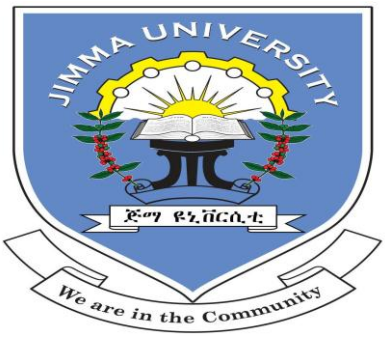
DETERMINANTS OF ROAD TRAFFIC ACCIDENT IN HADIYA ZONE: THE CASE OF HOSANNA TOWN

A Thesis Submitted To The School Of Graduate Studies Of Jimma University, In Partial Fulfillment Of The Requirements For The Award Of The Degree Of Master Of Science In Economics (Economic Policy Analysis)

BY:

DANIEL BIRU



JIMMA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

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A Thesis on Determinants of Road Traffic Accident in Hadiya Zone: The Case of Hosanna Town

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ECO PROGRAM

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Jimma, ETHIOPI

DECLARATION

I hereby declare that this thesis entitled “Determinants of road traffic accident in Hadiya Zone: The case of Hosanna Town”, has been Carried out by me under the guidance and supervision of Wondaferw Mulugeta (Phd) and Berehanu Getachehu (Msc).

The thesis is original and has not been submitted for the award of degree of diploma any university or instructions.

Researcher’s Name	Date	Signature
_____	_____	_____

CERTIFICATE

This is to certify that the thesis entities "Determinants Of Road Traffic Accident In Hadiya Zone: The Case Of Hosanna Town, Submitted to Jimma University for the award of the Degree of Master of Economics and is a record of Valuable research work carried out by Mr. Daniel Biru, under our guidance and supervision.

Therefore we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree of diploma.

Adviser's Name	*Date*	*signature*
_____	_____	_____
Co-Advisor's Name	*Date*	*Signature*
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ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
CHSFS	Children's Home Society and Lutheran Social Service of Minnesota
CSA	Central Statistics Agency
EFY	Ethiopian fiscal year
ETB	Ethiopian birr
FGD	Focus group discussion
KII	Key informant interview
MT	Motorized Traffic
NHTSA	National Highway Traffic Safety Administration
NMT	None Motorized Traffic
RTAs	Road Traffic Accidents
RTIs	Road traffic injuries
SNNP	South Nation Nationalist People
UNECA	United Nations Economic Commission for Africa
USAID	United States Agency for International Development
WB	World Bank
WHO	World Health Organization

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Abstract

Road traffic accidents are outcomes of several factors associated with the traffic system. And the major ones are, pedestrians, unsafe road environments, derivers and vehicles. The socio-economic costs of traffic accident includes deaths, disabilities, injuries and property loss. The prevalence of road traffic accident has increased continuously in alarming rate. Also it is a serious issue and great homework in developing countries like Ethiopia.

The aim of this study was to identify the major determinants of the traffic accidents and to discuss its consequences thereby to fill the knowledge gap in Hosanna Town, Hadiya Zone. The primary investigator used primary and secondary data sources for this research. The primary data was collected from 298 households' survey and was analyzed by employing stat and SPSS. Qualitative data was also gathered from focus group discussion and key informants interview to investigate the extent of accident and related impacts. Traffic accident documents, who served as secondary data sources, were also reviewed, compiled, organized, summarized and interpreted in light of the research objective. For this research binary logistic regression model was used to analyze the relationship between multiple explanatory, categorical variables. The study revealed that major factors behind road traffic accident were: Motor Cycle, Bajaj Motor, Minibus-taxies, Carts, Pedestrians, Age of the victims, Gender of the Victims, Deriving Experience, Helmet Use, Deriving Speed (at the time of accident), Availability of Multi-directional Way, Presence of Institutions or Organizations in the area of accident, Pedestrian Sideway, and Enforcement or Exercising the Law was significant. It was concluded from the research that it needs building pedestrians lane, alternative way for carts, assigning car parking space, broaden road safety education in regular class, controlling the level of implementation of the existing traffic law, equipping and empowering responsible sectors of road safety, strengthening coordination between responsible sectors and stockholders as well as using minibus-taxies were forwarded as to how to reduce the phenomenon of traffic accidents and to minimize its consequences in case of Hosanna town.

Keywords:- *Traffic accident, Binary logistic regression, Hadiya Zone, Hosanna*

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE
INTRODUCTION

1.1 Background of the study

Transportation system is essential for rapid economic, industrial and cultural growth of a country. According to Atnaf's report(2000), road transportation is the nearest to people and has major advantage compared to others transport modalities due to its flexibility, in using also door-to-door service over short distances at the most affordable prices. More than 80 percent of goods and people transportation service in Africa depends on road transportation. In Ethiopia, however transport accounts for over 90 percent of all the inter-urban freight and residents activities in the country (Ibid). In other words, transportation is one of the basic requirements for the proper functioning of societies as its demand is highly related to the movement of people from one place to another. Therefore, transportation has a direct impact on the day-to- day activities of people (Road Safety Transport Management Crisis in Ethiopia, 2000).

Figure1.1: Transportation service in Hosanna town (2017)

Despite its importance in economic development, road transport has its own negative consequences. These include environmental pollutions, road accidents, and others socio-economic problems (OECD, 1988, WorldBank, 1994, Arosanyin, 1999, 2000). The report by WHO (2004) about 1.2 million individuals died by road accidents; its economic cost of road traffic accident was estimated $518 billion dollars; cause injuries to 20–50 million people, and per year road traffic injuries becomes the 11th leading cause of death, and

accounted for 2.1 percent of all deaths. The report also shows globally only 4 percent of vehicles registered in Africa, but it accounts for 10% of the total road deaths in the world. Developed countries reduced road traffic accidents fatality by more than 25 percent in period 1968 -1998, and as per their strategic plan it will be reduced by 30 percent in 2020.

Awal (2013: p10) cited Arthur Kennedy in year article "Perishing on the road" that "many of our prominent politicians have been involved in accidents including the Former Presidents of Ghana; Rawlings and Kufour and many other prominent politicians and members of the parliament in Ghana". Peden and Sminkey(2004) also reports that over 3000 Kenyans lost their live due to road accident every year and the majority of victims were between the productive age group (15 and 44 years).

According to UNECA (2009) road transport remains to be the mode of transport that Ethiopia heavily relies on for both domestic as well as for international services. This initiates number of private cars to increase annually by 8%.and which coupled with weak road management Ethiopia stands as one of the worst countries with respect to road safety performance in terms of traffic accident fatalities per 10,000 vehicles (95 in 2007/8). Also 56 percent fatalities during 1987/8-1996/7 were pedestrians, which is higher than the corresponding average for African countries (40%) and the average for some developed countries (20%) in the period. The pedestrian fatalities in Addis Ababa are much higher, 88 % of fatalities in 1987/8-1993/4. An assessment of road accidents made in Ethiopia highlighted that the country has one of the world's worst accident records, 170 fatalities per 10,000 vehicles. The accident cost analysis made during the study gave an estimate economic cost of traffic accident between 340-430 million ETB which is 0.8-0.9 % of the gross domestic product in 1999(Ibid). The study further noted the worsening and the likely more severe situation due to under reporting.

According (Odero, 2004), in Ethiopia road traffic fatality accounts for 51% of pedestrians. Pedestrians in urban environment is expected to be much greater than that of in rural areas. The sum of passengers and pedestrians represent over 80% of all road deaths. Similar to the above facts, another research verifies that Ethiopia is a country with the largest number of traffic accidents and mortality rate. In addition to human life and bodily harm (injury) costs, the seriousness of the situation in socio-economic terms is also very alarming. Addis

Ababa lost more than 25 million Birr annually because of traffic accidents (tesema *et at.*, 2005). To sum up in Addis Ababa the number of accident increasing from 2,016 in 2010/11 to 3,003 in 2013/14 and it was reported by Addis Fortune. (Net/articles/Ethiopia-among-worst-in-accident-safety Apr 13, 2015).

In case of Hosanna administrative town, road traffic accident imposing burden on economic, social and health are very serious and the current hot issue. Thus far, the available literature on road accident indicate that the determinants were growth in urbanization, slow road construction and maintenance, rapid traffic growth, increment of motor vehicles, shortage of awareness creation education in road safety, as well as ineffective traffic management and enforcement are the main reasons for rapid growth of road traffic accident. Though much has been said about the traffic accident, little has been done on the determinants of road traffic accident and its consequences coping mechanisms.

1.2 Statement of the problem

Road traffic accident (RTA) can be defined as any vehicle or non-vehicle accident collision on a public highway. It is determined by collisions between vehicles and animals, vehicles and pedestrians, vehicles and fixed obstacles, carts and pedestrians or carts and animals (Safecarguide, 2007). Globally because of road accidents, over one million people died, 20-50 million are injured and financial cost of injuries was $ 518 billion dollars annually

Road traffic accidents are growing as need for vehicles rise in developing-countries. Such as by 2020, RTA was estimated to be the third leading cause of death and disability worldwide. Residents of developing countries are at much higher risk of RTAs than residents of developed countries. In poor countries road traffic accidents occur as a result of growth in urbanization and several factors associated with the traffic system, such as road users, road environment and vehicles type. Road traffic accident is increased at alarming rate and is a serious problem throughout the globe, particularly, in developing countries like Ethiopia. The costly road traffic accident involving deaths, disabilities, injuries, material loss and so on. As per the National Highway Traffic Safety Administration (NHTSA) report, (2003 From Sub-Saharan Africa Ethiopia, Uganda, Kenya, Ghana, and Tanzania are the countries that experience high numbers of road deaths.

The report by the UNECA (2009), shows the number of road traffic accident and victims of Road Traffic Accidents in Southern Nations, Nationalities and Peoples Region (SNNPR) of Ethiopia to be 1009 and 1013 respectively. The report of SNNPR Regional Police Commission and Transport Bureau training document (2014) shows that from the 1,135 annual Traffic Accidents in 2013, 222 were died, 679 were severely injured, and the remaining 679 were slightly injured on top of the material loss of 234 millionETB. Similarly, the Hadiya Zone Transport and Road Development Sector's Annual Report(2013) shows that in Hosanna Town 107 Traffic accidents occurred in year and the number of deaths, injury and material loss were33, 100 and 2,025,000ETB respectively.

Currently Hosanna Town is one of the towns facing frequent road traffic accidents. The facts behind frequent traffic accident were the following: First, Hosanna town is serving as one of the key business hubs for inhabitants in the region because of the position it is situated. The main highway leads from the Ethiopia's capital Addis Ababa via Butajira to Wolayita-Sodo/Arbaminch (and so) in one side and also linking the South Western Corridor (Jimma-Hosanna-Soddo/Arbaminch corridor) on another side; thus, it is not uncommon to see several public buses business trucks crossing the town all the way to South East and South West corridors. Second, the roads in the town are very compact and most of the roads are occupied by small businesses and both motorized (MT) and non-motorized (NM) traffic (NM).These were contributing to high traffic jams, and thereby leading to more traffic accidents. Moreover, the main road side drainages were left open and there were no alternative sidewalks or lane for pedestrians. Lack of enough awareness about road safety and weak stockholder's commitment were also among the factors that were worsening the situation.

Even though there were high traffic accidents in Hosanna, there were no full-fledged researches that could show the major determinants and the magnitude of the accidents the town. As such, the actions taken to mitigate road traffic accident were also traditional and not systematized enough. This research was conducted to determine the main contributory variables of road traffic accident in Hosanna Town, one of the fast-developing towns in the SNNPR, and to provide some actionable recommendations based on the findings. The findings of the research are believed to positively influence the decisions of the key

decision makers and help them make informed decisions as they strive to mitigate the incidence and impact of road traffic accident in the town. The findings will also serve as an eye-opener for the society in general and will trigger further researches and explorations too.

