**Assessing the Driver Behavior of On-demand Ride-hailing Services in Dhaka City from Road Safety Perspective**

*A Thesis Submitted*  
In Fulfillment of the Requirements for the  
*Degree of Bachelor of Science in Civil Engineering*

Md. Ataher Hosen

ID # 13106133

Md. Samim Alam

ID # 14206071

*To the*

Department of Civil Engineering  
College of Engineering and Technology (CEAT)  
IUBAT-International University of Business Agriculture and Technology



**May 2019**

# Approval

The dissertation entitled “***Assessing the Driver Behavior of On-demand Ride-hailing Services in Dhaka City from Road Safety Perspective***”, by Md. Ataher Hosen and Md. Samim Alam has been approved fulfilling the requirements for the Bachelor of Science Degree in Civil Engineering.

|  |
| --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Supervisor** Md. Hishamur Rahman Senior Lecturer Department of Civil Engineering IUBAT – International University of Business Agriculture and Technology  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Prof. Dr. Md. Monirul Islam  Dean, College of Engineering and Technology  Chair, Department of Civil Engineering  IUBAT – International University of Business Agriculture and Technology |

# 

**Author’s Declaration**

We are Md. Ataher Hosen with ID# 13106133, and Md. Samim Alam with ID# 14206071 declaring that this Thesis report on **" *Assessing the Driver Behavior of On-demand Ride-hailing Services in Dhaka City from Road Safety Perspective*",** has only been prepared under the supervision of **Md. Hishamur Rahman** for the fulfillment of the degree Bachelor of Science in Civil Engineering (BSCE).It has not been prepared for any other purpose, reward, or presentation and has not been submitted by us for any Degree, Diploma, Title or Recognition before

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Md. Ataher Hosen  
ID# 13106133  
May, 2019

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Md. Samim Alam  
ID# 14206071  
May, 2019

**Acknowledgements**

All praises to the Almighty Allah for giving me the strength to complete the research paper in fulfilling the CEN 488 successfully. In the process of completion of my course and preparing this dissertation, I would like to pay my gratitude to some personal for their immense help and enormous cooperation.

I would like to express my heartfelt thanks to my honorable teacher Md. Hishamur Rahman, Senior Lecturer, Department of Civil Engineering of IUBAT for giving me valuable suggestion and proper guidance.

Finally, I am very much thankful to my parents for their unlimited support, continuous inspiration and enormous love.

# 

# 

**ABSTRACT**

Road traffic accidents and injuries have now emerged as a serious man-made epidemic with an estimated 4556 people killed and as many as 84583 people injured worldwide each year. It is a rear event that road accidents accrue from a single cause. There is usually a myriad of causative factors that might have caused a road accident at any given point of time. Researchers estimated that around 90% of all causative factors involve road users of which drivers are the principal controlling elements. Accidents are particularly prevalent in low and middle-income countries- around 85 percent of the world’s deaths occur in developing countries like Bangladesh. Traffic accidents in Bangladesh have been increasing rapidly causing a huge amount of economic burden in terms of death, injury, lost productivity and property damage. Pedestrian-vehicle conflicts are clearly the greatest problem with the significant involvement of Motorcycle. The accident remains a serious problem for road safety, despite ongoing improvements in traffic law enforcement practice and technology. Drivers are classified into four groups: (a) no accidents; (b) one accident; (c) two accidents (d) three or more accidents. This thesis documents four groups that were undertaken to explore the scope and nature of accidents, in order to develop more effective countermeasures to the behavior and attitude.

**Table of Content**

[Approval 2](#_Toc12199407)

[Author’s Declaration 3](#_Toc12199408)

[Acknowledgements 4](#_Toc12199409)

[ABSTRACT 5](#_Toc12199410)

[**Chapter One: Introduction** 9](#_Toc12199411)

[1.1 Literature Review 11](#_Toc12199413)

[1.2 Research Question: 13](#_Toc12199414)

[**Chapter Two: Research Methodology** 14](#_Toc12199415)

[2.1 Data Collection: 14](#_Toc12199416)

[2.2 Data Analysis 15](#_Toc12199418)

[**Chapter three: Data Description:** 1](#_Toc12199419)7

[3.1 Driver Types 17](#_Toc12199420)

[3.2 Respondents' Characteristics by Groups 18](#_Toc12199422)

[3.3 Drivers' Age:](#_Toc12199424) 19

[3.4 Education: 20](#_Toc12199426)

[3.5 Trips 21](#_Toc12199428)

[3.6 Following-too-closely 2](#_Toc12199430)1

[3.7 Speeding 2](#_Toc12199432)3

[3.8 Overtaking 2](#_Toc12199434)4

[3.9 Driver Behaviors 2](#_Toc12199436)6

[3.10 Ordinary Violations 2](#_Toc12199437)6

[3.11 Errors In addition 2](#_Toc12199439)7

[3.12 Lapses](#_Toc12199441) 29

[**Chapter Four: Results and Discussions** 30](#_Toc12199443)

[4.1 Education Level 3](#_Toc12199445)2

[4.2 How many trips did you make in last 30 days? 3](#_Toc12199446)2

[4.3 Speeding Items 3](#_Toc12199447)2

[4.4 Overtaking items 3](#_Toc12199448)3

[4.5 Ordinary violations items 3](#_Toc12199449)3

[**4.6 Inflate Part** 3](#_Toc12199450)3

[4.7 Speeding Items 3](#_Toc12199451)4

[4.8 Error Items 3](#_Toc12199452)4

[**Chapter Five: Conclusion** 3](#_Toc12199453)5

[5.1 Summary of the Results 3](#_Toc12199454)5

[5.2 Strength and Limitations of the Research 3](#_Toc12199455)5

[5.3 Suggestions for future Research 3](#_Toc12199456)6

[**References**](#_Toc12199457) 37

**List of Table**

[Table 1.1 Growths of motorcycle and Road Accident Casualties 10](#_Toc12198147)

