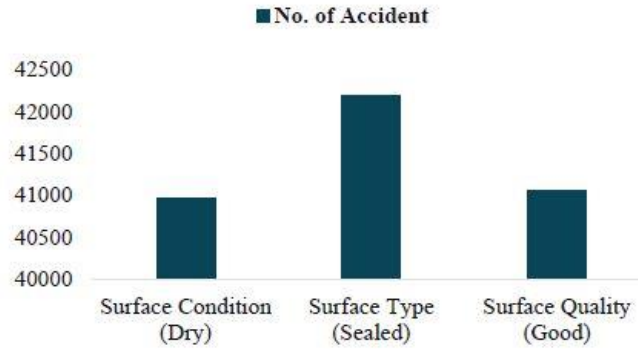


Figure 3.7.14: Road surface effect on RA (Source: ARI 2001-2015 and [2])

Road Class:

Different road classes have much impact on RA [2]. Where the maximum RA occurs on the rural and regional roads.

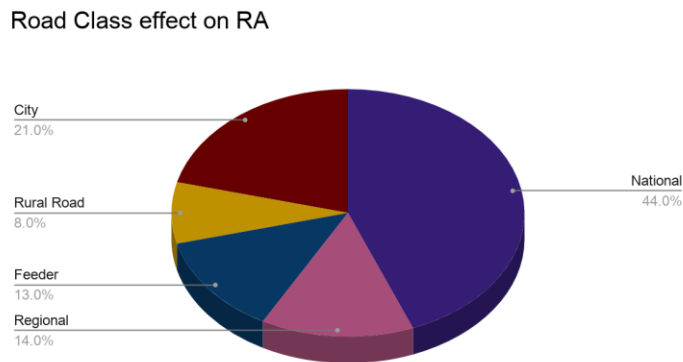


Figure 3.7.15: Effect of Road Class on RA (Source: ARI 2001-2015 and [2])

According to the paper [2] they have shown that there are some conditions based on features for which the RA fatalities get increased. Which includes Location type(rural), Divider(yes), Movement(2_way_street), Road geometry (straight flat), Light(daylight), Weather(fair) and Traffic control (no control).

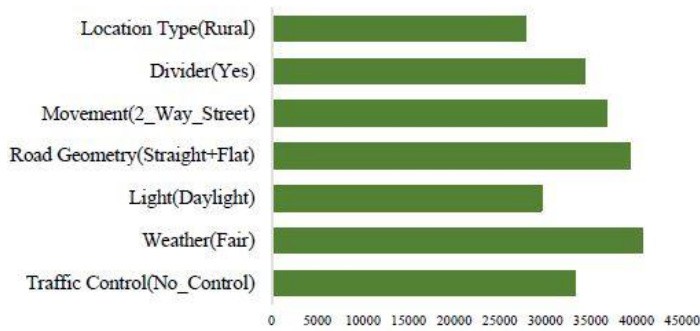


Figure 3.7.16: No. of Accidents for the condition of the features (Source: ARI 2001-2015, [2])

3.8 Time & Weather Data

According to ARI report data from (2001-2015) maximum RA fatalities occur at the time 12 pm to 06 pm and 06 am to 12 pm. On the other hand, 06 pm to 12 am and 12 am to 06 am has light but not less effect on RA, which has also been mentioned on the paper [2].

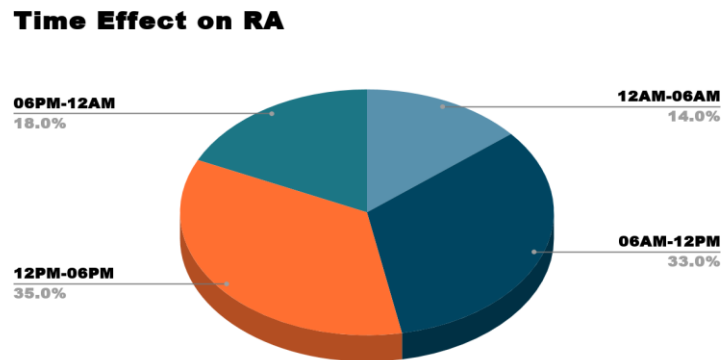


Figure 3.8.17: Effect of time on accident (Source: ARI 2001-2015 and [2])

Weather Data:

According to the ARI report 2013 of BUET weather has also had an impact on RA. From this report it upholds that the rainy condition has greater impact on RA, where foggy condition is in the second position for reasoning RA fatalities.

RA Due to Weather

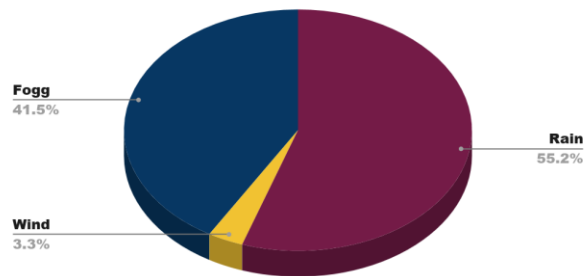


Figure 3.8.18: RA Due to weather conditions (ARI: BUET 2013)

3.8 Type of Accident Data

Type of accident	Number of accidents	Number of deaths	Number of injured
*1 Pressed by Vehicle	2013	2109	708
Push from behind	106	105	182
In face-to-face clashes	679	445	1843
Flippist Fall	511	569	1609
Fall into the ditch	178	232	1732
*2 Other	552	1767	879
Total	4702	5227	6953

Table 3.7: Type of Accident (Source: NISCHA 2019)

[*1, *2] 2,661 pedestrians died in road accidents in 2019. Which is 50.04% of the total accidents. Studies have shown that pedestrians are hit by cars, pushing from behind, causing damage in various ways. Pedestrians are facing road accidents due to lack of awareness about traffic laws, use of mobile phones in road and crossing, zebra crossings, underpasses, footpath bridges.

Types of Accident

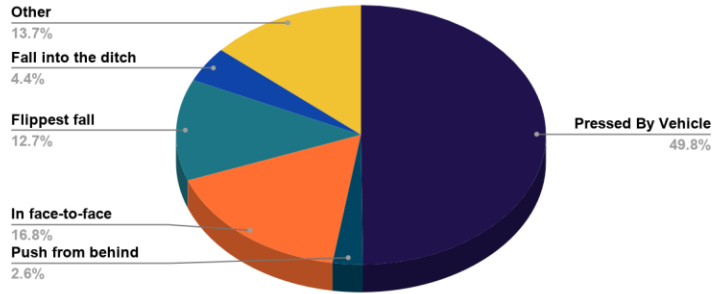


Figure 3.8.19: Types of accidents organized in 2019 (Source: NISCHA 2019)

CHAPTER 4

Factor Analysis Based on Data

4.1 Introduction

In Chapter 3, we have shown the data reasoning behind the fatalities of RA, where we can have a close look of all the segmentation of data with their features.