Figure1. 2: mixed transportation system of Hosanna Town (2017)

1.3 Objectives of the study

- The general objective of this study was to investigate the major determinants of the traffic accident and its consequence in Hadiya Zone, Hosanna Town.

  The specific objective are the following**:**

- To identify the major determinants of road traffic accidents and to estimate their magnitude in Hosanna Town.
- To investigate and describe the extent of road traffic accident for Hosanna Town.
- To examine the consequences of road traffic accidents of Hosanna Town.
- To recommend feasible remedial measures to curb the traffic accident in the town based on the findings of the study.

1.4 Research Hypotheses

Hypothesis is the principal instrument in research. In social science, where direct knowledge of population parameter(s) is rare, hypothesis testing is the often used strategy for deciding whether a sample data offer such support for a hypothesis that generalization can be made. Thus hypothesis testing enables us to make probability statements about population parameter(s). The hypothesis may not be proved absolutely, but in practice it is accepted if it has withstood a critical testing. Research hypothesis is a predictive statement, capable of being tested by scientific methods, that relates an independent variable to some dependent variable, C.R. KOTHARI, (2004).

1a) Ho: $\beta > 0$

Ho: Variables in the model like deriving speed, motorcycle, Bajaj motor, min-bus, carts, pedestrians, road side maintenance services (garaging), multi-directional way and institutions or organizations on the road side effects traffic accident positively.

1b) Ha: $\beta < 0$

Ha: Variables in the model like deriving speed, motorcycle, Bajaj motor, min-bus, carts, pedestrians, road side maintenance services (garaging), multi-directional way and institutions or organizations on the road side effects traffic accident negatively.

2a) Ho: $\beta < 0$

Ho: Variables in the model like helmet, age, gender, Pedestrians' sideway, law enforcement, capacitating officials and community in road safety to road safety, parking space, and driving experience affects traffic accident negatively.

2b) Ha:$\beta > 0$

Ha: Variables in the model like helmet, age, gender, Pedestrians' sideway, law enforcement, capacitating officials and community in road safety to road safety, parking space, and driving experience affects traffic accident positively.

1.5 Significance of the study

Different reviewed literatures show that the main determinants of road traffic accidents were vehicles, driver's speed, age, sex, driver's level of education, use of seat belt, location, license, pedestrians, road safety, lake of law enforcement, type of vehicles, service year of the vehicles, and mechanical/electrical problems of the vehicles. This research included variables like car packing space, road side garaging, non-motorized traffic, pedestrians sideway and stockholders commitment in the model to estimate road traffic accident—which will give more contextualized and additional insight. The findings of this research primarily will help governmental and non-government organizations in raising the level of awareness of the road safety practitioners and residents. The findings will also serve as a reference for further large-scale researches and innovations in response to road traffic accidents.

Figure 1.3: Unsafe road crossing in Hosanna Town (2017)

1.6 Scope and limitation of the study

This study was conducted in Hadiya Zone, Hosanna Town, and data collection for the research was carried out between January1, 2017 and March 31, 2017. The findings of the research can be carefully used for towns of similar status. We have been faced some problems in data collection were: the data for vehicles and derivers driving experience were not available. It is also the belief of the researcher that the road traffic accident determinants list in this research is not exhaustive.

1.7 Structure of the Thesis

This proposal has been organized in five chapters. The first chapter is devoted to bring about the background of road traffic accident in different parts of the world in general and Ethiopia in particular, objective of the study, statement of the problem, research hypothesis, and significance of the study. The second chapter reviews the theoretical framework of the study. The third chapter of this research is describing research design and methodology, the population of the study, the study area, the research process, source data and method of collection, sample size and sample size determination. The fourth chapter is about data analysis and results. The final chapter included conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1. Theoretical perspectives and models

A literature review is a scholar's research paper, which includes the current knowledge including essential findings, as well as theoretical methodological contributions to a particular topic. In order to find out the gaps in research, the literature already available identifying to the problem is to be reviewed. The literature on road accidents in Ethiopia includes books, thesis, dissertations, study reports and articles published by academicians and scholars in different periodicals. The review of this literature gives an idea to concentrate on the unexplored area and to make the present study more distinct from other studies.

The production of knowledge is basically dependent on past knowledge (Zina, 2010). Following that a theory of traffic accident should be go beyond statistical associations, make assumptions about underlying processes, and cover issues of measurement (Blander, West, & French, 1993) the present study seeks to find determinants in road traffic accidents.

Many researchers used different theories, models to explain and predict the accident phenomenon. Categorically such studies have addressed; accident causality in reference to the various traffic participants- drivers, passengers and pedestrians (Carsten, Tight, Southwell, & Plows, 1989) ; and environmental factors- roads, terrain, surroundings (Karlaftis & Golias, 2002). The vehicle- mechanical conditions, vehicle type, seat belt (Simsekoglu & Lajunen, 2008) . To achieve these, such studies employed numerous interdisciplinary theories and models that enabled them to perceive, conceptualize, and contextualize in-depth the whys and howls of the accident phenomenon. On that grounding, researchers have been able to define, distinguish and categories various accidents under respective contributory facets.

It is upon the same basis that the models and theories in context of the current study would be used to structure a theoretical framework that enhances the understanding of

determinants and interventional procedures of road traffic accidents. Thus, the importance of Systems theory.

The safe road transport system Conceptual Framework

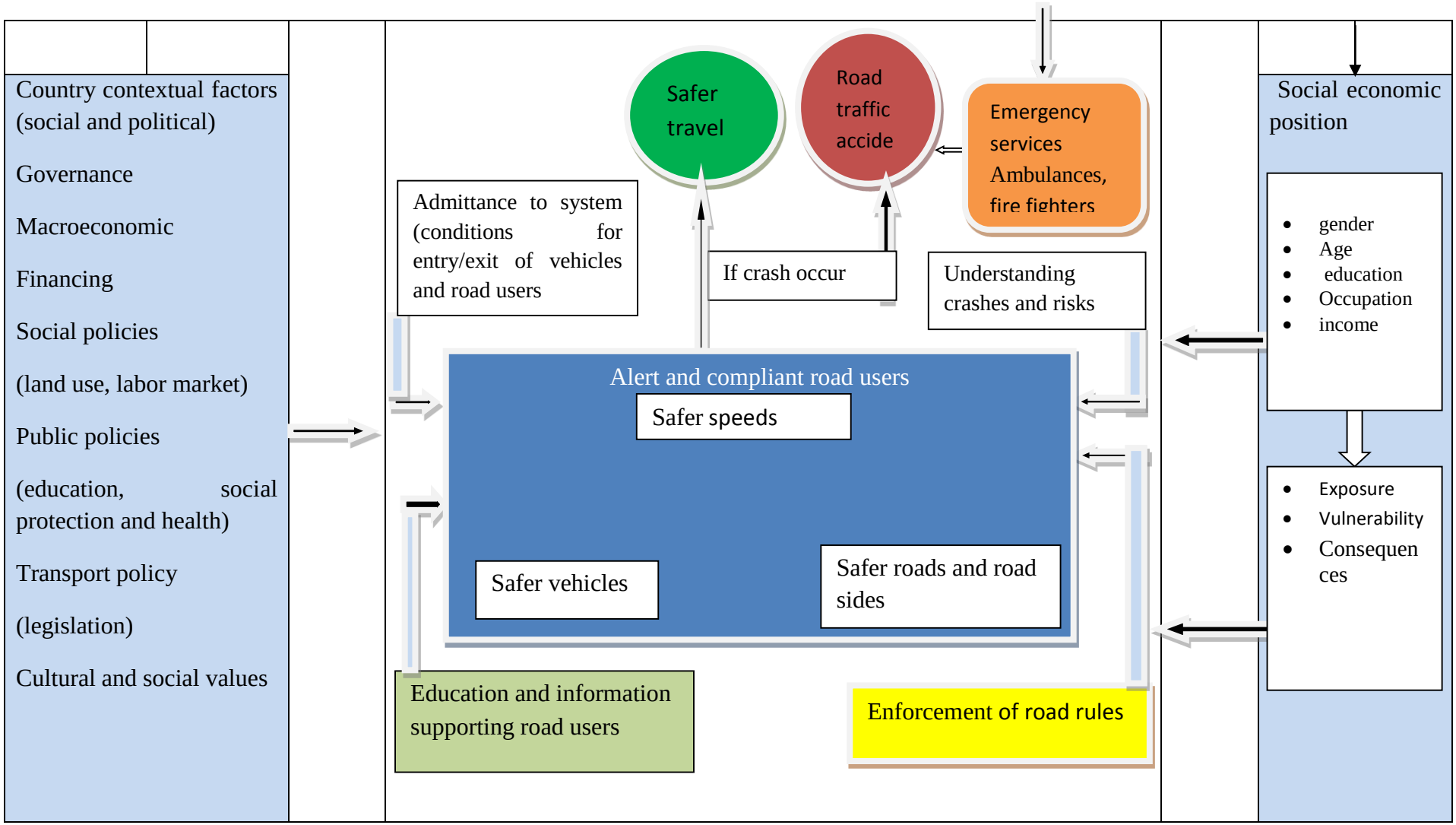

Figure2.1: The safe road transport system Conceptual Framework, Soures:Muvuringi (pp 9, 2012)

Thus, the importance of Systems theory in understanding the topic under consideration would be seen at three different levels. First, the theory helps to identify the system of traffic laws, regulations and mode of enforcement designed to ensure traffic safety in Motorized traffic, non-motorized traffic and Environmental factors in Hosanna town. Second the model help to identify the multiple causes' interplay of accident factors and prevention of traffic accidents that occur in the study area. Third, the model assist in identifying/understanding the major contributory determinants of road traffic accident including human, mechanical (vehicle) and road environment factors. The available literatures which support this study are below.

Residents of developing countries are at much higher risk of RTAs than are residents of high-income countries. They are also at greater risk of death when a crash occurs. Because developing countries have inadequate trauma systems and are often unable to care for crash victims. Unless possible intervention to be taken to facilitates road safety systems, poor countries will continue to bear the heavy toll of road traffic accident.

However, in low and middle income countries, where 81 percent of the world's population live and own about 20 percent of the world's vehicles, and death rate and disabilities from road traffic accidents expected to be will rise considerably by 2020. For instance, the Global Road Safety Facility (2012), indicated that the road related mortality rate per capita in Africa is the highest in the world at 28.3 deaths per 100,000 at an estimated cost of US$ 3.7 billion. The Global status report on road safety (2015), reflecting information from 180 countries, shows that worldwide the total number of road traffic deaths has increased by 1.25 million per year, with the highest road traffic fatality rates in low-income countries.

Driving speed is the most known factor in the generation of traffic crashes. Consequently, most countries have set maximum speed limits permissible for specific types of vehicles, and on specified roads and locations. Experience in a number of countries demonstrates that strong enforcement of speed regulation measures can be effective in preventing economic loss, serious injury and fatality from motor vehicles collisions (Wilkinson & Meiring, 1974). However, ever increasing in demand for mobility, coupled with the current trend in the production

of high performance vehicles, potential danger of increased speed, if not monitor effectively, may increase road accident problem, especially in developing countries where road safety initiatives are still weak.

As reported by (Peden & Sminkey(2004)), economic costs are very difficult even to estimate and to make it zero. For everyone killed, injured, or disabled by a road traffic crash there are countless others deeply affected. This means, many families are driven deeper into poverty by the expenses of prolonged medical care, loss of a family breadwinner, or the added burden of caring for the disabled.

Effective monitoring system giving awareness to society in road safety can reduce the current Road Traffic deaths and serious injuries by many fold, because it is to a great extend preventable, since the risk of incurring injury in a crash is largely predictable and there is many countermeasures make to be effective (WHO, 2004). This report additionally shows us that exposure to road injury risk can be decreased by strategies that include: Providing efficient networks where the shortest or quickest routes coincide with the safest routes facilitating active transport system.