[Table 3.1 Driver Profile by Group 18](#_Toc12199423)

[Table 3.2 Summary Statistics of Following Too Closely Items 2](#_Toc12199431)2

[Table 3.3 Summary Statistics of Speeding Items 2](#_Toc12199433)3

[Table 3.4 Summary Statistics of Overtaking Items 2](#_Toc12199435)4

[Table 3.5 Summary Statistics of Ordinary Violation items 2](#_Toc12199438)6

[Table 3.6 Summary Statistics of Error Items 2](#_Toc12199440)8

[Table 3.7 Summary Statistics of Lapses Items](#_Toc12199442) 29

[Table 3.8 Result Distribution 3](#_Toc12199444)0

**List of figure**

[Figure 2.1 the location map of the study area (source: Google map) 14](#_Toc12198152)

[Figure 3.1 Group Distributions among Driver Types 17](#_Toc12199421)

[Figure 3.2 Age Distribution of Bike Drivers](#_Toc12199425) 19

[Figure 3.3 Education Distribution of Bike Driver 2](#_Toc12199427)0

[Figure 3.4 Trips Distribution of Bike Drivers 2](#_Toc12199429)1

# Chapter One: Introduction

In the past few years, with the growth of information technology, we have witnessed the rapid rise of on-demand ride-hailing platforms such as Uber, Pathao, Obhai, Sohoj, and Pickme. The past few years have seen a significant increase in the number of motorcycles on the roads of Dhaka city. Since mobile phone app-based ridesharing services became popular in the capital, this number has increased by leaps and bounds.

Their advantage over traditional taxi services is due to the convenience of their services, e.g., ride requests at the touch of a button, fare estimation, automatic payments, and reputation ratings. Thanks to these platforms, passengers nowadays can request rides using their smart phones instead of hailing taxis on the streets, which used to be the norm in big metropolitan areas. Ride-hailing platforms help connect passengers with drivers (private drivers and traditional taxi drivers) in real time.

The growth of these platforms has been astonishing. Despite the rapid growth, it has been debated whether or to what extent such platforms should be encouraged by policymakers worldwide. Prominent in the debate are concerns about safety, privacy, and liability of the drivers and the platform. Though these motorcycle ride-sharing services have provided some relief to the public transport crisis in the city, the number of road accidents in Dhaka has also increased since their introduction. Uberpopularized ride-sharing services in Dhaka in 2016.

Though it initially began by offering personal cars for taxi services, it soon branched into motorcycles. Pathao, SAM, Bahon, and Shohoz have also become notable names in the market. The rise in motorcycles on Dhaka roads can be seen in the information provided by the Bangladesh Road Transport Authority or BRTA. The BRTA Dhaka office registered 53,738 motorcycles in 2016 and 75,251 in 2017. As of August this year, 65,332 motorcycles have been registered. This means that about 206 motorcycles were registered in Dhaka per day in 2017. This year the average has risen to 267 per day.

The growing number of motorcycles is mainly responsible for the sudden rise in accidents. Many underage bikers are careless on the road and speed recklessly, often causing accidents after losing control. According to BUET’s Accident Research Institute, or ARI, 53 people were killed and 19 injured in 48 motorcycle accidents in Dhaka in 2017. Between January and August, there have been 42 motorcycle accidents, leading to the deaths of 47 and the injuries of 37. Many of the dead are riders for ride-sharing services or their passengers. According to the Bangladesh Road Transport Authority (BRTA), the number of motorcycles saw an approximately threefold increase from 7 lakhs to 22 lakhs – in two years (2016 to 2018). The number of deaths in road crashes was 4,144 in 2016, 5,645 in 2017, and 3,414 in 2018 (until September), according to the survey.

# Table 1.1 Growths of motorcycle and Road Accident Casualties

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Years | Registered  Vehicles | Deaths | Injury | Total  casualties |
| 2001 | 5200253 | 3181 | 60000 | 63181 |
| 2002 | 5004156 | 3270 | 65000 | 68270 |
| 2003 | 5370035 | 3714 | 67000 | 70714 |
| 2004 | 5767934 | 4028 | 76000 | 80028 |
| 2005 | 6227146 | 4576 | 87000 | 91576 |
| 2006 | 6678958 | 4837 | 88000 | 92837 |
| 2007 | 7138476 | 5174 | 103000 | 108174 |
| 2008 | 7752926 | 5312 | 96000 | 101312 |
| 2009 | 7929724 | 4469 | 90000 | 94469 |
| 2010 | 7592057 | 4,502 | 82,000 | 86502 |
| 2011 | 114616 | 4,612 | 81000 | 81000 |
| 2012 | 101588 | 4957 | 93000 | 97957 |
| 2013 | 85808 | 4668 | 88000 | 92668 |
| 2014 | 90685 | 4586 | 92000 | 96586 |
| 2015 | 240358 | 4976 | 88000 | 92976 |
| 2016 | 332057 | 5286 | 90000 | 95286 |
| 2017 | 326550 | 4990 | 89500 | 94490 |
| 2018 | 94740 | 4870 | 87000 | 91870 |

National Highway Traffic Safety Administration (NHTSA)

About 25 percent of road accidents occurred in the motorcycle. A number of obstacles have hindered research into the issue of accidents and the development of related countermeasures. As such, the motives for a person being unlicensed and the associated driving behaviors and attitude may vary greatly Overall, the literature suggests that formal driver training programs did not significantly reduce the crash risks of the drivers compared to informal training. Hence, there is insufficient evidence to support any recommendations to make formal driver training mandatory. Current efforts should thus be devoted to developing better driver training programs that focus on improving drivers' attitudes and higher-order-skills. More than just campaigns and frightening statistics, alternatives for driver education, training, evaluation, and licensing are continually needed. In Bangladesh, for example, it is widely believed that over half of the drivers of the roads possess an illegal or unauthentic driver's license.