There can be myriad reasons behind a RA. Our goal is to identify all the causes behind every fatalities of RA and find out the possible solutions in order to repel the fatalities of RA. In this chapter 4, we will try to find out the causes of RA based on the data we have collected.

4.2 Identifying Factors

After reviewing all the data segmentation from chapter 3, we have selected five main categories of factors and named it “5-Factors” which are existing and continuous in RA fatalities.

The “5-Factors” are:

1. Human Factor
2. Vehicle Factor
3. Road Factor
4. Weather and Time Factor
5. Laws and Political will

All the causes of RA cover any of these “5-Factors” categories and these categories also includes a number of sub-categories. After defining and selecting the “5-Factors” category we classified them into sub- categories. The sub-categories have some features which are particularly impacting RA continuously.

4.3 Human Factor

Human Factor consist of the people who are directly and indirectly engaged in RA and they are the leading contributors amongst all the factors, because all the fatalities of accidents are caused by humans and sometimes, they are indirectly engaged in RA.

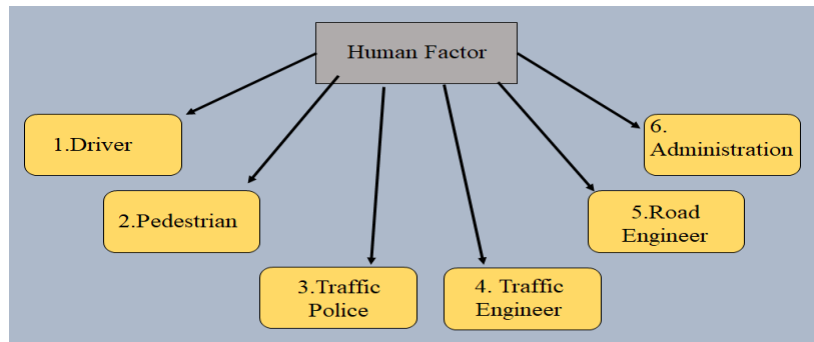


Figure 4.3.1: Human Factor Classification

So, the sub-category of Human factor includes driver, pedestrian, traffic police, traffic engineer, road engineer and administration.

1.1 Driver

Drivers are the top contributors in RA [19], many of the RA occurs because of reckless driving, overloading, overspeeding, overtaking, violating laws, illegal and dangerous competition, long time driving without break, use of alcohol, lack of skill [18]. All the features mentioned here are the parts of the driver.

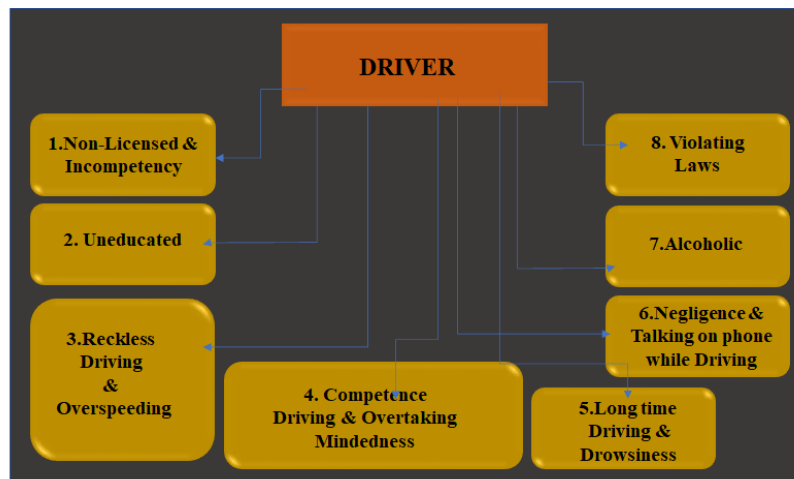


Figure: 4.3.2 Driver Features

1.1.1 Non-Licensed & Incompetency:

According to the BRTA: 2019 there are non-licensed drivers of heavy vehicles are 1,07,101, medium vehicles drivers are 35,949 and light vehicles drivers are 11,95,880. This means that there are 1,303,965 drivers who are running their vehicles on the road without a test of driving license. It is clear that the drivers who do not have a license are not eligible for driving and it is unknown to everyone of their skills. According to WHO-2019 report [1] there is no formal training session for the drivers in Bangladesh. Although the drivers show their license of light or medium vehicles, where they drive heavy vehicles. There is also a lack of transparency in issuing driving licenses. In many cases it is seen that driving license is issued in exchange for a bribe without any driving test (BRAC 2007), as a result incompetent driver are getting license easily. It may be possible that 70 percent of the licenses for heavy vehicles are fake (PwC 2018) [1].

Nowadays there has increased a number of adolescence bikers who are riding bikes all over the country without a license. As it is illegal for an immature person to ride a bike moreover, they do not follow the rules and regulations of driving a motorcycle. They run their bikes as fast as a jet plane and the last consequence becomes a worse accident.

1.1.2 Uneducated:

For obtaining a driving license there is a written test while most of the drivers are uneducated, so they find another way for getting a license which leads to an illegal bribe process. According to a survey on drivers' education for Dhaka to Aricha Highway there are 72% of drivers who went to primary school, 20% high school, 6% had done their S.S.C and H.S.C and 2 % others [4]. There are many drivers who do not have proper understanding of traffic signs and markings (Uddin and Hoque 2003). The drivers who are not educated at least they had to take proper schooling in driving schools. There are 98 private driving schools while 55 of them are in Dhaka and most of these schools train the drivers to drive light vehicles and it has said that it is not mandatory for training for heavy vehicles to get a driving license. It remains a question about drivers' skill when they only learn for light vehicle driving.

1.1.3 Reckless Driving & Overspeeding:

Reckless driving and overspeeding is one of the major leading causes of RA. Disobeying the rules of traffic, don't caring about other vehicles, competing with other vehicles, and negligence makes a driver reckless and cause accident. Regrettably, our country is a country where thousands of people are dying recklessly every year. More than 25,000 people have lost their lives on the road in the last decade due to reckless driving. Reckless drivers' behavior is endemic in Bangladesh and the consequence is overspeeding. According to ARI BUET, 53% of all road accidents are caused by overspeeding. Though there are speed limits, barrier drivers don't obey that and the

main problem of overspeeding especially affects national highways. The highest speed limit for motorway/highway is 80 km/h, for village with few pedestrians and a wide main street is 50 km/h, for town and villages where moderate pedestrian traffic or there is a narrow road is 40 km/h and the lowest speed limit for temporary bridge or the place where so many rickshaws and pedestrians are gathered is 25 km/h. Most of the drivers do not follow these speed limits [21].

There are some factors responsible for overspeeding [21]

1. Lack of education.
2. Lack of training.
3. Lack of awareness.
4. Socio-economic condition of the drivers.
5. Alcohol and drug addiction.
6. Transport owner's preference to recruit unskilled young drivers .
7. No fixed weekly or monthly basis salary system
8. Salary on the basis of the number of trips each day
9. Restlessness of the drivers.