Legislation has not been enough on its own as failure to use helmets, use of nonstandard helmets and use of improperly secured helmets is common in many places, especially in low income countries and calls on efforts to supplement these efforts with complementary prevention and educational strategies (Ameratunga, Hijar, & Norton, 2006). Some Evidence notices that although India has one percent of the world's vehicles and it accounts for six percent of world's RTAs. The RTA rate of 35 per 1000 vehicles in India is one of the highest in the world and so is the associated RTA fatality rate of 25.3 per 10,000 vehicles (Fitzgerald, Dewan, O'Reilly, Mathew, & McKenna, 2006). In other word; seventy three percent of deaths due to RTAs from the South-East Asia Region are in India.

Oginni F.(2008) identified the risk factors such as uneducated and unlicensed drivers and riders, reckless driving, carelessness, drunkenness, lack of knowledge on road safety rules, driver's age, fatigue, low practicing government policies, failure in law enforcement and road traffic injuries are the leading cause of death globally among 15-19 year olds, while for those in the 10-14 years and 20-24 years age brackets they are the second leading cause of death WHO (2007). The projected 40% increase in worldwide deaths resulting from injury between 2002 and 2030 is

predominantly due to the increasing number of deaths from road traffic accidents WHO (2007). India in risk, already accounts for about 9.5% of the total 1.2 million fatal accidents in the world Mondal; (2011). In 2007, many people in India lost their lives in road mishaps that are significantly higher than the 2006 road death figures in China, 89,455 (Mondal, Sharma, Kumar, Bhangale, Tyagi, & Singh, 2011a). Surprisingly, one person dies at every 4.61 minutes in India for road crashes. So, road traffic accident is one of the serious problem and its' deaths in India registered a sharp 6.1% rise between 2006 and 2007. RTAs account in India for 2 million people disability and for 16.8 deaths per 100,000 populations WHO, 'Global Status Report on Road Safety, time for action'(2009).

Road traffic accidents have physical, social, emotional and economic implications. Through the world economic cost of road traffic accident was estimated at $518 billion per year in 2003 and $100 billion of that occurring in poor developing countries (Ibid).

MajidSarvi (2016), the factors influencing tram-involved crash frequency at a macro level. The study aims to explore the safety effects of key traffic, transit and route factors on tram-involved crash frequency for tram route sections in Melbourne, Australia. A random effects negative binomial (RENB) regression model was adopted for this study to model crash frequency in relation to variables, as the available crash data followed a panel data structure and the variables (traffic, transit and route factors) are likely to have location specific effects. The average speed of the tram and the proportion of platform tram stops are also linked to tram-involved crash frequency but at a lower level in effect size. The study findings provide useful insights on route section level tram-involved crash occurrence and present useful planning tools for transit agencies. Fanueal (2016) study report shows the number of accident in Addis Ababa increased from time to time and the property damage estimates, only in Addis Ababa, which were 10 Million ETB in 1996, escalated to 25 Million ETB in the year 2005. According (Tesema et al., 2005). In Ethiopia, above 1,800 people died while above 7,000 were injured in 2003. Moreover the death rate is 136 per 10,000 vehicles and Ethiopia is losing over 400 million birr yearly as a result of road accidents.

UNECA (2009) report indicates in Ethiopia road transport remains to be the mode of transport that the country heavily relies on for both domestic as well as for international services. The number of private cars has increased annually by 8%. Ethiopia stands as one of the worst countries with respect to road safety performance in terms of traffic accident fatalities per 10,000 vehicles (95 in 2007/8). 56 % of the fatalities during 1987/8-1996/7 were pedestrians, which is higher than the corresponding average for African countries (40%) and the average for some developed countries (20%) in the period. The pedestrian fatalities in Addis Ababa are much higher, 88 % of fatalities in 1987/8-1993/4. An evaluation of road traffic accidents occurred in Ethiopia highlighted that the country has one of the world's worst accident records, 170 fatalities per 10,000 vehicles. The accident cost analysis made during the study gave an estimate economic cost of traffic accident between 340-430 million ETB which is 0.8-0.9 % of the gross domestic product in 1999. The study further noted the worsening and the likely more severe situation due to under reporting.

In Ethiopia, road traffic fatality accounts for 51% of pedestrians. Involvement of pedestrians is much greater in urban environment than in rural areas. The sum of passengers and pedestrians altogether represent over 80% of all road deaths ((Odero, 2004). Consistent to the above facts, another study shows that Ethiopia is a country with the largest number of traffic accidents and fatality rate. In Addis Ababa addition to human life and bodily harm costs, the severity of the situation in economic terms is also very serious. More than 12 million Birr is lost every year because of traffic accidents (Asfaw, 1999).

WHO (2009), Global status report on road safety shows Ethiopia is one of the 10 countries with the highest number of death. Such as this report show us road traffic fatalities in (2006), 2517 (78% males, 22% females) and 2 517d (78% males, 22% females). The report indicates reason for number of deaths is clearly related to both population and motorization level. Additionally WHO (2014) report indicate that road traffic accident death calculated in Ethiopia was 15015 (2.5) of total deaths. According to UNECA (2009) number of road traffic accident and Victims of Road Traffic Accidents in SNNRP 1009 and 1013 respectively.

Francisco & Aparicio-Izquierdob (2016) shows in their article, there are a high number of potential factors affecting fatal accident data. Bad behavior of drivers, weak legislative measures, and negligible amount of investment on road maintenance, Unsafe and below standard vehicles, and congested roads are found to be the main factors that could best explain the fatal accident data.

Wedagama (2010) in period 2006-2008 by using a logistic regression model shows the motorcycle fatality of collision with pedestrians and right angle accidents were respectively about 0.44 and 0.40 times lower than collision with other vehicles and accidents due to other factors. In contrast, the odds that a motorcycle accident will be fatal due to collision with heavy and light vehicles were 1.67 times more likely than with other vehicles. Collision with pedestrians, right angle accidents, and heavy and light vehicles were respectively accounted for 31%, 29%, and 63% of motorcycle fatal accidents.

Goswami & Sonowal (2011) investigate with statistical analysis of road traffic accident data for the year 2009 in Dibrugarh city. Data interpretation was done using Degree of freedom, Chi–square test for goodness of fit, χ 2 – test for independence of attributes and Kruskal - Wallis test. They found that human characteristics such as negligence and rushing make 95.38% of the total RTAs. 60% of the accidents were recorded during day time (6 AM to 6 PM). The peak time was between 12 PM to 6 PM (38.46%). The highest numbers of accidents (32.30%) were registered in the heavy rainy season during July –September.

Hassan Y, Othman, & Wahaballa (2003) studded in Traffic Accident Analysis & Modeling for Upper Egypt Rural Roads. The models are developed using simple regression, stepwise regression, and multiple regression analyses using linear, logarithmic, power, and exponential models to select the best models that have the highest coefficient of determination (R^2). And environments were responsible for 15%. Atubi & .O (2012), the result of the multiple regression analysis for dependent variable (i.e. road traffic accidents) explained by the independent variables (i.e. length of roads, presence of road safety and population) accounts 97%.

M, Fenta, Demeke, & LakewWorkie (2014) Worked Methods of data analysis were descriptive statistics, Chi-square and Binary logistic regression and its' report shows majority (55.5%) of accidents were occurring by drivers whose age is less than 30

years and the minimum (8%) accidents were occurring by drivers whose age is greater than 50 years old. Abdul-RahamanHaadi (2014) reported the factors relating to worsens of accidents in the Northern Region from the period of 2007-2009. Since the response variable is of dichotomous nature (i.e., has two categories: fatal or non-fatal), logistic regression technique was used to develop the model. Appling the concept of Deviance with test Wald Statistic, the study variables were subjected to statistical testing. Only two variables were included in the model, namely, Over Loading and Obstruction. The observed level of significance for regression coefficients for the two variables were less than 5% suggesting that these two variables were indeed good explanatory variables.

Manimekalai & tnuniv.ac.in (2014-2015) report shows a statistical study on road accident in salem city, India. Fatality in the year 2014 is quiet high. Injury rates and the Accident rates are increasing relatively during the whole study year. Among 861 Fatality case reported 890 persons were died during 2009 to 2014. Among 3724 Non-fatal case reported 4687 persons were injured during 2009 to 2014. Majority of the drivers in 18- 30 years and 31- 40 years of an age group took maximum number of road accident in the year 2014. Due to driver fault, 45.19% of an accident reported as maximum number of minor injury. And it is also says that the maximum number of persons killed is 50.52% due to minor injury during (2012- 2014). The main reasons for these accidents are noted to be: - 1) Variant behavior or low skill of drivers (Over speeding, not respecting pedestrian priority) 2) Poor vehicle technical conditions 3) Poor traffic law enforcement 4) Poor emergency medical services and most of the studies conducted on traffic accidents indicate that factors that contribute to the occurrence of traffic accident can be categorized as per their relation to Vehicle, Driver or Road condition and others like Visibility, Weather condition, population density are also additional factors that may be taken into consideration.

In case of Hosanna administrative town, road traffic accident imposing burden on economic, social and health are very serious and the current hot issue. In my opinion the accountable determinants for the issue are growth in urbanization, slow road construction and maintenance, rapid traffic growth, increment of motor vehicles, shortage of awareness creation education in road safety, as well as ineffective traffic

management and enforcement …etc are the main reasons for rapid growth of road traffic accident.

Even though much has been said about the traffic accident, little has been done on the determinants of road traffic accident and its consequences controlling mechanisms. This study attempt to analyze and estimate determinants that responsible for traffic accident and its consequence in Hadiya Zone: The case of Hosanna town.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1. Research design

The aims and methodology in econometrics are formulation of econometric models, estimation and testing of these models with observed data and using of these models for prediction and policy purpose. This chapter deal about the methods used for collecting data in the field and analyze the collected data. It also describes how and why the techniques were used as well as the extent to which they fit to the research objectives. Webster (1985) states that research is to search or investigate in-depth. It includes a carefully sampling, data collecting, testing the data, investigating the discovery and interpretations of outcomes, revision of accepted theories or laws. It is also the summation of information about a particular subject. In general this section focuses on discussion of the research process, the selection of the data sites, sampling methods and type of data, collecting and analyzing mechanism (analytical and statistical techniques used in analyzing the data for the study).