## 1.1 Literature Review

Gudmundurf et al., (2004) this research explores differences in injury severity between male and female drivers in single and two-vehicle accidents involving passenger cars, pickups, sport-utility vehicles (SUVs), and minivans.

Brian et al., (2000) this paper present a multivariate analysis on the impact ofthe exclusive motorcycle lane on motorcycle accidents along the Federal Highway Route 2, Malaysia.

Guo et al., (2018) consider the increasing availability of real-time vehicle trajectory data and stimulated by the advances in the modeling and analysis of big data, this paper developed a hybrid unsupervised deep learning model to study driving behavior and risk patterns. Using multi-layer auto encoders is effective for non-linear and multi-modal dimensionality reduction.

Wang et al., (2018) a cross-sectional survey was administered to 1021 taxi drivers from 21 companies in four Chinese cities and collected information about (i) socio-demographic characteristics, (ii) working conditions, (iii) frequency of daily aberrant driving behavior, and (iv) involvement in property-damage-only (PDO) and personal injury (PI) crashes over the past two years.

Zhen Chen M.S., (2015) travelers in the Pittsburgh region and the use of taxis and private autos are most impacted by ride sourcing where users’ shift away from these modes. Currently, ride-sourcing is still a relatively small number of daily trips in an urban area. However, as populations increase in urban areas and the demand for transportation facilities increases the new type of travel could increase to significant levels. It could be considered as a new transportation mode or categorized in as an auto mode in travel demand models.

Miyajima et al., (2007) in this paper, we model such driving behaviors as car-following and pedal operation patterns. Use the method of a Gaussian mixture model (GMM).

Feng et al., (2017) in this paper, we shed light on this question by building a stylized model of a circular road and comparing the average waiting time of passengers under various matching mechanisms. We discover the inefficiency in the on-demand ride-hailing system when the en route time is long, which may result in non-monotonicity of passenger average wait time as passenger arrival rate increases. After identifying the key trade-off between different mechanisms we find that the on-demand matching mechanism could result in lower efficiency than the traditional street-hailing mechanism when the system utilization level is medium and the road length is long.

Morton et al., (2005) we investigated the effect on two measures of risky driving in the presence of young male and female passengers. The presence of male teenage passengers was associated with risky driving behavior among teenage drivers.

## 1.2 Research Question:

The objective of this study is to find out propensity of accidents of ridesharing drivers for Dhaka city using Zero Inflate Ordered Probit model. Particular objective of this study contain:

To develop a model of propensity of accidents for ridesharing drivers by using zero inflate order probit model.

Analyse the effect of the socio-economic, driving attitude and behaviour factors on ridesharing driver and to determine the significant socio-economic, driving attitude and behaviour factors that effect to the ridesharing drivers by using the statistical model.

**Chapter Two: Research Methodology**

## Data Collection:

Data collection is typically the greatest single expense in a survey. Because of this problem arising during collection can be very expensive to fix – and could result in the overall failure of the project. In this study, we have targeted population consists of drivers in Dhaka city. The location for collecting data: House building, AirPort railway junction, Kuril Flyover, Mohakhali Rail crossing, Banani, Mirpur. These locations are also chosen for their availability of target groups. The approach taken is cost effective in a sense it keeps the number of locations limited which greatly facilitates personal interviews.



Our study area

# Figure 2.1 the location map of the study area (source: Google map)

## 2.2 Data Analysis

According to Statistics Canada, 2003, Data analysis involves summarizing the data and interpreting their meaning in a way that provides clear answers to questions that initiated the survey. Data analysis is one of the most crucial steps of a survey since the quality of the analysis and how well it is communicated can substantially affect the usefulness of the whole survey. Data analysis should relate the survey results to the questions and issues identified during the first step of the survey. Data analysis may be restricted to the survey data alone or it may involve comparing the survey results with results obtained from other surveys or data sources. Often, it consists of examining tables and charts of various summary measures such as frequency distributions, means, and ranges. More sophisticated types of data analysis may also be performed – statistical inference may be applied in order to verify hypotheses or study the relationships between characteristics.

Depending on the data we have performed Zero Inflate Ordered Probit Model (ZIOP).Zero Inflate Ordered Probit Model (ZIOP).

This research includes the zioprobit modeling of an ordinal dependent factor, with the potential presence of regular unobserved factors (for example attitude-approach and road safety) that affect the motorcycle ridesharing drivers. That’s why the selected model is Zero Inflate Ordered probit model.

Let,

‘j’ be an index for observation units (j = 1, 2,……,J)

Represent the socioeconomic, driver attitude and behavior factors

Represent the propensity of motorcycle accident ridesharing drivers.

Latten variable for individual ‘j’ and indicate the propensity of an individual to motorcycle accident ridesharing drivers.

The probability of participation is given by

Pr(sj = 1|zj ) = Φ (zjγ)………………………………………..(1)

Pr(yej = h|xj , sj = 1) = Φ (κh − xjβ) − Φ (κh−1 − xjβ) h = 0, 1, . . . , H …………….…..(2)

where κ−1 = −∞, κH = +∞, and xj is Represent the socioeconomic, driver attitude and behavior factors from zj . κh are boundary parameters that need to be estimated in addition to the coefficients vector β.

The intercept β0 is set equal to 0 in (2) for identification. Note that sj and are both unobservable in terms of the zeros. Represent the propensity of motorcycle accident ridesharing drivers is. Thus, the zero outcome occurs when sj = 0 (the individual is not a participant) or occurs when sj = 1 and (the individual is a participant with zero activity). To observe a positive yj, it is a joint requirement that sj = 1 and .