1.1.4 Competence Driving & Overtaking Mindness:

Underpaid bus drivers racing to compete for passengers, most of them are reckless minded and run their vehicle as fast as they can without obeying the speed limit and they overtake the vehicles around them. On the other hand, some drivers compete & overtake as a part of enjoyment and sometimes for reaching the destination. According to BRTA, DMP, DTCA 90 % of the RA occurs for driver's reckless mindedness, overspeeding and competence driving (Prothom Alo). The drivers blame the passengers for telling them to drive fast and they also blame the owner for renting the vehicle on contractual basis. Kazi Md Saifun Newaz, an assistant professor at ARI, mentioned that frequent accidents are taking place because of overtaking tendency and reckless driving.

1.1.5 Long Time Driving & Drowsiness:

One of the mentionable points is long time driving and drowsiness. According to a news article of "PROTHOM ALO" most of the long-distance drivers run their vehicle nonstop 20-22 hours while there is no place for taking rest. On a survey of Dhaka to Aricha Highway the drivers who drive on this highway regularly they drive 10-12 hours a day continuously where the amount is 40% and 30 % of the drivers run their vehicle continuously 12-14 hours a day [9]. The public transport drivers who drive inside the capital Dhaka start driving at dawn time while it ends at late night. The truck-covered van drivers who take vehicles on contractual basis they even have to drive for 2 to 3 days continuously on road. This shows terrible data of long time driving. The consequences are tiredness, drowsiness while driving on the road and causes RA fatalities.

1.1.6 Negligence & Talking on the Phone:

One of the biggest problems of drivers is negligence and they use to talk on the phone while driving. According to researchers, distraction caused by talking on phone while driving leads to inattentive blindness and reduces mental attention to their surroundings. The drivers become negligent when they talk on the phone. On a national highway survey, the drivers who use to drive on that road there are 28% of drivers talk on the phone while driving. This is one of the reasons for RA fatalities.

1.1.7 Alcoholic:

According to transport owners there are 50,000 public transport drivers and their helpers are drug addicts [25]. Stakeholders say, a common habit of drivers is drugged driving which leads to RA [25]. There is no particular study on the number of the alcoholic drivers in Bangladesh though the private organizations have found that the number of drugged drivers is 80%. Drivers say that drugs or alcohol removes their endless fatigue and frustration. It has already shown on the long-time driving section that, most of the drivers have to drive up to 15 to 18 hours a day and they use alcohol to stay awake. This alcohol or drug keeps them relief and avoid pressures but this temporary energy do not let them to drive normally so they face accidents (Psychiatry Professor Dr Md Tazul Islam:NIMH).

1.1.8 Violating Laws:

A common tendency in drivers is that they do not follow the traffic rules. They only follow it only when there remain traffic police but nowadays the bribe becomes a green card for the drivers and it is given by the traffic police. Frequently parking, taking passengers from here and there off the road, overtaking, speeding, not using seat belts, excessive passengers and goods carrying, taking passengers on the rooftop are the common violating laws from drivers. Not using the helmet is one of the major mistakes in bikers.

1.2 Pedestrian:

Drivers are to blame for accidents but in all cases the driver alone is not responsible, in some cases pedestrians are also responsible. According to Buet's Traffic Research Institute (ARI), 70% of all accident casualties in Bangladesh are pedestrian. 54% of the victims from urban accidents are pedestrians. Some features are responsible for pedestrian accidents. Those are-

1. Age and Sex
2. lack of traffic responsibility of passengers and unaware people

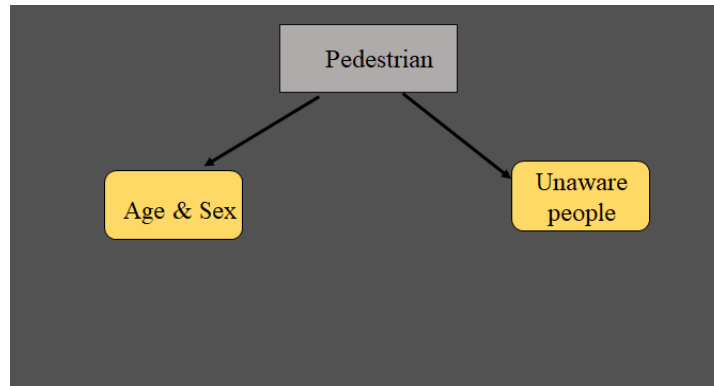


Figure 4.3.3: Pedestrian Features

1.2.1 Age and Sex:

We already discussed pedestrian age in chapter 3.4.3, where we have seen that the pedestrian group between the age 15 and 49 years has the highest risk in RA which is 15 times higher than that across the South Asia region and where it is also remarkable that children have the highest risk in road safety among 5-14 age. It shows that there is a lack of health and education outcomes for children [1].

1.2.2 Unaware People:

Pedestrian negligence is the main reason for pedestrian accidents. Pedestrian accidents are admitted due to frequent road crossings, reluctance to use foot over bridges, non-use of zebra crossings, use of phones while crossing roads, not riding on the vehicle from the stoppage or junction. All the situation indicates that the unawareness between pedestrians is also the common mistake for causing RA fatalities.

1.3 Government Manpower:

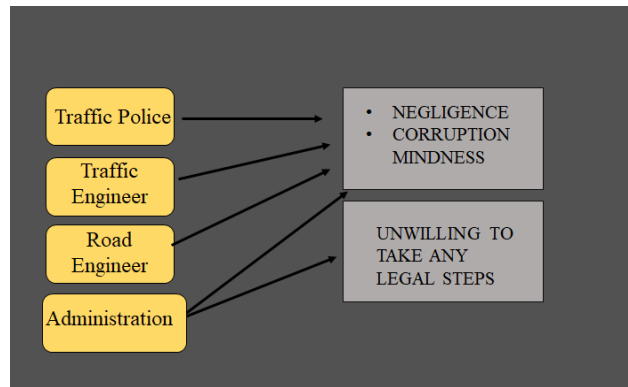


Figure 4.3.4: Government Manpower

In this section we have named it Government Manpower by which we are meaning to the peoples who are related to Government and directly or indirectly they are impacting on RA. Here we have listed four categories of government people: Traffic police, Traffic engineer, Road engineer and Administration where four of each category have involved negligence and corruption mindness and the administration has an extra feature which is unwilling to take any legal steps. Traffic police have a big role on the road, but sometimes they fail to do that because of the corruption mindness and negligence. Sometimes many of them take bribes from the driver and let them chance to drive on the road and sometimes they really don't care at all about the vehicles on the road.

A Traffic engineer has several duties to do such as point out the black spot of accident, accident type, accident reason, checking road sign and marking, speed limits, analyzing the RA problems etc and find out the solutions but there are several accidents has been occurred by traffic engineer fault, where a road engineer fault is more malign. According to the data from 2015 to 2018 over 25,000 people have been killed on RA in 3 years. The experts had mentioned that there is a lack of awareness and engineering faults behind these RA. The ARI researcher and BUET teacher said that there are inadequate zebra crossing, no free space in footpaths, lack of automatic signaling system, and lack of management for pedestrians' road crossing are among the culprits.