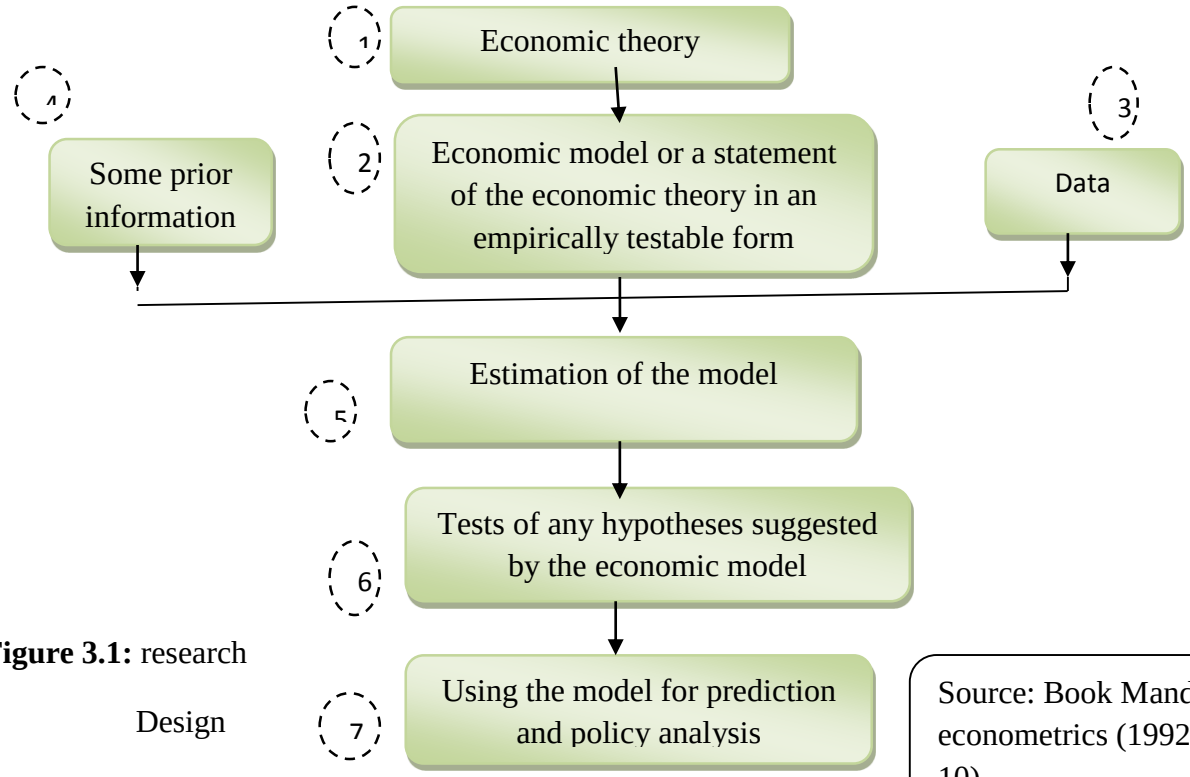

Figure 3.1: research Design

Source: Book Mandalas econometrics (1992: p 10)

3.2. The study area

This research was conducted in SNNPR, Hadiya Zone, and Hosanna Town. Hadiya Zone has ten woredas and two towns (Hosanna and Meseraq-Badawacho). From these two towns Hosanna was selected for this research, because Meseraq-badawacho is a new town and the data for this research is not available. Hosanna is a town and separate woreda in Hadiya Zone and is also administrative center of Hadiya Zone. It is surrounded by Lemo Woreda which was previously part of it. Population in Hosanna was 75,963 CSA (2012) and it has a latitude and longitude of 7°33′N 37°51′E coordinates: 7°33′N 37°51′E with an elevation of 2177 meters above sea level.

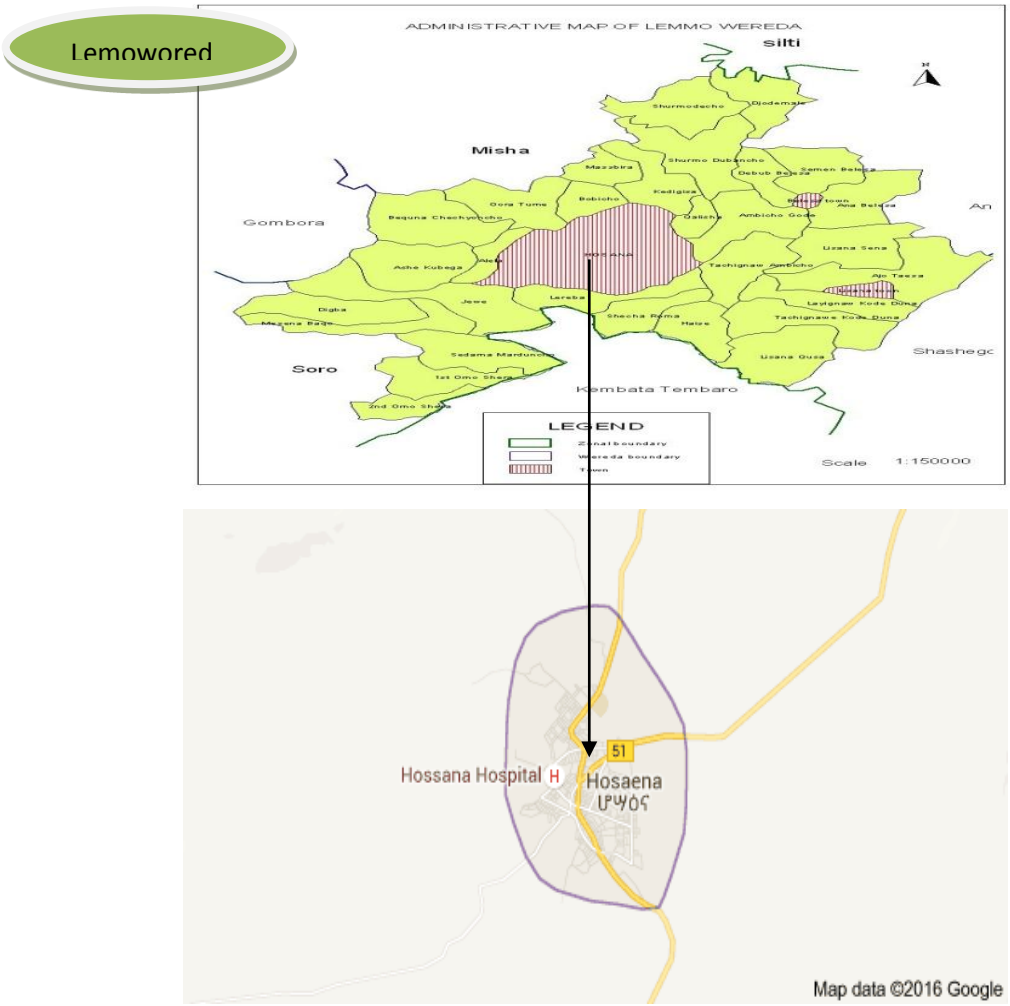

Figure 3.2: Geographical map of Hosanna.
Source: CSA (2012) Map of Hosanna

Sometimes Hosanna written also as Hosaena, Hossana, Hosaina, and locally known as Wachemo is located in southern Ethiopia, at 235 km from the capital city of Ethiopia. It is found on an elevation of 2177 meters above sea level, across the main highway leading from the capital Addis Ababa via Butajira to Wolayita-Sodo. Hosanna serves as a one of the major business center for inhabitants in south Ethiopia.

Facilities of Hosanna town including University, governmental and private schools, hospital, digital telephone, postal service, bank, 24-hour electricity, post office, gas stations, suitable hotels and restaurants. Saturday is a market day where visitors enjoy a rich cultural attractions and songs of the Hadiya people.

Hosanna is one of the largest towns in the region and many of its residents are primarily ethnic Hadiyas, followed by Kembata, Gurage, Silte and Amahara origins they all live together peacefully and they respect one another .While the majority of its residents speak Hadiyissa as their first language, some of them speak other languages such as Amharic, Kembatissa, Guragenga and Silitigna.

The most dominant religions in the town are Protestant and Orthodox, with some Muslims and Catholics. The Ethiopian Evangelical Church locally called Sinodos (to say Southern Central Synod of Ethiopian meakane-Yesus Church) in the town's entrance is a model for local grass-root projects. It provides Deaf School to residents – it is also one of the largest schools in the country. Since 1929 after the settlement of SIM missionaries in the town, Hosanna became a center of Protestant Christianity in Southern Ethiopia.

Hosanna serves as a base for various humanitarian organizations which are the main sources of aid to alleviate rural poverty in Southern Ethiopia. For instance, Love in action, World Vision, Action Aid, USAID and CHSFS strive to improve the welfare of poor communities, CSA (2012).

3.3. Population of the study

Target populations of the study area 1,321 households of Gofer-Meda Sub City residents (Bobichokeble = 330, Jallo-Naremo Keble = 665 and Heto Keble = 326) of Hosanna town.

3.4. Source of data and method of collection

The convenient methodology was applied for data collection and employing it in the field for both qualitative and quantitative methodologies within a framework of a case study approach. Key informant interviews (KII), review of secondary data, focus group discussions (FGD), interviewing the traffic police on duty and observations were also done accordingly. According to Baker (1999) triangulation enables a researcher to collect evidence from multiple sources to address the questions at hand from several points of view. One merit of triangulation is it enhance the research to lock things in different direction and at the same time strengthen the validity of the research. So, it is powerful means of acquiring knowledge about the socio- economic world.

In order to achieve the objectives of this study, both primary and secondary data were used. For this research primary data sources were interviews with the residents of the KII in targeted population and from FGD of residents in Hosanna Town. A comprehensive questionnaire was used to collect quantitative information from the targeted individuals and then, the collected primary data from survey was analyzed by employing Stat and SPSS. Quantitative method was used to compare and analyze the aggregate statistical data and Qualitative approach was used to collect the secondary data from statistical report of Hadiya Zone road safety core-process, Hadiya Zone police department, traffic police on duty, personal observation and a focus group discussion with Government officers (representatives of Hadiya Zone road safety core process, Hosanna town transport unit, transport vehicles associations, insurance companies and selected derivers) in Hosanna town. Reviews of relevant books, journals, articles, and reports (extracted from international organizations such as WHO, World Bank and others) and other published and un-published documents was also carried out. The goal of collecting information from key informants was to get clear information about the road accident, to understand the extent of accident in the town and to understand the contributions of stockholders in facilitating the transport system and in reducing the road traffic accidents in case of Hosanna town.

3.5. Sample size

This research used both random sampling and systematic sampling approach at the same time. The detail reason for this sampling is as follows.

In Hosanna town we have three sub towns and one of these (Gofer-meda sub town), was taken randomly, because the distribution of RTAs in each sub town was nearly similar. But the sample from each Keble was taken not randomly because the household number in each Keble was heterogeneous and so, samples from households was taken by using systematical stratification method. Then, the actual sample size was determined based on statistical method and 298 households were taken from total population.

3.6. Sample size determination

Sample size determination is the basic task prior to conducting a research work based on a sample of the selected population. In order to have a maximum sample size, objective of the study, design of the study, cost (budget) consideration, appropriate use of statistical analysis, degree of precision required for verifications and level of confidence used for conclusion has to be taken into the work. Based on the above issues, there are different formulas developed for sample size calculation that conform to several research situations. Therefore, the sample size determination formula adopted for this study is: $n = \frac{n_0}{1+\frac{n_0-1}{N}}$, as the sample is from a finite population the sample size calculated as $n_o = \frac{Z^2pq}{e^2}$, according to (Cocharen, 1977). Where n_0 is unadjusted sample size, $Z = Z_{\alpha/2}$ is the test statistic of standard normal distribution at significance level of α. e= is the margin of error, P= is the estimated proportion of an attribute that is present in the population, and q = 1-p estimated proportion of an attribute that is absent in the population.

In this research, both random and systematic sampling techniques were used. And as can be seen below, based on the formula the minimum sample size was calculated to be 298. For these sampled household's questionnaire will be distributed. Our sample size is as follows:

$$n_o = \frac{\mathbf{1.96^2(0.5)(0.5)}}{\mathbf{0.05^2}} = 384 \quad \text{.....3.1}$$

Hence, $n_o = 384$ which is unadjusted.

Since the ratio $\frac{no}{N} > 5\%$, the adjustment is done as follow

$\frac{384}{1321}$ = 0.29 > 5%. Therefore,

$$n = \frac{no}{1+\frac{no-1}{N}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.2$$

In this research both random and systematic sampling techniques have been used. And as you can see below, based on the formula the sufficient sample size is calculated to be 298.

$$n = \frac{384}{1+\frac{384-1}{1321}} = 298 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.3$$

3.7. Stratified random sampling model

In this method, samples will be chosen at random from different strata of usually different sizes of population and these will be based on priority information about the variation and accident. It is done in heterogeneous population. Heterogeneous populations will be divided in to several more or less homogenous sections or groups. These groups called "Strata" samples drawn from each stratum by simple random sampling method. In this study, the target population will be the total number of households in Bobicho, Jelo-Naremo and HetoKeble of Gofe Meda Sub-City. The strata of the Gofer-meda sub town are shown below.