The distribution of Y is given by

Pr(yj = 0|zj , xj )

Pr(Y ) =

Pr(yj = h|zj , xj ) h = 1, 2, . . . , H

Pr(sj = 0|zj ) + Pr(sj = 1|zj )Pr( = 0|xj , sj = 1) ……………………(3)

=

Pr(sj = 1|zj )Pr( = h|xj , sj = 1) h = 1, 2, . . . , H

Substituting (1) and (2) in (3), we get

Pr(yj = 0|zj , xj )

Pr(Y ) =

Pr(yj = h|zj , xj ) h = 1, 2, . . . , H − 1

Pr(yj = H|zj , xj )

{1 − Φ (zjγ)} + Φ(zjγ)Φ(κ0 − xjβ)

=

Φ(zjγ) {Φ(κh − xjβ) − Φ(κh−1 − xjβ)} h = 1, 2, . . . , H − 1

Φ(zjγ) {1 − Φ(κH−1 − xjβ)}

# Chapter three: Data Description:

Preliminary studies identify that examine the effects driver accidents last two years, over speeding, and unreasonable Competitive and aggressive attitudes of Bike are a few of the most prevalent causes of road accidents in Bangladesh. The required information is collected by a driver questionnaire survey administered to drivers for motorcycle.

## 3.1 Driver Types

# Figure 3.1 Group Distributions among Driver Types

The percentages of bike drivers for accidents in the last two years are shown in Figure 4.1. It is clear from the figure that a relatively large percentage of the bike drivers no accidents in Bangladesh had very carefully driven many drivers and some drivers had not carefully drive then for accidents one or more and only a fairly small percentage of the drivers three or more accidents last two years.

## 3.2 Respondents' Characteristics by Groups

A detailed questionnaire was prepared to collect data related to the divers’ demographic and personal information, the number of accidents as well as ownership of the last two years. The driver profiles for each group are shown in Table 4.1. Note that all the respondents in the survey are male because very few females drive in Bangladesh. Therefore, this variable is excluded from our analyses.

# Table 3.1 Driver Profile by Group

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | How many accidents did you have within last two years? | No | One | Two | Three or more |
| Socio-Economic Information | | | | | |
|  | Education (% in each education level) | | | | |
|  | Less than high school | 30.30 | 34.00 | 11.00 | 18.20 |
|  | High school graduate(SSC) | 23.50 | 16.00 | 0 | 4.50 |
|  | College graduate (HSC) | 24.10 | 25 | 15.00 | 18.00 |
|  | Diploma Degree | 4.90 | 13.60 | 52.00 | 45.50 |
|  | Bachelor Degree and Graduate/Post Graduate | 17.30 | 11.40 | 22.00 | 13.60 |
|  | Age (% in each age group) | | | | |
|  | 18-24 | 34.85 | 22.73 | 15.00 | 32.00 |
|  | 25-34 | 51.50 | 66.00 | 44.50 | 9.00 |
|  | 35-44 | 10.75 | 9.00 | 33.00 | 59.00 |
|  | 45-54 | 2.93 | 2.30 | 7.50 | 0 |
|  | Trips (% in each trips group) | | | | |
|  | Less than 30 | 15.64 | 18.20 | 29.63 | 4.55 |
|  | 30-60 | 21.50 | 6.82 | 0 | 4.55 |
|  | 60-90 | 48.21 | 52.30 | 25.93 | 9.10 |
|  | More than 90 | 14.66 | 22.73 | 44.44 | 81.82 |

Drivers we have surveyed possess many years of driving experience and have held an accident for the last two years as well. However, it is noted that the mean number of years the respondents have held an accident is generally greater than the mean number of the last two years the respondents have not accidents. These results indicate that a large percentage of the drivers have driven without an accident for a significant period of time. It is noted that the percentage for the number of last two years a driver has been driving and the number of years a driver has held an accident are relatively large compared to the means and it should be considered in the result.

## 3.3 Drivers' Age:

**Drivers' age is found to be a significant factor, Bike drivers, among this accidents groups Bike driver**.

**Figure 3.2 Age Distribution of Bike Drivers**

Drivers having experience from five years to more than thirty years were interviewed in the survey. Among the bike drivers who no accident, the largest group are not between the ages of 25 to 34 (figure 3.2). Whereas the age group with the less than of bike drivers who accident one or two is the 25-34 years and very few bike drivers are accidents three or more. As time progress the young drivers are more response accidents.

## 3.4 Education:

Due to the questionnaire survey, it is observed that about 29 % of the interviewed drivers have less than high school education. Whereas among young drivers did accidents, with less than high school education form the largest category.

# Figure 3.3 Education Distribution of Bike Driver

## 3.5 Trips

Due to the questionnaire survey, it is observed that about 79% of the interviewed drivers have 60-90 trips per month. Whereas among more trips drivers did accidents, with 60-90 trips form the largest category.

# Figure 3.4 Trips Distribution of Bike Drivers

## 3.6 Following-too-closely

The percentage of following-too-closely for each accident group is shown in Table 3.2. The results show that most drivers do not consider following too closely as a serious problem. Because in Bangladesh the roads are too narrow and small comparing the population it holds and there is always a vehicle that exceeds the design limits of the road, so it is very common that the vehicle follows each other very closely. But the drivers also think that following-too-closely is more prone to accident and that the law against following-too-closely should be more strictly followed.