The administration has a big role for preventing RA by taking proper steps. Many of the RA are happening and many of the people are losing their lives but the necessary steps and roles are missing from the administration. According to NISCHA it is impossible for them to determine the actual number of road accidents accurately because it was the responsibility of the government. Despite the directives of National Road Safety Council's, no official figures have been released by the police, civil surgeons and district administrations for not providing regular information to the NRSC. The BRTA also doesn't know the real number of vehicles without fitness (JAMUNA tv).

4.4 Vehicle Factor

Vehicle factor means where the vehicle is directly or indirectly responsible for the accident. Many times, we can see unfit vehicles becoming the main cause for RA. Unfit vehicles are alarmingly high in our country, which is increasing the number of RA.

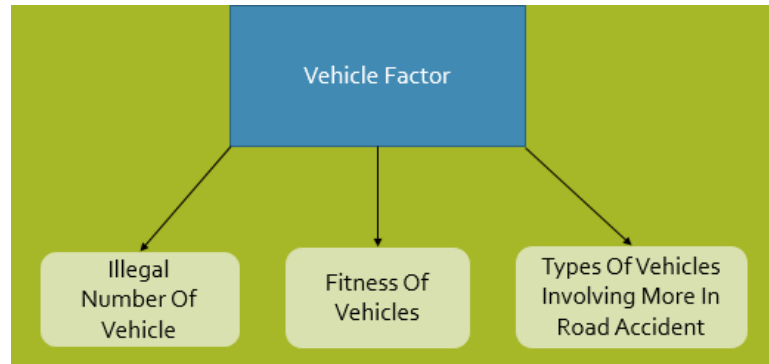


Figure 4.4.5: Vehicle Factor Classification

So, the sub-category of Vehicle factor includes Illegal number of vehicles, Fitness of vehicles, Types of vehicles involving more in RA.

4.4.1 Illegal Number of Vehicles

According to BRTA, 504,130 new vehicles were registered in 2019, which is more than 2018. In 2018, a total of 497,374 vehicles were registered (NISCHA). In Table 3.4-3.6 we have mentioned the number of different types of registered vehicles. Where the number of registered vehicles until 2019 was 32,17,523. But in reality, the number of vehicles on the road is much more than that. The number of unregistered vehicles running at the tip of the nose of law enforcement on the road is not less. All these unregistered vehicle accidents are being admitted. Due to lack of accurate information on unregistered vehicles, it is not possible to take appropriate action from BRTA. Analysis of the data shows that the number of three-wheeler and two-wheeler vehicles is the highest among unregistered vehicles.

4.4.2 Fitness of Vehicle

A myriad number of unfit vehicles are running on the road and occurring RA fatalities. There are 30,000 unfit vehicles running on the road of Dhaka the capital [26]. There are a number of dishonest officials who are giving a green card to many unfit vehicles by taking bribes (BRTA). In 2019 a report was submitted to the High Court where it has been mentioned that 479,320 registered vehicles by BRTA have no fitness certificates [27].

Till 18th October 2020, the number of unfit vehicles is 484,536, where the number of bus and mini-buses are 25,000 and truck- covered vans are more than 60,000 (BRTA). At the Mirpur office of BRTA, an average of 400 driver's licenses are tested daily and fitness certificates are issued for an average of 600 vehicles, where only 8 people are in charge of issuing licenses (Prothom Alo).

4.4.3 Type of Vehicles Involving More in RA

In Figure 3.11 we have mentioned the Responsible Vehicles data involved in RA, where the percentage of bus 17.2%, truck 17.9%, motorcycle 19%, covered van 2.8%, micro bus 2.7%, nosimon 1.4%, car 1.4% and others 37.7% (NISCHA 2019).

According to Jatri Kalyan Samity, in November month of 2020, 486 lives were killed in 443 accidents all over the country, where 741 people were injured. Accident percentage for responsible vehicles are-

Pickup-Covered van 26.76%, Bus 13.14%, Nosimon-Korimon 11.69%, CNG 38%, Battery Rickshaw-Easy bike 9.23%, Car-Jeep-Microbus 4.32% and Motorcycle 24.83% [28].

4.5 Road Factors

One of the major reasons behind the increased number of RA and casualties for hazardous roads, lack of proper road design and inferior road constructions. Also, the use of low-quality pitch between highways and rural roads does not maintain the quality of the road. This results in potholes in the water during the rainy season and increases the chances of major accidents. Many times, the risk of accidents is higher as there are single lanes on rural roads. In many cases, major accidents occur due to a lack of sign indications on the junction roads and sometimes the roadside obstacles. In many cases, parking on the side of the highway makes the road narrower, which increases the probability of an accident.

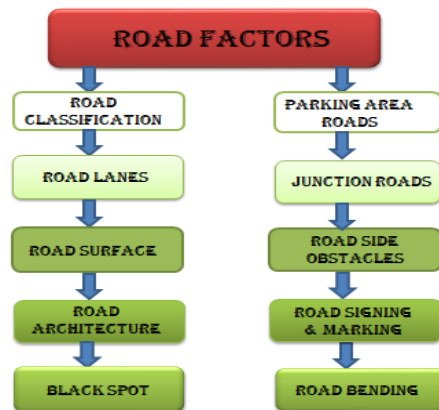


Figure 4.5.6: Road Factors

4.5.1 Road Classification

The road network in Bangladesh consists of six road categories: National Highways, Regional Highways, Zila Roads, Upazila Roads, Union Roads and Village Roads. The highest number of accidents from the above six road categories occur in rural parts of national highways. The reason is that the existing traffic control system in that place is considered unsuitable. In one study route shows, 81% of accidents occurred in rural areas and 19% in urban areas of national highways [29].

4.5.2 Road Lanes

In our road transport, lanes are part of a carriageway that allows drivers to control, guide and reduce traffic congestion, allowing vehicles to move in a single lane or in multiple lanes. Many highways have at least two lanes and are separated by one lane marking on each side for traffic. The lower the lane, the greater the chance of an accident. If there is no divider between the two lanes, there is a greater chance of a head-on collision with an oncoming vehicle during overtaking.

4.5.3 Road Surface

In general, the road surface is a stable surface material intended to maintain vehicle or foot traffic. There are three types of road surfaces: Sealed, Brick and Earth. Most of the time drivers have accidents on the Sealed Road. According to the "Roads and Highways Department of Bangladesh", the total length of paved roads in Bangladesh is 17353.69km and the length of unpaved roads is 636.06km [31]. As the speed of vehicles is higher on sealed roads and the rate of accidents is higher on sealed roads due to the length of the road and more traffic.