- Bobicho Keble households = N1 = 330
- Jelo-naremo Keble households = N2 = 665
- Heto Keble households = N3 = 326

  Using proportional allocation, samples from each keble is calculated as follows.

$$n_h = n * N_h / N \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.4$$

Where: n_h= the required sample size from the h^{th} strata

n=determined sample size

N_h=total number of households in the h^{th} strata and h= 1, 2, 3,

N =total number of households in Gofer-meda sub town

N_1= sample size from Bobicho households

$N_1 = n*{Nh}/_N = 298* {330}/_{1321} = 74$ …….3.5

N_2= sample size from Jelo-naremo households

$N_2 = n*{Nh}/_N = 298* {665}/_{1321} = 150$……...3.6

N_3= sample size from Heto households

$N_3 = n*{Nh}/_N = 298* {326}/_{1321} = 74$ ……..….3.7

The total sample size taken from the all Keble's $n_1+n_2+n_3$ =74+74+150 = 298

3.8. Binary regression model

The basic limitation of linear regression is that it cannot deal with dependent variable's that are dichotomous and categorical. Logistic regression dose not assume a linear relationship between dependent and independent variable. The dependent variable must be dichotomy and the categories (group) must be mutually exclusive and exhaustive; a case can only be in one group and every case must be a member of one of the group.

The Binary Logistic regression model has ability to predict the relative likelihood of being effect in a road accident. One may choose Binary Logistic model rather than log linear models, when the main focus is describing effects on that response. The goal of Binary Logistic regression is to identify the best fitting model that explains the relationship between a binary dependent variable and a set of independent or explanatory variables. The response variable is the probability (p) that, the resulting outcome is equal to 1. Coefficients obtained from analysis for the independent variables can be used to estimate odds ratios for every independent variable in the model. For the binary response variable y, represent its categories by 1 and 0. It uses the generic term success and failure for the two outcomes. Agreti (2007) show that Binary Logistic regression is the most preferred where the independent variables are categorical or mix of continuous and categorical. In this study y=1 represents fatal (serious problem) and y = 0 represents non-fatal (not a serious problem).

However, the Binary Logistic transformation model is:

$$\text{Logit (P)} = \ln\left(\frac{P}{1-P}\right) = \beta o + \sum_{i=0}^{n} \beta i.Xi \quad \text{.....3.8}$$

The quantity to the left hand side is called a Logistic and it is the log of the odds that an event occurs. These methods support researchers to rank the relative importance of respondent variables; to assess relation effects; and to estimate the impact of covariate control variables. Therefore, Binary Logistic regression model was used to analyze the relationship between multiple explanatory variables and the occurrence of traffic accidents. Where

β_0: The model constant.

βi: The parameter estimates for the independent variables.

Xi: The set of independent variables (i=1, 2… n)

P: Probability ranges from 0 to 1

$\ln\left(\frac{P}{1-P}\right)$, The natural logarithm ranges from negative infinity to positive infinity.

Lee (2003), suggest that there are two important reasons that make logistic regression strong;

1. The range of the Logistic function is between 0 and 1; that make it suitable for use as probability model, representing individual accident.

2. The Logistic regression curve has an increasing s-shape with a threshold; that makes it suitable for use as statistical model, representing road traffic accident due to exposure.

The odd that shows what function of the probabilities results in a linear combination of parameters is:

$$\ln\left\{\frac{prob(event)}{1-prob(event)}\right\} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \ldots..\beta_k x_k \quad \text{.....3.9}$$

3.9. Fitting model

The three goodness-of-fit test criteria usually used for comparing different models for the same data in LOGISTIC procedure are:

- NagelKerKerPseudo-R^2
- Odds Ratio
- Wald Statistic (W)

3.9.1. NagelKerKerPseudo-R^2

There is no true R^2 value in logistic regression, as there is in Ordinary Least Squares (OLS) regression. Alternatively, Pseudo- R^2 can be a proxy of an R^2 including Cox & Snell Pseudo- R^2 and NagelkerkePseudo-R^2 (Charnkol, S., & Y, 2007).

Cox SnellPseudo-$R^2 = 1 - [\frac{-2LLnull}{-2LLk}]^{2/n}$ ……………………………3.10

The null model includes only the constant while the *k* model contains all explanatory variables in the model. Cox & Snell R^2value cannot reach 1.0, so that Nagelkerke$R^2$is used to revise it.

NagelkerkerPseudo-R^2 = R^2 = $\frac{1-[\frac{-2LLnull}{-2LLk}]2/n}{1-(-LLnull)^{2/n}}$ ………………………3.11

3.9.2 Odds ratio

The odds ratio is a ratio of two odds. Odds ratio can be used to give us clue of how strongly a given variable may be related with the outcome of interest compared other variables. For a probability of success π, the odds (likelihood) of success (in our case with accident determinant) are defined as shown in the equation

Odds = $\frac{\pi}{1-\pi}$…………………………………………..….3.12

Essentially, odds are nonnegative values. When the odds less than one, the probability of success is less than that of failure; when the odds are equal to one, the probability of success and failure are equally likely; and when the odds are greater than one, the probability of success is greater than that of failure.

. $\frac{Odds1}{Odds2} = \frac{\frac{\pi1}{1-\pi1}}{\frac{\pi2}{1-\pi2}}$ ………………………………………3.13

3.9.3 Wald statistic (W)

Wald Statistic (W) which follows a standard normal distribution under the null Hypothesis that βo = 0. This statistic is computed by dividing the estimated value of the parameter by its standard error as:

$$W = \frac{\beta 1}{SE(\beta 1)} \quad \text{.....3.14}$$

3.10. Description of the study variables

The following categorical and non-categorical variables are considered in this study. Namely:

- ✓ Road traffic accident (Y): This variable is a dichotomous fatal (serious issue) vs not- fatal (not serious issue) traffic accident by motorized or non-motorized traffic on the public high way.
- ✓ Demographic variables: - The demographic variables related to deriver experience level and, the gender of accident victims and age are considered under this category.
- ✓ Motorized traffic: - This variable is a type of vehicles which cause accident such as motorcycle, Bajaj motor and min-bus are considered under this variable.
- ✓ Non-motorized traffic:-Any non-motorized traffic on the public high way and variables like pedestrians and carts are considered under this category.
- ✓ Location:- The area where traffic accident occur and variables like multi-directional way, parking space and institutions or organizations on the road side are considered under this category.
- ✓ Stockholders commitment: - The Governmental, NGOs and other stockholders contribution on traffic accident reduction and variables like Capacitating officials and community in road safety, keeping safe driving speed and enforcing the law are considered under this category.

Dependent Variable (Y) is a dichotomous variable called road traffic accident (serious issue vs not serious issue event), which is assumed to be affected by independent variables. This includes the number of people fatality, lightly injure or heavily injure due to a traffic accident and material loss.

$\ln(P) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \ldots . \beta_k x_k$

ln[Road traffic accident **(RTA)**] = Motor cycle (**MC**) + Bajaj motor (**BMo**) + Minibuses and Taxies (**Minb**) + Pedestrians (**Pedmis**) + Carts + Age + Gender + Deriving experience (**Dexp**) + helmet + Deriving speed (**Spe**) + Multi directional way (**MDW**) +parking space**(Parksp)** + Institution or organization (**INIOR**) + road side maintenance services or Garag + Pedestrian sideway (**Padway**) + Capacitating officials and community in road safety (**Capcom**) + Enforcement or exercising the law (**Exclaw**) + e

Table 3. 1: The main categorical variables in the model and their an expected signs

no	Coefficient or symbol	The represented variable name	Expected signs	Reasons for an expected signs
1	P	Road Traffic accident		-
2	$\boldsymbol{\beta_0}$	Constant		-
3	$\boldsymbol{\beta_1}$	Motor cycle	+ve	An increment of vehicles affects traffic accident positively
4	$\boldsymbol{\beta_2}$	Bajaj motor	+ve	An increment of vehicles affects traffic accident positively
5	$\boldsymbol{\beta_3}$	Minibuses	+ve	An increment of vehicles affects traffic accident positively
6	$\boldsymbol{\beta_4}$	Pedestrians	+ve	Using a single road in mix with cars invites to collision
7	$\boldsymbol{\beta_5}$	Carts	+ve	Using a single road in mix with cars invites to collision
8	$\boldsymbol{\beta_6}$	Age	+ve	Running for different activities may give chance to accident
9	$\boldsymbol{\beta_7}$	Gender	+ve	Most of the time males are vulnerable than females. Because they are participate in different works and they go near and far distances on day to day.
10	$\boldsymbol{\beta_8}$	Driving experience	-ve	Experiences help to control the bad conditions in

no	Coefficient or symbol	The represented variable name	Expected signs	Reasons for an expected signs
11	$\boldsymbol{\beta_9}$	Helmet	-ve	Wearing helmet reduces the level of harm of accident.
12	$\boldsymbol{\beta_{10}}$	Deriving speed	+ve	Speed is one of the major agents of the accident
13	$\boldsymbol{\beta_{11}}$	Multi directional way	+ve	Multidirectional spots are vulnerable to accident because the road users from multi direction have a chance to collision.
14	$\boldsymbol{\beta_{12}}$	Institution	+ve	Populous area aggravate accident.
	$\boldsymbol{\beta_{13}}$	Parking space	-ve	Enough parking space can minimize accident
15	$\boldsymbol{\beta_{14}}$	Garaging	+ve	The road side garaging can make the road become more compact and unexpected activities in that environment is also the main source for collision.
16	$\boldsymbol{\beta_{15}}$	Pedestrian sideway	-ve	Building separate way for vehicles and pedestrians can reduces an opportunity of accident
17	$\boldsymbol{\beta_{16}}$	Capacitating officials and community in road safety	-ve	Capacitating officials and community in road safety can facilitate societies welfare
18	$\boldsymbol{\beta_{17}}$	Enforcement or exercising the law	-ve	Punishing one when violating the law has ability to teach and to make him to go in right way.
19	**e**	Error term	19	**E**

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter represents the findings on determinants of road traffic accident in Hosanna Town. The findings were based on Key informant interviews (KII) with residents, statistical report of Hadiya Zone Road Safety Core-Process, in-depth interview (with government officials from Hadiya Zone Police Department and traffic police on duty) and a focus group discussions (FGD) with representatives of Hadiya Zone Road Safety Core Process, Hosanna Town Transport Unit, Transport Vehicles Associations, and selected drivers. The findings mainly focused on identifying factors associated with road traffic accidents as well as determining why and how the accidents took place in Hosanna Town.

In identifying the determinants of road traffic accident, the findings were based on logic of four theories. The first is the systems theory which is based on man-environment relationship and its adjustments. In systems theory, the components are the behavior of man and the means of transport (vehicles). Second, an individual's risk taking decision theory which represent controlling or tackling risk factors before being a victim. The third theory focuses on stockholders' contribution which plays a very good role in determining the way in which the people view and use the resources available to them. It is strongly linked with building and putting overall road safety strategies. The shortage or lack of resources can affect the integrated activities of traffic accident controlling mechanisms and it indicates the poor national and local policy on road traffic issue. The fourth approach is based on geographical locations. With this theoretical base knowledge, several determinants were identified qualitatively with the best knowledge of informants who were well familiar with environment and victims of the traffic accidents.

4.2 Descriptive statistics

Road traffic accident in this study was a dependent and dichotomous variable fatal (serious issue) vs non-fatal (not serious issue) and this section discusses all available information of road traffic accidents.

4.2.1 Trend and type of the traffic accident

Based on Hadiya Zone Road Safety Core Process's records on road traffic accident in Hosanna Town between EFY2001-2009, 316 accidents were recorded and 950 people were victims of the accidents. Out of the 950 accident victims, the number of death, disability and injury were 268(27.15%), 313 (33%) and 379(39.9%) respectively.