# Table 3.2 Summary Statistics of Following Too Closely Items

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Following too-closely |  | | | | |
| How many accidents did you have within last 2 years? | No | One | Two | Three or More |
|  | | | | |
| Following- too- closely is one of the main causes of accident (%) | | | | |
| No | 4 | 9 | 0 | 0 |
| Strongly disagree | 0.6 | 0 | 0 | 0 |
| Disagree | 1 | 2 | 0 | 0 |
| Neutral | 17 | 9 | 4 | 5 |
| Agree | 15.5 | 18 | 44 | 54 |
| Strongly Agree | 61.5 | 62 | 52 | 41 |
| In a rush condition following -too-closely situation may be permitted (%) | | | | |
| No | 66.45 | 70.45 | 55.56 | 72.73 |
| Strongly disagree | 3.91 | 11.36 | 22.22 | 18.18 |
| Disagree | 8.14 | 11.36 | 0 | 9.10 |
| Neutral | 15.31 | 6.82 | 14.81 | 0 |
| Agree | 4.23 | 0 | 7.41 | 0 |
| Strongly Agree | 2 | 0 | 0 | 0 |
| Close following isn't really a serious problem at the moment (%) | | | | |
| No | 76.5 | 73 | 41 | 41 |
| Strongly disagree | 1 | 9 | 30 | 27 |
| Disagree | 4 | 2 | 7 | 18 |
| Neutral | 8 | 0 | 0 | 9 |
| Agree | 5 | 7 | 7 | 5 |
| Strongly Agree | 5.5 | 9 | 15 | 0 |

## 3.7 Speeding

Table 3.3 shows the percentage of speeding items in each accident group by driver types. The percentage for each group lies between 1 and 3, which indicates that the drivers are less agrees with the question that is set for speeding. Most of the 39 drivers think that speeding more than the speed limit can be the cause of more severe accidents.

# Table 3.3 Summary Statistics of Speeding Items

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Speeding Items | How many accidents did you have within last 2 years? | No | One | Two | Three or More |
| Speed breaker is helpful for reducing speed (%) | | | | |
| No | 3 | 0 | 0 | 0 |
| Strongly disagree | 0 | 0 | 0 | 0 |
| Disagree | 0 | 0 | 0 | 0 |
| Neutral | 0 | 14 | 0 | 5 |
| Agree | 1 | 16 | 30 | 36 |
| Strongly Agree | 96 | 70 | 70 | 59 |
| More fine should be imposed to discourage speeding on highway (%) | | | | |
| No | 6.54 | 6.80 | 14.80 | 0 |
| Strongly disagree | 1.00 | 2.00 | 0 | 0 |
| Disagree | 4.00 | 16.00 | 14.80 | 9.00 |
| Neutral | 23.00 | 32.00 | 44.50 | 45.00 |
| Agree | 16.00 | 13.64 | 22.00 | 23.00 |
| Strongly Agree | 49.30 | 29.55 | 3.70 | 23.00 |
| Stricter enforcement of speed limits on roads would be effective in reducing the occurrence of road accidents (%) | | | | |
| No | 1 | 0 | 0 | 0 |
| Strongly disagree | 0 | 0 | 7 | 0 |
| Disagree | 0 | 14 | 15 | 18 |
| Neutral | 2 | 7 | 15 | 9 |
| Agree | 9 | 16 | 7 | 14 |
| Strongly Agree | 88 | 63 | 56 | 59 |
| Speeding is one of the main causes of road accidents (%) | | | | |
| No | 2 | 0 | 0 | 0 |
| Strongly disagree | 0 | 0 | 0 | 0 |
| Disagree | 3 | 5 | 0 | 0 |
| Neutral | 5 | 2 | 0 | 0 |
| Agree | 3 | 7 | 67 | 45 |
| Strongly Agree | 87 | 86 | 33 | 55 |
| Speeding at day time is safer comparing with night time for crash occurrence perspective (%) | | | | |
| No | 38 | 34 | 0 | 5 |
| Strongly disagree | 10 | 7 | 0 | 0 |
| Disagree | 28 | 18 | 22 | 27 |
| Neutral | 11 | 9 | 41 | 50 |
| Agree | 5 | 5 | 15 | 9 |
| Strongly Agree | 8 | 27 | 22 | 9 |
|  |  |  |  |  |

## 3.8 Overtaking

Overtaking or passing is the act of one vehicle going past another slower moving vehicle, traveling in the same direction, on a road. The accidents for each group lies between 5 to 6, which indicates that the drivers are disagreed or shear a neutral opinion with the question that is set for overtaking.

Table 3.4 Summary Statistics of Overtaking Items

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Overtaking Items | How many accidents did you have within last 2 years? | No | One | Two | Three or More |
| Presence of proper road marking would be helpful for safe overtaking (%) | | | | |
| No | 8 | 2 | 4 | 0 |
| Strongly disagree | 2 | 5 | 15 | 0 |
| Disagree | 34 | 43 | 30 | 36 |
| Neutral | 18 | 14 | 30 | 50 |
| Agree | 5 | 2 | 7 | 9 |
| Strongly Agree | 33 | 34 | 14 | 5 |
| Overtaking is a serious problem for crash occurrence (%) | | | | |
| No | 0.65 | 4.55 | 0 | 0 |
| Strongly disagree | 0 | 0 | 14.81 | 0 |
| Disagree | 2.93 | 16.00 | 7.41 | 0 |
| Neutral | 20.85 | 11.36 | 14.81 | 18.20 |
| Agree | 11.73 | 16.00 | 40.74 | 45.45 |
| Strongly Agree | 63.84 | 52.27 | 22.22 | 36.40 |
| Overtaking at curve is safer if you are capable (%) | | | | |
| No | 80 | 75 | 70 | 91 |
| Strongly disagree | 4 | 11 | 15 | 9 |
| Disagree | 7 | 2 | 7 | 0 |
| Neutral | 3 | 12 | 0 | 0 |
| Agree | 4 | 0 | 0 | 0 |
| Strongly Agree | 2 | 0 | 8 | 0 |
| I think it is OK to overtake in risky circumstances as long as you drive within your own capabilities (%) | | | | |
| No | 84.40 | 81.82 | 100 | 100 |
| Strongly disagree | 5.20 | 11.40 | 0 | 0 |
| Disagree | 4.23 | 2.20 | 0 | 0 |
| Neutral | 2.00 | 4.50 | 0 | 0 |
| Agree | 3.60 | 0 | 0 | 0 |
| Strongly Agree | 0.65 | 0 | 0 | 0 |
|  |  |  |  |  |

**3.9** Driver Behaviors

The road safety domain is lacking in predictive models of driver behavior to discern causality and association that is cause and effect relationship with the myriad of factors which are in general involved in a traffic accident situation. Understanding driver behavior to achieve enhanced road safety provides as a basic platform for the development and installation of new, innovative and cost-effective traffic accident countermeasures. The widely used Driver Behavior Questionnaire was included in the survey and the responses are recorded using the six-point scale from 1 = "Never" to 6 = "Nearly all the time" as designed by the original researchers (Lajunen et al., 2003). All item scale is often clustered into four major subscales: Aggressive Violations, Ordinary Violations, Errors and Lapses (Lajunen et al., 2003) and these clusters will be used to analyze the data in this study. Since all the items included in the questionnaire are unsafe behavior, scores that are closer to one indicate safe driving behaviors whereas scores closer to six indicate unsafe driving behaviors.