4.5.4 Road Architecture

Due to the poor quality of road architecture in Bangladesh, the World Economic Forum's Global Competitiveness Index 2017-2018 has declared that Bangladesh has the second-worst quality roads in Asia (Dhaka Tribune). It is disappointing to say that a country that is second in Asia in terms of poor road architecture and construction, has a higher risk of accidents on those roads.

4.5.5 Road Black Spot

Accidents have black spots on more or less many roads in Bangladesh. There are black spots in different areas, especially on the highway road. Such as Dhaka-Sylhet National Highway, Dhaka-Chittagong National Highway, Dhaka-Barisal Highway. An analysis of the data obtained through the development and maintenance of highways by the Roads and Highways Department shows that about 25 percent of the roads and highways in our country are in very bad condition (The Financial Express).

4.5.6 Parking Area Roads

In other countries the parking lot system is good but our country's parking system is in a very bad condition. Many people in our country keep their cars on the side of the highway without following the law, which makes the roads narrow and there is a possibility of an accident while driving.

4.5.7 Junction Roads

There are several types of junctions on the road, some of which are prone to accidents. According to a study, about 71% of accidents (1925 out of 2720) occur where there is no junction. This is followed by T-junction (16%). Another type of risky junction is cross-junction (12%). And in particular, stagnant-junctions and railway crossings have the lowest number of accidents (Road Traffic Accident Characteristics in Dhaka, Bangladesh - Ishtiaque Ahmed, Bayes Ahmed, Mohd Rosli Hainin -2014).

4.5.8 Roadside Obstacles

Most of the roadsides in our country are occupied by people. Sometimes the hawkers are seen occupying the side of the road, sometimes they are seen occupying small temporary shops, sometimes it is seen that the passengers are occupying because there is no passenger canopy. As a result, the roads become narrower, resulting in disruption of traffic and increased risk of accidents.

4.5.9 Road Signing and Marking

Road signs and markings are important for the safety of the public as well as for the proper direction of the vehicle. The survey was conducted among 202 Dhaka city drivers. Forty-two (42) traffic signs have been determined. There were twenty (20) administrative signs, seventeen (17) warning signs, and five (5) informative signs out of those 42 traffic signs. The average result of comprehension was just around 50 percent, calculated in terms of the number of right answers (Motorist understanding of traffic signs: a study in Dhaka city - Abdur Razzak and Tanweer Hasan - 2009). This means that drivers in our country have very little knowledge of the meaning of road signs and markings. As a result, the desire for an accident can be expected more.

4.5.10 Road Bending

Road bends often become a threat to accidents. Especially when there is no sign at the bend of the road, many drivers get into accidents due to speed. Many heavy vehicles lost control while taking complex turns and fell into the trap of accidents. Thus, there is a risk of major accidents due to complex turns.

4.6 Time & Weather Factor

Time Factor

Most accidents occur during the day and in sufficient light (66%) (Ma Jabbar 2010). In Figure 3.16 we have shown the time effect of road accidents. Where we can see 33% accidents happen in 6AM-12PM, 35% accidents happen in 12PM-6PM, 18% accidents happen in 6PM-12AM, 14% accidents happen in 12AM-6AM.

Weather Factor

Weather has a remarkable influence on RA in the context of Bangladesh. In the rainy season the percentage of RA is 55.2%, in wind it is 3.3% and in foggy weather it is 41.5% (ARI 2013). The reason for the rainy season accident is the road surface. Many of the roads have holes and because of the poor water drainage it becomes waterlogging and RA occurs. On the other hand, in the foggy season, it becomes difficult to drive in the heavy fog. Moreover, due to lack of headlights and braking on slow-moving cars, more RA occurs in dense fog and rain (NISCHA).

4.7 Laws and Political Will Factor

It is more important to implement and maintain the law than generate it. In 2018 an act of law which is “Road Transport Act 2018” has been generated by replacing previous “Motor Vehicle Ordinance 1983”. Though it has not fully implemented yet. There is some sub-category of Laws and political will factor, which is Lack of proper implementation and maintenance of the law, Corruption mindedness and Negligence.

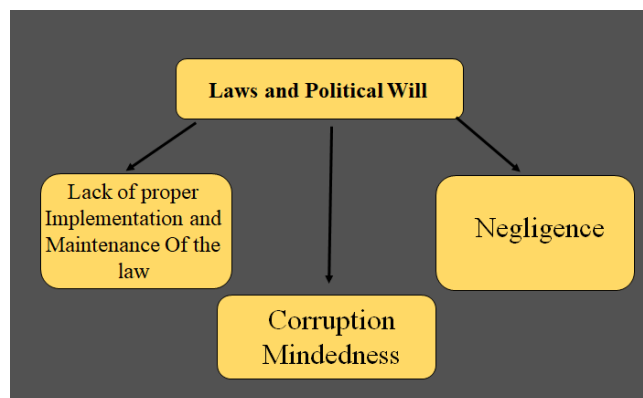


Figure 4.7.7: Laws and Political Will Factor

The maximum penalty for violating traffic laws by disregarding the Motor Vehicles (MV) Ordinance of 1983 is two years imprisonment, while the minimum imprisonment is one month. The maximum fine is TK 5,000 and the minimum is TK 100. On the other hand, the maximum fine is Tk5,000 and the minimum Tk100. Under the Road Transport Act (RTA), 2018 the maximum fine is as much as Tk5 lakh and the minimum fine is Tk5,000. Here are the amendments to the new law.

OLD LAW VS NEW LAW		
OFFENCES	PUNISHMENT UNDER OLD LAW	PUNISHMENT UNDER NEW LAW
Driving without licence	4 months in jail or Tk500 fine	6 months in jail or Tk25,000 fine
Unregistered vehicles	3 months in jail or Tk2,000 fine	6 months in jail or Tk50,000 fine or both
Unfit vehicles	3 months in jail or Tk2,000 fine	6 months in jail or Tk25,000 fine or both
Chassis or body change	2 months in jail or Tk5,000 fine	3 months in jail or Tk3 lakh fine or both

Figure 4.7.8: Old Law VS New Law [17]

With this law, some insidious quarters are spreading fear among the public and drivers. In fact, this law is not for any jail, not for fines, this law has been made to restore order on the road. If everyone obeys the law, discipline will return to the streets where there is no question of jail-fines. In particular, the fact that the law provides driver-friendly facilities (such as driver's employment letter, working hours welfare fund, clothing) etc. is widely disseminated in various leaflets, posters, banners, festoons and various electronic and printing media so as not to confuse the drivers (NISCHA). Some of the people related to government and administration have negligence and corruption mindedness who are still the barrier for implementing this law.

4.8 Summary

Several studies on RA have covered several factors which are reasons for RA fatalities. Many of them have classified these factors and features into human factor, vehicle factor, road factor and weather factor. Here we have added laws and political will as a factor because depending on all the research till now on RA, we have found an effect of the laws and political will which we have discussed in 4.7. These “5-Factors” are existing factors for road crashes and the top and main factor is “Human factor” including all the people who are directly and indirectly related to RA fatalities. We cannot blame only drivers because behind a RA many of the factors and peoples are also responsible.