Table 4.1: Trends of traffic accident in Hosanna Town (EFY 2001 - 2009)

Year	number of accident	Type of accident			material loss Birr	Remark
		Death	disability	injury		
2001	15	19	19	32	166,100	
2002	21	19	24	48	227,300	
2003	29	21	13	43	220'000	
2004	44	19	9	37	380,860	
2005	40	35	17	11	639,000	
2006	107	33	55	45	2,025,000	
2007	98	43	77	44	1,763,400	
2008	96	62	46	44	871,000	
2009	17	17	53	75	826,500	The first six month report
Total	316	268	313	379	7,119,160	

Source: Hadiya Zone Transport and Road Development Sector (2017)

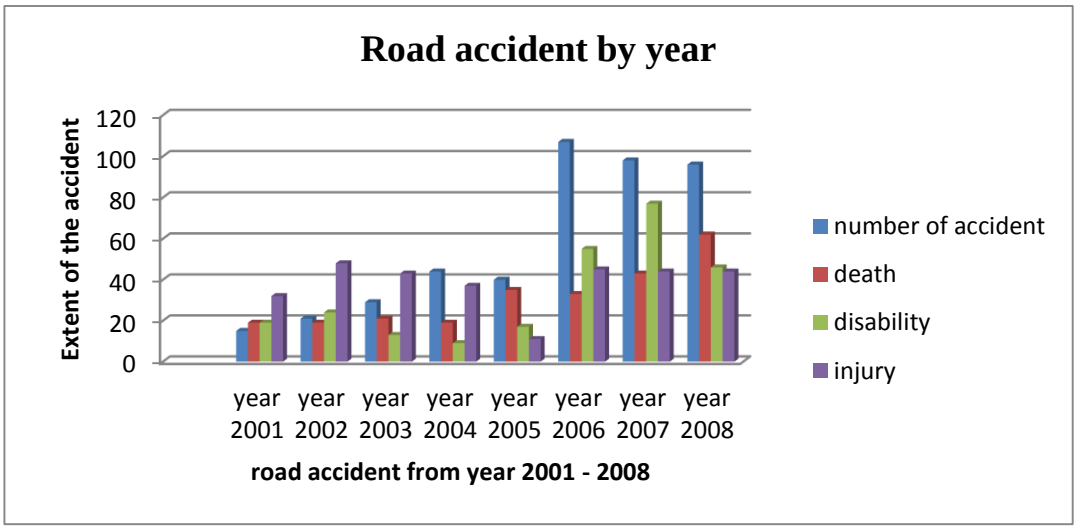

Figure-4.1: Road traffic accident between EFY 2001 and 2009

The Bar Chart above (Figure 4.1) and Table 4.1 together display the trend and extent of traffic accident in Hosanna Town from EFY2001 –2008 including death, disability and injury, as well as material loss over those years (taking note that that figures of EFY 2009 was only a half-year report).The figures also tell us that death, disability, injury and material loss were increasing over the years. Evidences collected from in-depth interview respondents was also strongly agree with the facts described above.

Table 4.2: Seriousness or fatality rate of road traffic accident (as per the responses of the research subjects)

Type of variable	yes		No	
	Frequency	percent	Frequency	Percent
Road traffic accident an issue	263	88.3	35	11.7
Motor cycle	260	87.2	38	12.8
Bajaj	186	62.6	112	37.4
Minibus	73	24.5	225	75.5
Pedestrians	211	70.8	87	29.2
Carts	241	80.9	57	19.1
Gender	239	80.2	59	19.8
Age <19	89	29.9	-	-
>19 and <48	174	58.4	-	-
>48	34	11.4	-	-
Deriving experience	237	79.5	61	20.5
Helmet	243	81.5	55	18.5
Deriving speed	118	39.4	180	60.4
Multidirectional way	145	48.7	143	53.3
Parking space	244	81.9	54	18.1

Type of variable	yes		No	
	Frequency	percent	Frequency	Percent
Organization	152	51	146	49
Pedestrian side way	260	87.2	38	12.8
Garaging location	237	79.5	61	20.5
Capacitating the community	227	76.2	71	23.8
Exercising law	241	80.9	57	19.1

WHO Global Status Report (2009) on road safety shows reason for number of deaths is clearly related to both population and motorization level. In the same way, findings seen above agree with WHO's report. Results of Focus Group Discussion strongly stressed that there was a remarkable increase of road traffic accident in Hosanna Town mainly due to increased migration of people from rural to urban, inappropriate drivers' behavior such as over speeding, lack of law enforcement, poor traffic management(like vehicles, carts, pedestrians share the same road or one way), unsafe road environment(lack of pedestrians side way, lack of parking space, running small businesses on the road sides, deep drainage/sewerage lines that were left open on the road sides, and high traffic volume on the high way), alarmingly increase of vehicles without significant enhancement of the road facilities (especially motorcycles and Bajajs) and poor &inconsistent road design.

The Hadiya Zone Road Safety Core Process stressed that the marginal rate of traffic accidents were increasing from year to year and in there were many other accidents which were not reported. One of the challenges that underestimate the actual number of accidents and victims has been the norm of handling such issues by community elders without being officially registered by police or other legal entity. Unfortunately, majority of such cases that were resolved by community elders were not recorded or reported as accident. Another challenge regarding this was the trend of rushing and hiding selves after accident—particularly motorcyclists. That has a lot to do with ignorance and fear of the remedial measures that can be taken by justice bodies. These are the typical instances showing the magnitude of the accidents were not well documented.

4.2.2 Socio-economic cost of road traffic accident

Road traffic accident cost analysis involves two steps. First, quantifying physical impacts, such as the number of accidents that occurred, the number and severity of vehicle damages, human injuries, disabilities and deaths. Second, measure in monetary values these impacts or monetize these impact

Table 4.3 Estimated materials loss

year	2001	2002	2003	2004	2005	2006	2007	2008	2009 (Half year)
Material loss (ETB)	166,100	227,300	220'000	380,860	639,000	2,025,000	1,763,400	871,000	826,500
Total 7,119,160ETB									

Source: Hadiya Zone, Transport and Road Development Sector (2017)

The table above (Table 4.3) shows that only the estimated materials loss for EFY2001 through the first half of 2009 but related suffering of victims and their families of road traffic–related injuries (psychological trauma, financial expenses, time, loss of job, etc.) is incalculable. There are endless repercussions: families break up; no income for a family if a breadwinner is lost; and thousands of Birr to care for injured and paralyzed people. These are the socio-economic impact of road traffic accident at micro level.

The Ethiopia Third Party Insurance Proclamation Articles 16 and 27(1), Proclamation No. 799/2013indicate that insurance cover should be obtained for death, bodily injury, damages to property and Emergency Medical Treatment (EMT). As a result, cover be obtained for death (ETB5000 to 40,000), for a bodily injury/ person up to ETB40, 000, for EMT ETB2, 000 and for property damage up to ETB100, 000 (Mekelle, 2014).Therefore the accident cost for data in Table 4.1 above can be calculated as following: for death10, 720,000ETB, disability-12,520,000ETB and injury 758,000ETBthe total cost including the material loss is 31,117,160ETB.

Also some of the costs of road traffic accident (such as lost output, and administrative cost) can be directly measured in terms of money while others (such as pain, grief, and suffering due to the accident) can't be directly valued due to their nature. At individual and/or family level, road traffic accident affects social, economic, and psychological aspects of victims and their families. The effect could be time spent in taking care of the victim, medical expenditure, property damage, funeral expenses and a loss of an active household member as well as incalculable costs related to pain, grief, and suffering. All of these costs of road traffic accidents drive many families into deeper poverty because of the loss of main source of income (income earner), or high costs of extended medical care, or the additional burden of caring for a family member who is disabled due to a road traffic injury.

The finding of WHO, (2004) was consistent with this research findings, and support that the above information and it says "active people in age between 15–44 years old account for more than half of all road traffic deaths, and 73% of the people fatal are male. People of that age are in their most productive earning years"-, so their families suffer financially when they are killed or disabled." In addition, WHO noted that the impact of RTA on poor people is greater than the rich and they represent the higher risk group such as passengers, pedestrians and motorcyclists. Therefore, RTA affects strongly both household income and GDP of the country.

4.2.3 Accident by gender and age groups

The variables Age and Gender are significant at the 5% level of significance. Table 4.3 below shows the distribution of injured and killed by sex and age from year 2001 to 2008 in Hosanna Town. The age and sex distribution of victims have the same pattern for injury and death. The constitution of Ethiopia indicates that the age less than 18 is a child, minimum age for an Ethiopia to apply for a vacancy and be employed in formal sectors is the age of 18 and other scripts show an average life expectancy of low income or developing countries is around 47years. Depending on these evidences the researcher categorized age in three groups. First age less than 18, second age greater than 19 and less than 48, and third age greater than 48. For these three age groups, Qualitative data indicates more males, 552(68%) were injured compared to females 263(32%). In the age group (according table 4.4), age greater than 19 and less than 48 years was 645(79%) affected by injuries for both sexes. Similarly, between EFY2001 and 2008 data showed that the highest number

of those who died was male aged above 19 and less than 48 years. The general observation was that males were more involved in road accidents because they travel more in their daily duties compared with females who usually stay at home doing domestic duties. Similarly WHO (2009), Global status report on road safety shows Ethiopia is one of the 10 countries with the highest number of deaths. This report shows taht road traffic fatalities in (-2006-) to be, 2517 (78% males, 22% females.

Table 4.4The trend of accident by gender and age

	Gender		Age		
year	male	female	Female and male <19	Female and male >19&<48	Female and male >48
year 2001	51	19	28	19	23
year 2002	74	17	52	39	0
year 2003	47	30	13	60	6
year 2004	53	12	9	54	2
year 2005	45	18	17	40	6
year 2006	82	51	37	87	9
year 2007	98	66	25	125	14
year 2008	102	50	31	221	0

Source: Hadiya Zone Transport and Road Development Sector (2017)

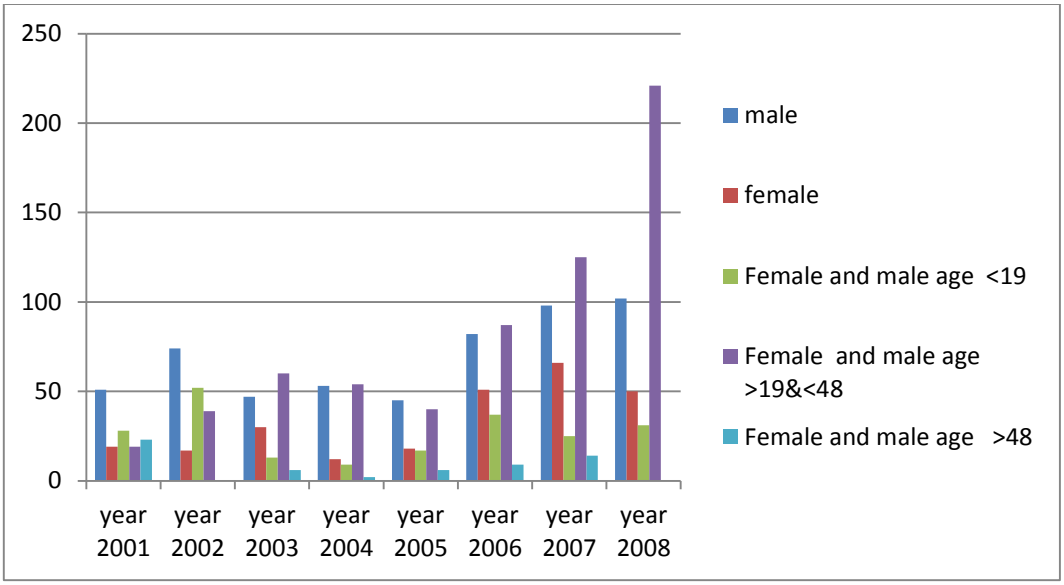

Figure 4.2: Bar chart showing the trend of accident by gender and age

It is evident that that labor force is one of the essential input in production of output and growth of an economy. The study on the other hand disclosed that645 (67.9 percent) of economically active and very productive groups (with their ages between 19 and 49) are the main victims of RTAs. Losing active and productive human capital because of traffic accident not only affects an individual or a family but also the socio-economic burden will be left on the community and the country at large. A hospital based study in India also indicated that the majority of the victims were in the age group of 15-50 years. The conclusion from the Indian hospital-based study was similar: RTAs highly affect the most active and productive part of the population which leads the country to incur loss in its economy(Singh A, Bhardwai A, Pathak R, Ahluwalia SK., *(*2011)).