## 3.10 Ordinary Violations

Aggressive violations are proposed to be associated with an interpersonally aggressive component while “ordinary” violations do not have an aggressive aim, but are still deliberate violations. More specifically, the scale distinguishes two classes of violations that are Highway code violations which consist of behaviors such as speeding and running red lights compared to Interpersonal aggressive violations such as sounding one’s horn or chasing another motorist when angered (Lawton et al., 1997). Tables 3.5 list the ordinary violation items in the Driver Behavior Questionnaire together with their percentage of the responses from the participants.

# Table 3.5 Summary Statistics of Ordinary Violation items

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Ordinary Violations** | How many accidents did you have within last 2 years? | No | One | Two | Three or More |
| Do not maintain lane because other don't maintain (%) | | | | |
| No | 74.30 | 63.64 | 40.74 | 22.73 |
| Strongly disagree | 1.63 | 0 | 44.44 | 36.36 |
| Disagree | 0.70 | 9.00 | 7.41 | 36.36 |
| Neutral | 17.60 | 13.60 | 0 | 0 |
| Agree | 2.00 | 4.55 | 0 | 4.55 |
| Strongly Agree | 4.00 | 9.00 | 7.41 | 0 |
| Cross a junction knowing that the traffic lights have already turned against you (%) | | | | |
| No | 90 | 86 | 85 | 95 |
| Strongly disagree | 2 | 0 | 7.5 | 0 |
| Disagree | 1 | 9 | 0 | 0 |
| Neutral | 3 | 0 | 0 | 0 |
| Agree | 3 | 0 | 0 | 5 |
| Strongly Agree | 1 | 5 | 7.5 | 0 |
| Disregard the speed limits late at night or very early in the morning | | | | |
| No | 64 | 45 | 34 | 55 |
| Strongly disagree | 7 | 24 | 52 | 27 |
| Disagree | 14 | 18 | 7 | 13 |
| Neutral | 9 | 2 | 0 | 5 |
| Agree | 4 | 4 | 0 | 0 |
| Strongly Agree | 2 | 7 | 7 | 0 |

## 3.11 Errors In addition

Table 3.6 reports the percentage scores for the four group categories of bike drivers, which were: Percentage of no accidents; Percentage of one accident; Percentage of two accidents; Percentage of three or more. The results indicate that error is the most common form of aberrant behavior for Bike drivers.

# Table 3.6 Summary Statistics of Error Items

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Errors | How many accidents did you have within last 2 years? | No | One | Two | Three or More |
| Attempt to overtake someone that you hadn't noticed to be signaling a right turn (%) | | | | |
| No | 147 | 15 | 3 | 2 |
| Strongly disagree | 15 | 7 | 10 | 2 |
| Disagree | 62 | 11 | 8 | 15 |
| Neutral | 46 | 7 | 4 | 2 |
| Agree | 25 | 4 | 0 | 1 |
| Strongly Agree | 12 | 0 | 2 | 0 |
|  | 307 | 44 | 27 | 22 |
| Fail to notice that pedestrians are crossing when turning into a side street from a main road (%) | | | | |
| No | 23.10 | 18.20 | 0 | 9.00 |
| Strongly disagree | 2.60 | 0 | 14.80 | 0 |
| Disagree | 18.24 | 25 | 7.40 | 13.60 |
| Neutral | 45.60 | 45.45 | 44.40 | 54.55 |
| Agree | 8.14 | 11.36 | 26.00 | 22.72 |
| Strongly Agree | 2.28 | 0 | 7.40 | 0 |
| Fail to check your rear-view mirror before pulling out, changing lanes, etc (%) | | | | |
| No | 72.64 | 54.55 | 7.40 | 13.60 |
| Strongly disagree | 9.45 | 9.00 | 0 | 0 |
| Disagree | 4.56 | 16.00 | 55.60 | 41.00 |
| Neutral | 7.20 | 16.00 | 22.00 | 45.40 |
| Agree | 5.50 | 4.54 | 15.00 | 0 |
| Strongly Agree | 0.65 | 0 | 0 | 0 |
|  |  |  |  |  |

## 3.12 Lapses

Lapses in driver attention can be assumed to be a significant contributory factor in traffic accidents. They cite estimates from 15 to 90 percent as the proportion of traffic accidents related to inattention. This great range can, to a large extent, be attributed to differences in definitions of attention-related problems. Responses (table 3.7) have shown that Bike drivers who accidents are involved in lapses. But Bike drivers are more involved.