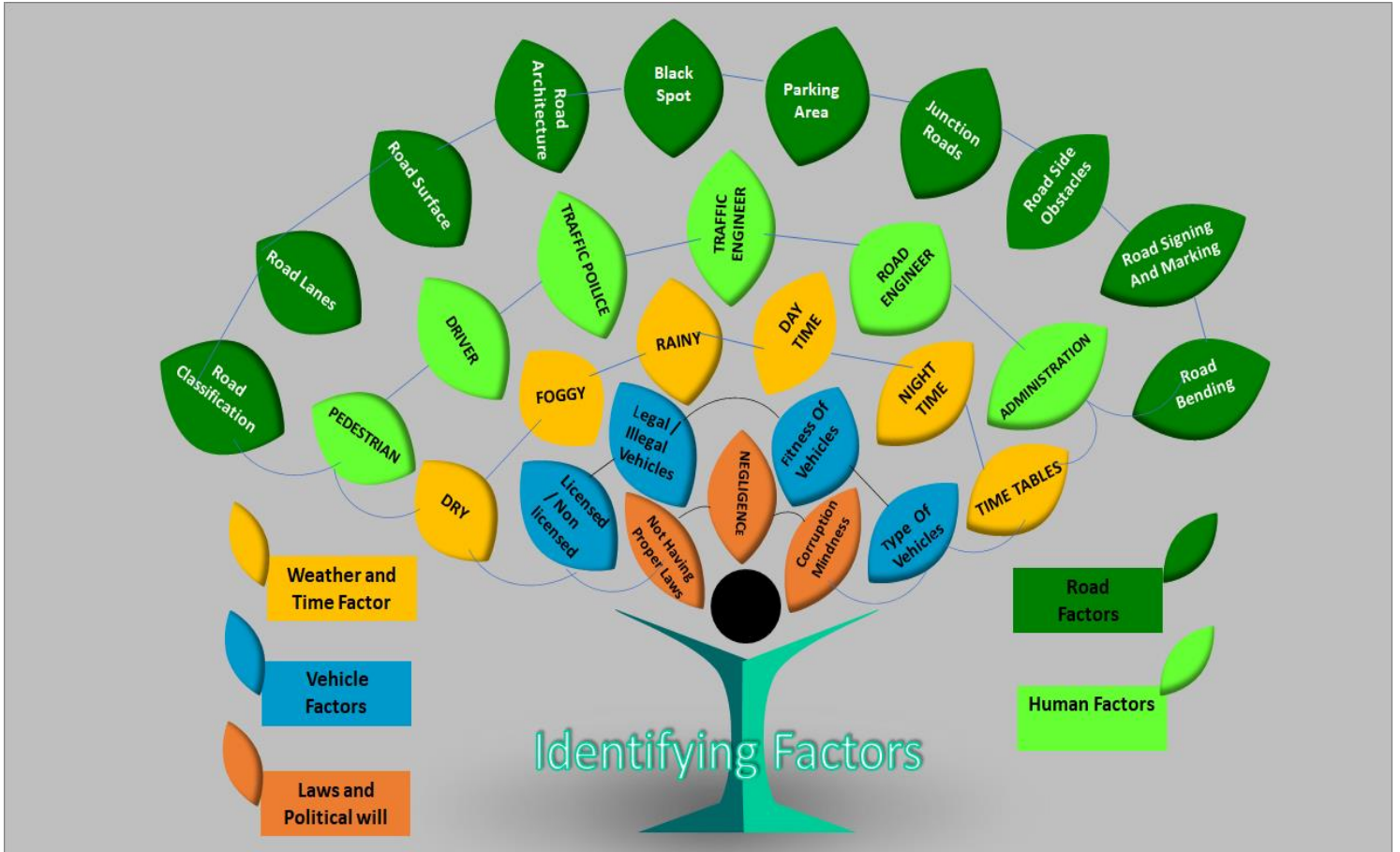


Figure 4.8.9: Identifying Factors Tree

CHAPTER 5

Feasible Solutions & Recommendations with Project Model

5.1 Introduction

In this chapter we will try to find out the feasible solutions depending on the “5-Factors” and the legitimate recommendations with a project model for the RA fatalities. Firstly, we have discussed the solutions about RA from four points of view. Which are:

1. Pedestrian’s points of view
2. Driver’s point of view
3. Transport operator’s point of view
4. Researchers and expert’s point of view

After that we have included “Authors point of view with feasible solutions” which are the solutions depending on our analyzing about the rest four points of view, all the data segmentations and “5-Factors” which we have described before.

5.2 Solutions Based on 4-Points of View

After studying and analyzing several research papers of RA in the context of Bangladesh, news articles, TV-news and the public-private organization’s study we have listed the solutions from four points of view.

5.2.1 Solutions from Pedestrian’s Point of View:

1. Reckless driving, competence driving, overspeeding of drivers should be solved.
2. Alcoholic drivers should be brought under punishment.
3. Traffic rules should be maintained.
4. The tendency and competitive attitude to pick up passengers from everywhere should have been solved.
5. Talking on the phone and sleepiness while driving should be prohibited.
6. Light vehicles on highways have to decrease.
7. Proper training and driving skills have to increase.
8. Strict monitoring and decrease of Non-Licensed drivers and adolescence bikers.
9. Unfit vehicles should not run on the road.

10. Road space should be increased, road side parking and stalls should be prohibited.
11. The dilapidated condition of the road should be fixed.
12. Laws and enforcement should be implemented strictly.

5.2.2 Solutions from Driver's Point of View:

1. Pedestrians shouldn't cross the road unconsciously.
2. Pedestrians should use over bridge or zebra crossing.
3. Passengers should not distract the driver by saying to drive fast.
4. Passengers should wait at the bus stop; they should not get in the vehicle from anywhere on the road.
5. Roadside obstacles should be prohibited.
6. Working load of driving should have to be reduced, because they drive for a long time and get tired, feel stressed and dizzy.
7. Monthly salary should be formed.
8. The fitness of the vehicle should be maintained by the owner.

5.2.3 Solutions from Transport Operator's Point of View:

1. Drivers should follow traffic rules.
2. Reckless driving, competence driving, speeding of drivers should be solved.
3. Traffic police have to be skilled.
4. Pedestrians have to be more conscious.
5. Vehicles are losing their fitness due to poor road conditions so steps should be taken to repair the road.
6. Separate lanes have to be formed for non-motor vehicles.