4.3 Motorized traffic

The researcher could not find vehicle type data in Hadiya Zone Transport and Road Development Sector as data on vehicle type was not recorded in an organized ways after EFY2004 because of some mandate complexity between transport sector and police commission. So, the researcher was forced to depend on qualitative data that came through focus group discussion (FGD) and key informant interview (KII).

According to the findings of the FGD and KII, the cumulative number of vehicles in the town is more than five thousands and includes motorcycle, Bajaj, automobile, minibus, D4D, buses, Isuzu, Sino Track and others. The highest number of vehicles

are motorcycle group followed by Bajaj. From these vehicle groups majorities of motorcyclist sand Bajaj motorists were reported to frequently violate the traffic law in their day- to- day duties. Motorcyclists drive more than two passengers at a time with high speed and neither motorist nor passengers wear helmets. Also they often transport unbalanced freights like chat in the town from one place to another. Some of these motorcycles were without plate code and the drivers were without driving licenses. Moreover, most of them lack driving experience.

Most of the issues raised about Motor Cyclists work also for Bajaj drivers—and the level of accident by them is comparable. Vehicles like Isuzu, Sino track minibus and D4D also significantly contribute to the traffic accident compared with the remaining vehicle groups in Hosanna Town.

In this study, all of the three vehicle groups were significantly related to traffic accident. Motorcycle and Bajaj motor were positively associated with the accident in Hosanna town and significant at level of 1% significance. This positive relationship indicates that the odds ratio in favor of RTA as these vehicles number increases. If all other things are held constant, the odds ratio of 1064.4 and 72.8 for motorcycle and Bajaj motor implies that the accident was increase by a factor 1064.4 and 72.8 respectively. The consistent study by (Atubi and Onokala, 2009) suggests Motor vehicle crashes are the leading cause of traffic related deaths in adolescents and young adults.

But Minibus-Taxies transport service related with accident negatively and significant at 1% level. Thus, increasing the number of a minibuses (at the expense of motorcycles and Bajaj)can decrease an accident significantly by 1 percent. This result contradicts the finding of Tewolde Mekonnin, (2007) “in Addis Ababa, taxies responsible for 26 percent of injuries”. This indicates that the minibus-taxies are relatively more adoptable in Hosanna town than motorcycles and Bajaj motor.

Figure 4.3: Illegal (Commercial service providers) motor cyclists in Hosanna town (2017)

4.4 Non-motorized traffic

This group include pedestrians' mistake and carts for this study. The secondary source data or out of the total accident victims recorded data 216(22.7) percent victims were pedestrians. Also pedestrians' mistake and carts were significant at 5% and 10% level significance and their odds ratio are 25.3 and 9.5 respectively. As emphasized during the focus group discussions (FGD) the trip of non-motorized traffic was ambiguous. Given a remarkable increase of migration of people from rural to urban, using a single road in common for pedestrians, bicyclists, carts and animals has not been comfortable to all road users. In such condition trying to control traffic accident was also very difficult.

4.5 Location

The area where traffic accident occurred and variables like multi directional way, parking space and institutions or organizations on the road side were considered under this category. The known and the marked accidental traffic corridors/ locations mentioned by focus group are Naramo Condominium Site, Boicho Taxies Station, Gomboro Hotel Area, Jerusalem Bar Area, Mobile Fuel Gas Station, Orthodox - Church Area, Electric Power Station (Hossana Branch), Synod's Church location, Wachamo University Area, and Batena and Shelansha Rivers Side were reported to be the most accidental locations. The highways from Addis Ababa via Butajera to Hosanna and from Wolkete to Hosanna both cross these locations and that made the area even more vulnerable to frequent traffic accidents. Moreover, those locations also have their own problem(s). For example:

- Boicho Taxystation didn't have enough parking space but the location was crowded by motorized and non-motorized traffic.
- Gomboro Hotel area hosted five governmental organizations (Transport and Road Development Sector, Trade and Small Enterprises Department, Health Department, Commercial Bank of Ethiopia and Small and Medium Public Transport Services Association) and these institutions were providing services for their customers in uncomfortable condition.
- Orthodox - Church Area was a multidirectional location and taxies station. There was also an International Hotel (Shambalala) in opposite side of the Church.
- Except Boicho Taxies Station, Gomboro Hotel Area and Jerusalem Bar Area, the remaining sites left road side drainages open.

As mentioned by both informants and focus group members the major focus of traffic polices in their day-to-day activities was managing motorized traffic and non-motorized traffics in multi-directional locations—but infrastructural limitations mentioned above limit them to do their jobs effectively. The analysis result of this study also indicated negative relationship in between accident and multi directional locations which was a bit unexpected. However, the researcher understands that this may have something to do with the practical fact that traffic polices give much attentions to such sites that the others. The garaging location with highest mean (0.79) followed by institutions and multi-directional way with mean 0.50 and 0.48 respectively.

4.6 Stockholders contribution

In this category predictor variables; helmet use, pedestrians sideway, driving speed and exercising law are significant at 5% significance level and their marginal effects were 8.5%, 1.4%, 1% and 0.3% respectively.

The researcer finding consistante with Oginni F.(2008) and suggests that "uneducated and unlicensed drivers and riders, reckless driving, carelessness, drunkenness, lack of knowledge on road safety rules, driver's age, fatigue, low practicing government policies, failure in law enforcement and unsafe road system are the leading cause of death globally".

So, what can stockholders do? The following response was derived from key informants discussion and respondents about the contribution of stockholders in minimizing road traffic accidents. The FDG members believed that coordinating the stockholders has a great impact in reducing the level of accidents in the town and can improve the transport system. Key stockholders like traffic policies, transport sector leaders and officials, public transport cars unions, insurance organizations, drivers teaching and training institutions, operators and others concerned governmental and non-governmental organizations as well as all road users should be mobilized so that they coordinate to mitigate the RTAs. They also admitted that the efforts made so far in this regard was not satisfactory. The study participants stressed that stakeholders should strive to enhance the road design, deploy more traffic polices, to fight against exaggeratedly high corruption in the sector and to enhance the level of awareness of the community.

In case of Helmet use, as per the respondents' explanation and witnesses, most of the motorcyclists would like to wear helmets but the problem was that there was no available market to purchase them. So, for further solution implementing three basic things would solve this problem. First, facilitating the way of the supplying helmet. Second, implement the existing rules motorcyclists to use helmet. Third, providing comprehensive education focus on behavioral change of the drivers and techniques of safe deriving. Consistent study showed legislation has not been enough on its own as failure to use helmets, use of nonstandard helmets and use of improperly secured helmets is common in many places, especially in low- income countries and calls on efforts to supplement these efforts with complementary prevention and educational strategies (Ameratunga, Hijar, & Norton, 2006).

4.7 Multicollinearity Test

The researcher run multicollinearity test to checked for existence of sever problem and then predict logistic regression model to estimate the explanatory variables. Had no serious problem of multicollinearity (refer annex-5). Therefore, all the explanatory variables were included in the model. Moreover, hetroscedasticity test was done using Breusch-Pagan / Cook-Weisberg test for hetroscedasticity and the P-value was 0.00 which is strongly significant implying the presence of the problem of hetroscedasticity (see annex 7). Thus, the researcher remove hetroscedasticity and correct the model by robust logistic regression (refer annex 7).

4.8 Result: Logistic Regression

This is the most important model for dummy and categorical response data as mentioned in chapter three. In this sub section Logistic analysis considered an explanatory variables found significantly associated with the dependent variable as per the p-values.

Table 4.6 Logistic analysis for road traffic accident

RTA	Coef.	Robust Std.Err.	Z	P>/z/	[95% Conf.	Interval]
Moc	6.97	1.84	3.79	0.000	3.37	10.57
Bmo	4.29	1.27	3.38	0.001	1.80	6.77
Minib	-2.24	1.11	- 2.01	0.044	-4.41	-0.06
Pedmis	3.23	1.06	3.04	0.002	1.15	5.31
Carts	2.26	1.32	1.71	0.087	-0.33	4.84
Age	1.22	0.49	2.46	0.014	0.25	-2.71
Gender	1.79	0.81	2.22	0.027	0.2	3.4
Derexp	2.42	0.86	2.81	0.005	0.73	4.11
Helmet	-4.64	1.15	-4.02	0.000	-6.9	-2.4
Derspe	4.28	1.43	3.00	0.003	1.5	7.07
MDW	-5.29	1.45	-3.66	0.000	-8.13	-2.53
Parksp	0.23	0.81	0.28	0.781	-1.37	1.82
Pedsway	-2.27	1.09	-2.09	0.037	-4.4	-0.14
INIOR	2.38	0.79	3.03	0.002	0.84	3.92
Garag	0.92	0.78	1.18	0.239	-0.61	2.46
Capcom	0.58	0.97	0.60	0.545	-1.30	2.47
Exclaw	2.12	0.92	2.31	0.021	0.31	3.93
Cons	-12.29	3.2	-3.84	0.000	-18.56	-6.02

4.9 The Logit Model

From the analysis, the Logit model with variable is

Logit (RTA) = - 12.29 + 6.97**Moc** + 4.29**Bom** – 2.24**Minib** + 3.23**Pedmis** + 2.26**Cart** + 1.22**Age** + 1.79**Gender** + 2.42**Derexp** – 4.64**Helmet** + 4.28**derspe** – 5.29**MDW** + 0.23**Parks + 2.38INIOR** + 0.92 **Garage** – 2.27**Pedway** + 0.58**Capcom** + 2.12**Exclaw**

It was however observed that park space, garaging and capacitating the community are not statistically significant to the study.

4.10 Result Interpretation

The interpretation of our fitted model requires the practical inferences from the estimated coefficients. Thus, by comparing the difference in impact among the each variable is possible by looking at the regression coefficients. To this end Stata11 was used and it has two commands for logistic regression, Logit and Logistic. The main difference between the two is that the former displays the coefficients and the latter displays the odds ratios.

The critical relationship between the coefficients and the odds ratios are work like, if Log (a) = b then exp (b) = a. In short to transform the coefficient into an odds ratio, we take the exponential of the coefficient. The constant is the predicted log odds when all of the variables in the model are held equal to 0. The interpretation of the estimated parameter coefficients is that, for a one unit change in the predicted variable, the difference in log-odds for a positive outcome is expected to change by the respective coefficient, given the other variables in the model are held constant. Accordingly, those predictors with positive coefficients cause an increasing opportunity to result into fatalities. Likewise, negative coefficients indicate decreasing tendency for those significant predictors. Therefore:

The coefficient for Motorcycle is 6.97, meaning that we expect an increase of 6.97 in the Log odds of road traffic accident with every one unit increase of Motorcyclists.

The coefficient for Bajaj Motor is 4.29, meaning that we expect an increase of 4.29 in the Log odds of road traffic accident with every one-unit increase in Bajaj Motor derivers.

The coefficient for Minibus/taxies is -2.24, meaning that we expect a decrease of 2.24 in the Log odds of road traffic accident with every one unit increase in Minibus/taxies derivers (relatively an accident by minibus/ taxi in case of Hosanna town is very low, and it indicates' that in current situation minibus/taxis is/are more adaptable than other vehicles type for Hosanna town).

The coefficient for pedestrians mistake is 3.23, meaning that we expect an increase of 3.23 in the Log odds of road traffic accident with every one unit increase pedestrians mistake.