# Table 3.7 Summary Statistics of Lapses Items

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Lapse | How many accidents did you have within last 2 years? | No | One | Two | Three or More |
| Get into the wrong lane when approaching a roundabout or a junction (%) | | | | |
| No | 27.00 | 16.00 | 18.50 | 0 |
| Strongly disagree | 8.50 | 15.00 | 7.40 | 0 |
| Disagree | 32.20 | 22.70 | 29.63 | 18.20 |
| Neutral | 23.10 | 34.00 | 37.00 | 72.73 |
| Agree | 8.50 | 11.30 | 7.47 | 9.00 |
| Strongly Agree | 0.67 | 0 | 0 | 0 |
| Switch on one thing, such as the headlights, when you mean to switch on something else, such as the wipers (%) | | | | |
| No | 78.20 | 63.64 | 11.00 | 5.00 |
| Strongly disagree | 4.20 | 6.82 | 15.00 | 9.00 |
| Disagree | 7.50 | 13.64 | 52.00 | 68.00 |
| Neutral | 7.20 | 16.00 | 22.00 | 18.00 |
| Agree | 2.00 | 0 | 0 | 0 |
| Strongly Agree | 1.00 | 0 | 0 | 0 |
|  |  |  |  |  |

# 

**Chapter Four: Results and Discussions**

Preliminary studies identify that examine the effects of driver testing, over speeding, and unreasonable Competitive and aggressive attitudes of bike drivers are a few of the most prevalent causes of road accidents in Dhaka city. The required information is collected by a driver questionnaire survey administered by drivers for different types of vehicles: Bike.

# Table 3.8 Result Distribution

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| How many accidents did you have within last 2 years? | Coefficient | Statics  Error | Z | P>|Z| | 95% conf | Interval |
|  |  |  |  |  |  |  |
| Education Level |  |  |  |  |  |  |
| Less than high school |  |  |  |  |  |  |
| High school graduate (SSC) | 1.155529 | 0.6017 | 1.92 | 0.055 | -0.0238 | 2.335 |
| College graduate (HSC) | 0.794876 | 0.37814 | 2.10 | 0.036 | 0.05374 | 1.536 |
| Diploma degree/Bachelor degree/Graduate / post graduate | 0.1365 | 0.31356 | 0.44 | 0.663 | -0.47806 | 0.75106 |
| How many trips did you make in last 30 days |  |  |  |  |  |  |
| Less than 30 |  |  |  |  |  |  |
| 30-60 | -1.34159 | 0.751271 | -1.79 | 0.074 | -2.81405 | 0.13087 |
| 60-90 | -0.32811 | 0.36783 | -0.89 | 0.372 | -1.049 | 0.39282 |
| More than 90 | 0.962409 | 0.338038 | 2.85 | 0.004 | 0.29987 | 1.62495 |
| Speeding Items |  |  |  |  |  |  |
| In a rush condition following-too-closely situation may be permitted. | -0.5863 | 0.123186 | -4.76 | 0.000 | -0.82775 | -0.34486 |
| Speeding at day time is safer comparing with night time for crash occurrence perspective | 0.322780 | 0.086545 | 3.73 | 0.000 | 0.153154 | 0.492405 |
| Overtaking Items |  |  |  |  |  |  |
| Overtaking is a serious problem for crash occurrence | 0.60818 | 0.136484 | 4.46 | 0.000 | 0.340678 | 0.8756869 |
| I think it is OK to overtake in risky circumstances as long as you drive within your own capabilities | -0.56236 | 0.12298 | -4.57 | 0.000 | -0.80339 | -.321324 |
| Ordinary violations |  |  |  |  |  |  |
| Do not maintain lane because other don't maintain | 0.338771 | 0.104607 | 3.24 | 0.001 | 0.133745 | 0.543797 |
| Lapses Items |  |  |  |  |  |  |
| Switch on one thing, such as the headlights, when you mean to switch on something else, such as the wipers. | 0.566947 | 0.139714 | 4.46 | 0.000 | 0.293113 | 0.840781 |
|  | | | | | | |
| Inflate |  |  |  |  |  |  |
| Speeding Items |  |  |  |  |  |  |
| More fine should be imposed to discourage speeding on highway. | -0.25632 | 0.083538 | -3.07 | 0.002 | -0.42005 | -0.0925 |
| Stricter enforcement of speed limits on roads would be effective in reducing the Occurrence of road accidents. | -1.38613 | 0.454251 | -3.05 | 0.002 | -2.27645 | -0.4958 |
| Errors Items |  |  |  |  |  |  |
| Fail to check your rear-view mirror before pulling out, changing lanes, etc | 0.270943 | 0.080968 | 3.35 | 0.001 | 0.112248 | 0.429638 |
| Fail to notice that pedestrians are crossing when turning into a side street from a main road. | 0.285659 | 0.081078 | 2.57 | 0.010 | 0.049657 | 0.367475 |
| Lapses Items |  |  |  |  |  |  |
| Get into the wrong lane when approaching a roundabout or a junction. | 0.179767 | 0.088495 | 2.03 | 0.042 | 0.006319 | 0.353214 |

## 4.1 Education Level

The educational coefficient is significant. With respect to educated drivers, less educated drivers have a high propensity to motorcycle accidents ridesharing than educated drivers. However, education has an impact on the accidents of motorcycle ridesharing.

Educated drivers are carefully to drive motorcycle than less-educated drivers because they are well educated and they have a better idea of driving it. However, this is a factor for motorcycle ridesharing.

## 4.2 How many trips did you make in last 30 days?

With respect to take more trips, drivers take more trips high propensity to motorcycle accidents ridesharing than take fewer trips drivers. However, trips have an impact on the accidents of motorcycle ridesharing.

Take more trips always hamper concentration of motorcycle driving than take fewer trips drivers. However, this is a factor for motorcycle accidents of ridesharing.

## 4.3 Speeding Items

The following-to-closely coefficient is significant. With respect to the allowed following-to-closely motorcycle driving high propensity of accidents that not allow following-to-closely motorcycle driving. However, following-to-closely has an impact on the accidents of motorcycle ridesharing.

This seems to reflect a vehicle division among drivers because according to measurements, motorcycle drivers are less attentive to speeding. There is a big difference in the proportion of motorcycle drivers by areas with different speed limits.

Speeding items have a high propensity of accidents because all time enters the heavy vehicle in Dhaka City. However, this is a factor for motorcycle ridesharing.