5.2.4 Solutions from Researchers and Expert's Point of View:

1. The announcement made to include road accident prevention subjects in the school curriculum must be implemented.

2. The continuity of the awareness program that has been started through various media has to be maintained extensively.
3. Disobeying traffic signals, car parking everywhere, picking up and dropping off passengers at certain places, overspeeding, overtaking, reckless driving, overloading passengers and freight, carrying passengers on the roof of the car, over bridge underpass or the tendency not to use them despite having zebra crossings must be strictly controlled by law enforcement agencies and over bridge has to be formed on main point of the road where it is needed.
4. With the implementation of 12-day and 24-day training workshops for creating 1,410 driver trainers and upgrading 3 lakh drivers through the 'SAFE' project adopted by the government, unlicensed drivers will come under valid licenses through 24 days training and light and light and We believe that the drivers of medium vehicles will get the license of this heavy vehicle through 12 days training which will help in solving the problem of skilled drivers in the country.
5. Long and high road dividers have to be arranged for one-way roads like Dhaka-Chittagong, Sylhet, Mymensingh, Tangail. Roads and highways must be upgraded to a minimum of four lanes. Separate roads (Service Roads) have to be constructed on both sides of the highway for slow moving vehicles.
6. Road defects need to be fixed soon. Road accidents have been reduced to a great extent due to rectification of defects on the Dhaka-Aricha highway. Similarly, if the defects of other highways are removed then the road accidents can be reduced.
7. Sidewalks need to be vacated for pedestrians to move smoothly. Where there are no sidewalks, arrangements have to be made to make sidewalks and regular monitoring should be done to ensure that the sidewalk is not occupied again.
8. Road length and lanes have to increase.
9. Traffic management has to be strong for reducing RA.
10. Separate lanes for light and non-motor vehicles have to be formed.
11. BRTA has to be honest to deliver a license.
12. The rules from the high court for unfit vehicles have to be implemented strictly.

5.3 Authors Point of View with Feasible Solutions

All the “5-Factors” we have discussed in chapter 4 where we have analyzed the factors based on the data of RA fatalities. We have mentioned several causes and faults from all the factors. It is very crucial and hard to find the best solution for all the reasons which are impacting on RA. We have discussed four points of view where all the people have given their own opinions about the RA solution. Here we have tried to give solutions depending on our analyzing about the four points of view, all the data segmentations and “5-Factors” which we have described before.

1. Everything about RA prevention has to be done through proper and sharp planning and management and funds has to be establish with donor those who can contribute in the fund. Budgetary process has to be formed for road safety projects [40].
2. Accident data needs to be saved and updated regularly. Problems need to be solved by analyzing the cause of the accident through data analysis. Data has to be inserted in both digital and hard copy report systems where it is needed and data has to upload on the government website so that any researchers can perform their study more efficiently.
3. Definitely all the government road safety institutions have to work on project accompanying with the non-government and non-profit organizations like NISCHA (Nirapad Sarak Chai), PWAB (Jatri Kalyan Samity) etc for more efficient solutions.
4. Traffic police has to be more efficient in the term of traffic management, so training academies has to be formed.
5. A board has to be formed with honest police officers, road and traffic engineers, government employees, experts and researchers related to road safety solution field, those who can surveillance over the organizations, teams and management committees related to road safety solution field.
6. More traffic checkpoints have to be formed with efficient traffic police on every highways, regional roads and district roads. Every checkpoint must have cameras and digital machines, so that they could check the speeds of vehicle, inquiry on them and vehicle passengers.

7. People need to be made aware about road safety; the basics of roads (Example: Road Sign symbol, basic traffic signal etc.) need to be integrated in the primary education system because most of the drivers are poorly educated.
8. Must be licensed through driving training and testing and on giving a driving license BRTA has to be honest.
9. Fix the speed limit on the basis of design and pattern of the roads because over speed is one of the major factors of RA and speed limit has to be fixed in bad foggy and heavy rainy weather conditions. The speed breaker, speed bumps and ISA (Intelligent speed Adaption) can be used for speed reduction.
10. Traffic police contact numbers and necessary information's templates of do's and don'ts about driving, drivers and passengers has to be set in every passenger and non-passenger vehicles, so that passengers could contact traffic police about any wrong driving, wrong behavior from drivers, competitive and risky driving.
11. Both public and private vehicle maintenance should be assured and inspired by the government.
12. Every vehicle must have fitness certificate, in the case of unfit vehicles a project has to be taken by traffic police where they have to identify the unfit vehicles with drivers and the vehicles has to be banned, on the other case a law has to be formed for fining against traffic police, BRTA and the related organizations and persons who will responsible for giving chance for running unfit vehicles on the road and who will fail to perform their duty properly.
13. Road engineers has to plan and design more effective solutions for road safety management. Roads should be maintenance; black spots should be identified and danger signs should be used in those black spots and necessary actions has to be taken. Digital system has to be designed on the roads for road crossing of pedestrian and disable people.
14. Children has to refrain from crossing road consciously by parents, helmets have to make mandatory for every motorcycle user, seat belts have to make mandatory as well for every driver, adolescence bikers have to treat strictly by traffic police and parents has to make

aware about them, for this reason more awareness programme has to advertise on roads, TV-news and proper strict laws has to be formed.

15. Drivers should be well paid and treated by the transport authority. Traffic police and passengers has to behave well to the drivers. A fixed and preferable time management has to be set for drivers for driving because overworked and long driving makes them tired and sleepy. In case of long driving there has to keep two or more drivers.
16. Extra lane has to be formed for non-motorized and light vehicles and footpaths has to be clear from hawkers and an over bridge has to be formed in the front of schools, garments and others.
17. Free medical treatment has to be given to those who are affected by RA.

5.4 Recommendation & Project Model

5.4.1 Recommendations

1. “Transport Act 2018” has to be implemented and necessary funds management has to be established with donor those who can contribute in the fund. Budgetary process has to be formed for road safety projects.
2. It has to perform a mandatory and immediate survey of the condition of national highways throughout the country and to take appropriate steps to repair them and necessary road safety design has to be implemented. Road engineers has to plan and design more effective solutions in road management. Roads should be maintenance; black spots should be identified and danger signs should be used in those black spots and necessary actions has to be taken. Digital system has to be designed on the roads for road crossing of pedestrian and disable people. It has to Ensure road sign-signal, road marking, improved road crossing facilities, improved sidewalk facilities, speed controlling devices, separate lean for non-motorized and light vehicles.
3. Proper and effective training has to build for drivers and awareness has to advocacy between general people for refraining children from crossing roads and using footpath and over bridge and footpath has to be free from roadside hawkers.

4. Drivers should be well paid and treated by the transport authority. Traffic police and passengers has to behave well to the drivers and a fixed and preferable time management has to be set for drivers for driving because overworked and long driving makes them tired and sleepy. In case of long driving there has to keep two or more drivers.
5. A proper and detailed data has to be formed. It has to be readily available on government websites and every single accident through the country has to be recorded for more research and comprehensive study.
6. Several traffic checkpoints have to be built on every highway and other roads specially on the blackspots. The distance of every check post for highways can be 100 km. These checkpoints have to be formed with skilled traffic police and unemployed manpower who can be trained and formed for helping traffic police. At the check posts they have to perform their best abilities to check the driver and vehicle conditions and they have to communicate with passengers about driving. In every passenger and other vehicles have to set templates where the contact numbers of traffic police, do's and don'ts about driving, drivers and passengers will be given. So, that any passenger can inform police about the driver if they do any major wrong driving and behavior.
7. Last but not the least, many people become injured in accidents, the injured should be officially provided free services. Many people have to cut off their arms or legs due to an accident, artificial arm or leg can be officially provided so that injured person will be released from cripples. Accidents kill the only earning member of many families. These helpless families should be given grants by the government.

5.4.2 Proposed Project Model for RA prevention

Step 1: Planning and Management for Road Safety

1. Team has to be formed including road authorities, police, BRTA, vehicle operators and owners, public and private organizations, researchers and the professionals related to this field.
2. Have to make an effective meeting for the guidance, directions, decisions and have to make the preparation plan for taking action.
3. It has to form an effective Road safety committee in every district and metropolitans for monitoring, evaluating and actions that can prevent accidents. This committee has to form with police, collectors, BRTA, road and traffic engineers, transport agencies.
4. board has to be formed with honest police officers, road and traffic engineers, government employees, experts and researchers related to road safety solution field, those who can surveillance over the organizations, teams and management committees related to road safety solution field and committee should be formed as a board for monitoring these district committees.
5. Several traffic checkpoints have to be built on every highway and other roads specially on the blackspots. The distance of every check post for highways can be 100 km. These checkpoints have to be formed with skilled traffic police and unemployed manpower who can be trained and formed for helping traffic police.
6. These checkpoints have to locate cameras and effective digital machines to check out the speed limits and others.
7. Speed limits have to be managed by building roads that can calm traffic, new technologies that help drivers and vehicles keep to speed limit [1] and laws enforcement speed limit has to be established (WHO 2017) [1]. Speed limit has to be set for bad foggy and rainy conditions.

Step 2: Traffic police & Traffic Engineering Management

1. Traffic police has to be more efficient in the term of traffic management, so training academies has to be formed.
2. At the check posts they have to perform their best abilities to check the driver and vehicle conditions and they have to communicate with passengers about driving.
3. Traffic engineers have to point out the black spot of accident, accident type, accident reason, checking road signs and marking, speed limits, analyzing the RA problems.

Step 3: Proper Data System Management

1. Both digital and hard copy report systems have to be formed. For the data management system, the DRIVER (Data for Road Incident Visualization, Evaluating and Reporting) is more effective than the MAAP5 [1].
2. Hard copy report collection can be used by every accident investigator and traffic engineer on the spot.
3. Data has to make public for more research.

Step 4: Road Safety Engineering and Assessed

1. Effective management and planning have to build for causality prevention.
2. Effective design for pedestrian, cycle and light vehicles.
3. Proper signing and lining have to be formed
4. Effective designing for speed controlling
5. Safety routes design has to be planned and implemented in the front of the school, institutions, garments and roadside market.
6. Effective road bends and lanes has to be designed

Step 5: Administration Policy and Law Enforcement

1. The “Road Transport Act 2018” laws have to be implemented.
2. All the corruption from BRTA, traffic police and the administration have to be removed.

3. More suitable and preferable road architecture projects have to be formed throughout the country. Budgetary process has to be formed for road safety projects [40].
4. Road lanes have to be increased where it is needed.

Step 6: Licensing, Training and Testing of Drivers

1. BRTA has to be honest and transparent in giving and testing driving license
2. Training has to give to driver instructors
3. Proper Training has to be given to all heavy, light and medium vehicle's drivers.
4. Driving schools have to be supervised by BRTA.
5. Drivers have to train for not evolving in competition, risky overtaking and reckless driving.
6. All Drivers have to train about signing and markings of the road.

Step 7: Vehicle Fitness Management and Vehicle Operator's Responsibility

1. BRTA has to investigate about vehicle fitness and certification
2. The vehicle operators should check the fitness of the vehicle regularly.
3. Drivers may feel drowsy due to excessive driving, which requires two drivers so that one can rest and the other can drive, these rules should be implemented by vehicle operators.
4. In order to maintain the fitness of the vehicles, the parts of the vehicles should be monitored regularly.
5. Vehicle operators should remove unfit vehicles from the road and unload good fitness vehicles.

Step 8: Communications and Awareness study for RS management

1. It has to increase awareness amongst all the people from drivers to all the people.
2. Awareness has to increase between School children, their parents and all the local community throughout the country.

3. A good communication has to build between road users and drivers
4. Workshop from both government and non-government organizations

Step 9: Research and information for Road Safety

1. More research has to be done for preventing RA
2. Administration should follow the pros perspectives from every research paper.
3. RA data has to be uploaded in the government website so that researchers can get the data easily and perform research upon that.
4. Road crossing systems should be installed with advanced technology, especially on the country’s highways.
5. If the Roads are made with correct and modern technologies, then the accusation of the road accelerates is very likely to be reduced.



Figure 5.4.1: Proposed Project Model for RA prevention

5.5 Conclusion

This study has upheld a total overview of RA, where many existing factors have been involved and we have made their probable solutions from several points of view and at the end of the study we have proposed a model for RA prevention based on several descriptions of RA in the context of Bangladesh. It is not possible that RA will be totally removed from Bangladesh because this is a fatality that is not in our hand, we can just decrease the rate of RA by taking the best steps. People from all walks of life should make a significant contribution to the prevention of this road accident. People at all levels need to be more aware to reduce the rate of these accidents.

5.6 Future Studies

- ❖ We can make this study more efficiently by getting all the necessary data
- ❖ It will be more efficient if we can work on field for doing survey from every walk of life
- ❖ In the future we are eager to work in a machine learning approach for prediction accident rate by knowing the factors with practical work.

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APPENDIX

It was very difficult for us to determine the specific title at the beginning of our thesis paperwork. About 8 months ago, we started working on our paper. We have come so far because of our good understanding between group members.

Since the beginning of the work, we have been reading a lot of research papers and trying to understand the papers according to our topic. After that, when we went to collect data for our thesis paper, all the educational institutions, offices were closed due to the effects of Coronavirus (Covid-19) around the world, and the lockdown was issued across the country. Back then, it was almost impossible for us to physically go and collect thesis related data, but we contacted the various government and non-government organizations online. In doing so, some organizations have helped us with thesis related data and we have been able to collect our required data from various research papers, newspapers, online articles without getting a response from many places.

It was very difficult for us to add accurate and precise data to the paper by sorting the thesis related data verification obtained from online. Also, if we had any problem with the thesis paperwork, we would take good suggestions from our dear mam. Our supervisor, "Warda Ruheen Bristi" ma'am, often helped us with our thesis work with a lot of information. All in all, we were all quite aware of the work of our thesis paper. We have done our best to complete this thesis paper. Alhamdulillah! We were able to finish our work because Allah gives us the ability.

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