## 4.4 Overtaking items

Shows the statistical tests for overtaking items we got coefficient are significant. This seems to reflect a vehicle division among drivers because according to measurements, Bike drivers are less attentive to overtaking and the high propensity of accidents.

Because motorcycle drivers do not have to carry the load so, they overtake more. However, this is a factor for motorcycle ridesharing.

## 4.5 Ordinary violations items

Show the statistical tests for Ordinary violations items that have been found to be significantly different among the accident group. Which bike drivers do not maintain lane, because others do not maintain lane. Do not maintain lane high propensity of accidents. However, this is a factor for motorcycle ridesharing.

# 4.6 Inflate Part

The motorcycle drivers that are in the last two years have not accidents. We will try to find out the propensity for accidents.

## 4.7 Speeding Items

Shows the statistical tests for speeding items we got coefficient are significant. Maximum bike drivers believe finer and if the administration performs the responsibility properly then help reduce the speed and help reduce the propensity of accidents. However, this is a factor for motorcycle ridesharing.

## 

## 4.8 Error Items

Shows the statistical tests for error items we got coefficients are significant and coefficient results positive. Error items have the propensity for accidents. Because lane change and overtake must be check error items. According to the driver’s opinion, due to any mistake error items, increases the propensity of the accident.

**Chapter Five: Conclusion**

The research has been carried out to observe how different transportation factors along with some demographic factors, driver behavior, and attitude keep effecting on road safety perspective i.e., road accidents, of the drivers. Zero Inflate Ordered Probite Model was developed between the dichotomous response variable of road safety perspective or not and different explanatory variables. The results show that drivers, driving time have a significant role in creating a road safety perspective in the drivers.

## 5.1 Summary of the Results

The study is carried out to explore and to find how different transport effecting on a road safety perspective in the form of road accidents. The outcomes of this study are expected to help policymakers in re-thinking about in Socio-Economic Information, driver behavior and attitude, to make drivers oriented transport policy based on their comfort, to keep a record of accidents by drivers, etc. Also, the study has some limitations. The sample size is moderately large, accidents are analyzed together as a road safety perspective, less continuous variables, and heterogeneity of the model is checked by applying Zero Inflate Ordered Probite Model, and so on.

## 5.2 Strength and Limitations of the Research

This program of research featured a number of strengths that enhanced the quality of the information obtained. The locations are also chosen for their availability of target subgroups. The approach taken is cost-effective in a sense it keeps the number of locations limited which greatly facilitates personal interviews. The sample is representative of urban drivers. That’s the main difference between the existing study on driving accidents and the present study. The questioner survey design used in these studies made it possible to examine the behavior and attitude of a more general sample of different license group. From the analysis of data provide important information, it remains clear that whether the driver only involved for the crushes or not.

It is quite clear that motorcycle drivers’ are involved in most severe accidents and a huge life loss is encountered with these studies that will help us to take the initiatives required to make them understand the scenario. Due to the design of the study, it is possible to directly compare people who had driven unlicensed with those who had not.

In addition, each of the studies featured specific limitations that need to be acknowledged. From the database, only one method of analysis is used to evaluate data analysis. More analysis helps to accurately quantify the crash risk with the behavior and attitude of the driver. Sample of the different vehicles of the driver was not taken for this study.

## 5.3 Suggestions for future Research

This research is required to better explain aspects of different accidents group of driving behavior and attitude, to establish the impact of various policies or countermeasures on the behavior and attitude and to inform the design of new countermeasures. The study needs a better method of estimating the exposure of different accidents group of drivers.

# References

Feng, G., Kong, G., & Wang, Z. (2017). We are on the way: Analysis of on-demand ride-hailing systems. *Available at SSRN 2960991*.

Guo, J., Liu, Y., Zhang, L., & Wang, Y. (2018). Driving behaviour style study with a hybrid deep learning framework based on GPS data. *Sustainability*, *10*(7), 2351.

Harris, M. N., & Zhao, X. (2007). A zero-inflated ordered probit model, with an application to modelling tobacco consumption. *Journal of Econometrics*, *141*(2), 1073-1099.

Lawton, R., Parker, D., Stradling, S., &Manstead, A. (1997). The role of affect in predicting social behaviours: the vase of road traffic violations. Journal of Applied Social Psychology, 27, 1258 – 1276.

Lajunen, T., Parker, D., &Summala, H. (2003). The Manchester Driver Behaviors Questionnaire: a cross-cultural study. Accident Analysis and Prevention, 942,1-8.

Miyajima, C., Nishiwaki, Y., Ozawa, K., Wakita, T., Itou, K., Takeda, K., &Itakura, F. (2007). Driver modeling based on driving behavior and its evaluation in driver identification. *Proceedings of the IEEE*, *95*(2), 427-437.

RadinSohadi, R. U., Mackay, M., & Hills, B. (2000).Multivariate analysis of motorcycle accidents and the effects of exclusive motorcycle lanes in Malaysia. *Journal of Crush Prevention and Injury Control*, *2*(1), 11-17.

Simons-Morton, B., Lerner, N., & Singer, J. (2005).The observed effects of teenage passengers on the risky driving behavior of teenage drivers. *Accident Analysis & Prevention*, *37*(6), 973-982.

Statistics Canada.Survey methods and practices, Social Survey Methods Division, Statistics Canada, 2003, ISBN 0-660-19050-8, CS 12- 587-XPE.

Ulfarsson, G. F., & Mannering, F. L. (2004).Differences in male and female injury severities in sport-utility vehicle, minivan, pickup and passenger car accidents. *Accident Analysis & Prevention*, *36*(2), 135-147.

Wang, Y., Li, L., & Prato, C. G. (2019).The relation between working conditions, aberrant driving behaviour and crash propensity among taxi drivers in China. *Accident Analysis & Prevention*, *126*, 17-24.

Zhen, C. (2015). *Impact of ride-sourcing services on travel habits and transportation planning* (Doctoral dissertation, University of Pittsburgh).