The coefficient for age is 1.22, meaning that we expect an increase of 1.22 in the Log odds of road traffic accident with every one unit increase cart.

The coefficient for gender is 1.79, meaning that we expect an increase of 1.79 in the Log odds of road traffic accident with every one unit increase of male.

The coefficient for deriving experience is 2.42, meaning that we expect an increase of 2.42 in the Log odds of road traffic accident with every one-year increase lack of experience in deriving.

The coefficient for helmet is -4.64, meaning that we expect a decrease of 4.64 in the Log odds of road traffic accident with every one unit increase

of users of helmet.

The coefficient for derivers speed is 4.28, meaning that we expect a increase of 4.28 in the Log odds of road traffic accident with every one unit increase of speedy derivers.

The coefficient for multi directional way is -5.29, meaning that we expect a decrease of 5.29 in the Log odds of road traffic accident with every one-percent increase multi directional way. Many studies findings shows the multi directional location increase an accidents, but surprisingly in case of Hosanna town increasing the number of multi directional location decreases the cause of accident. Why? Or how? This may have something to do with the practical fact that traffic polices in the town usually give much attentions to such sites that the others.

The coefficient for Organization is 2.38, meaning that we expect a increase of 2.38 in the Log odds of road traffic accident with every one unit increase institute/ organization in the road side.

The coefficient for pedestrians side way is – 2.27, meaning that we expect a decrease of 2.27 in the Log odds of road traffic accident with every one unit increase of pedestrians side way.

The coefficient for Exercising law is 2.12, meaning that we expect a increase of 2.12 in the Log odds of road traffic accident with every one unit increase in poor exercising law.

4.11 Goodness of fit

Stat's output of Logistic regression contains the log likelihood Chi-square and pseudo R-square for the model. The Log likelihood Chi-square is an omnibus test to see if the model as a whole is statistically significant. It is 2 times the difference between the Log likelihood of the current model and the Log likelihood of the intercept-only model. Since, the Log likelihood at Iteration 0 for Logit-regression to the Log likelihood of the empty model is 107.695 and. Log likelihood of the current model is 43.176146. (See appendix 1)

The Log likelihood Chi-square = 2[107.695 - 43.176146]

= 129

A) NagelKerKerPseudo-R2

A pseudo R-square is the proportion of change in terms of likelihood.

Pseudo R-square = 2[107.695 - 43.176146]/ 107.695

= 0.5991

It is a "pseudo" R-square because it is unlike the R-square found in OLS regression, where R-square measures the proportion of variance explained by the model. The pseudo R-square is not measured in terms of variance, since in logistic regression the variance is fixed as the variance of the standard logistic distribution. However, it is still a proportion in terms of the log likelihood. Because of the problem that it (what??) will never be 1

B) Odd ratio test

The odds ratio is a ratio of two odds and nonnegative values. Odds ratio can be used to give us clue of how strongly a given variable may be related with the outcome of interest compared other variables.

When the odds are greater than one the probability of success is greater than that of failure; when the odds less than one, the probability of success is less than that of failure; and probability of success and failure are equally likely; and when the odds are than one. This is already done in logistic regression "odd ratio" column. (See annex 2)

C) Wald statistic test (W)

The Wald statistic, analogous to the *t*-test in linear regression, is used to assess the significance of individual predictors of coefficients. The Wald statistic is the ratio of the regression coefficient to the standard error of the coefficient and is asymptotically distributed as a chi-square distribution. Wald test values (called z). An odds ratio of 1 means that there is no effect of **x** on **y or** there is no effect of dependent variable on independent variable. Looking at the z test statistic, if the confidence interval of the coefficient includes 0(zero), and it is not statistically significant. Note that when there is no effect, the confidence interval of the odds ratio will include 1.

The statistic is computed by dividing the estimated value of the parameter by its standard error as:

$W = \frac{\beta 1}{SE(\beta 1)}$ = the value of "Z" for logistic regression (refer annex 1 and 2), and the marginal effects for each variables (refer annex 3)

CHAPTER FIVE

CONCULUSIONS AND RECOMMENDATIONS

5.1 Conclusion

This research examined the road traffic accident in Hadiya Zone,Hosanna Town. This research employed both quantitative and qualitative analysis to come up with results and conclusions. This study applied Logistic Regression Technique to investigate the determinants of road traffic accidents (RTAs)in Hosanna Town using quantitative data. Seventeen predictor variables were employed in the model development to predict factors behind severe RTAs. Explanatory variables—Motor cycle, Bajaj motor, Minibuses, Pedestrians, Carts, Age, Gender, Driving experience, Helmet, Driving Speed, Multi directional Way, Institution or Organization, Road Side Maintenance Services or Garaging, Pedestrian Sideway, Capacity officials and Community in road safety, Enforcement or Exercising the Law—were examined in the model. All variables in the model except Garaging, Parking Space**,** and Capacity of Community were significantly associated with RTAs. Qualitative techniques including key informant interviews and focus group discussions were applied to further enrich and complement the quantitative data.

The analysis results in this study clearly also showed that the road traffic accident was increasing in the town. The study has revealed that young males aged between 19 and 48 years that are economically active—are highly vulnerable to road traffic accidents. The road users who were always at risk of dying on the road were found to be passengers and pedestrians. The trend of accident occurrence was almost increasing almost every year in a period between 2008 and 2016G.C (or between EFY 2001 and 2009) for which data were compared. Similarly, the property damage and other accident costs (death, disability and injury) estimate in Hosanna town, which were 166,100ETB and 1,584,000ETB respectively in 2008G.C were escalated to 852,500ETB and 2,950,000ETB respectively in the year 2016G.C.Unless tangible actions are in place and coordinated efforts are effected, the current trend showed that the traffic accident in the town would end up with persistent morbidity, mortality, economic and social consequences.

5.2. Recommendations

Based on the findings of the study, the researcher forwards the following key recommendations for responsible bodies.

A mechanism should be in place to document and report all road traffic accidents irrespective of whom (the justice body or the community elders) handle the legal or traditional resolution processes with the victims or their families. Failure to do so means failure to clearly show the problem that again highly underestimates the efforts towards mitigating the problem.

The road accident is significantly associated with pedestrians' behaviors on traffic roads. As such government needs to come up with meaningful measures to enhance the knowledge and practice of pedestrians. There have been regulation that included penalizing pedestrians of their improper use of traffic roads but the return on investment was un expectedly low. Therefore, on top of the awareness creation efforts, it will be wise to include hands-on road traffic safely basics in education curriculum so that the new generation would grow with the right attitude regarding traffic safety precautions.

It was observed from the findings that motorcyclists would like to wear safety cloths (mainly helmets) but such apparatuses were not available at nearby markets. Concerning bodies should be creative enough and work with stockholders (mainly motorcycle importers or delegated sellers) to avail such safety clothes to motorcyclists. One of such mechanisms in this regard can be urging the motorbike vendors (distributors) to sell their bikes only along with safety wears. Given increasing number of motorbikes in the town, this sounds necessary.

The research findings have clearly shown that the minibus-taxies are relatively more adoptable to Hosanna Town context than motorcycles and Bajaj taxies. That is acceptable given the topography of the town (which is full of hills and mountainous looking). So concerned bodies should work on availing more minibus-taxies or public buses of that kind for the public and limiting the number of motorbikes and Bajaj for the sake of safety of the residents. This of course requires a long term plan and step by step action over years.

In the long term, the Hosanna Town needs standard pedestrians sideway, alternative ways to animal carts as well as strong policy that enforces building with sufficient parking areas. The town administration should take the assignment of enhancing each features as the town is growing fast.

Both Hadiya Zone's Transport department and Hosanna town administration should implement computerized data management system on key road traffic accident indicators for easy access and reference as well as action researches in the area.

This is an academic exercise. The researcher encourages further comprehensive studies in the topic to further understand the magnitude and impact of road traffic accidents in Hosanna Town.

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ANNEXES

Annex 1: Logit regression/ Coefficients' of the variables

```
Iteration 0:   log pseudolikelihood =   -107.695
Iteration 1:   log pseudolikelihood = -67.740843
Iteration 2:   log pseudolikelihood = -49.560263
Iteration 3:   log pseudolikelihood = -43.815151
Iteration 4:   log pseudolikelihood = -43.189572
Iteration 5:   log pseudolikelihood =  -43.17617
Iteration 6:   log pseudolikelihood = -43.176146
Iteration 7:   log pseudolikelihood = -43.176146

Logistic regression                               Number of obs     =        297
                                                  Wald chi2(17)     =      78.81
                                                  Prob > chi2       =     0.0000
Log pseudolikelihood = -43.176146                 Pseudo R2         =     0.5991
```

rta	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
moc	6.970179	1.836752	3.79	0.000	3.370211	10.57015
bmo	4.287894	1.268591	3.38	0.001	1.801502	6.774286
minib	-2.2365	1.110605	-2.01	0.044	-4.413246	-.0597553
pedmis	3.233102	1.062482	3.04	0.002	1.150676	5.315528
carts	2.257955	1.320399	1.71	0.087	-.3299803	4.845891
age	1.223579	.4967989	2.46	0.014	.2498708	2.197287
gender	1.794663	.8091335	2.22	0.027	.2087904	3.380536
derexp	2.42454	.8634631	2.81	0.005	.7321832	4.116896
helmet	-4.635255	1.154434	-4.02	0.000	-6.897904	-2.372605
derspe	4.27706	1.426882	3.00	0.003	1.480422	7.073698
mdw	-5.294298	1.447952	-3.66	0.000	-8.132232	-2.456365
parksp	.2264944	.8148829	0.28	0.781	-1.370647	1.823636
pedsway	-2.272081	1.088108	-2.09	0.037	-4.404734	-.1394274
inior	2.383029	.7862388	3.03	0.002	.8420291	3.924029
garaging	.9246696	.7846225	1.18	0.239	-.6131623	2.462502
capcom	.5839157	.9657732	0.60	0.545	-1.308965	2.476796
exclaw	2.124464	.9214786	2.31	0.021	.3183991	3.930529
_cons	-12.29274	3.200598	-3.84	0.000	-18.56579	-6.019679

Anne2: Logistic regression/ Odds ratio

Logistic regression — Number of obs = 297; Wald chi2(17) = 78.81; Prob > chi2 = 0.0000; Log pseudolikelihood = -43.176146; Pseudo R2 = 0.5991

rta	Odds Ratio	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
moc	1064.413	1955.063	3.79	0.000	29.08466	38954.4
bmo	72.81296	92.36984	3.38	0.001	6.05874	875.0544
minib	.1068317	.1186478	-2.01	0.044	.0121158	.941995
pedmis	25.35819	26.94262	3.04	0.002	3.160327	203.4719
carts	9.563513	12.62766	1.71	0.087	.7189379	127.2165
age	3.399332	1.688784	2.46	0.014	1.283859	9.00056
gender	6.017447	4.868918	2.22	0.027	1.232187	29.38651
derexp	11.29703	9.754568	2.81	0.005	2.079616	61.36848
helmet	.0097036	.0112022	-4.02	0.000	.0010099	.0932375
derspe	72.02838	102.776	3.00	0.003	4.394799	1180.506
mdw	.0050201	.0072689	-3.66	0.000	.0002939	.085746
parksp	1.254196	1.022023	0.28	0.781	.2539427	6.194338
pedsway	.1030974	.1121812	-2.09	0.037	.0122194	.8698562
inior	10.83768	8.521004	3.03	0.002	2.321072	50.6039
garaging	2.521035	1.978061	1.18	0.239	.5416353	11.73413
capcom	1.793046	1.731676	0.60	0.545	.2700995	11.90307
exclaw	8.368411	7.711312	2.31	0.021	1.374925	50.93391
_cons	4.58e-06	.0000147	-3.84	0.000	8.65e-09	.0024304

Note: 0 failures and 2 successes completely determined.

Annex 3: Marginal effects of the variables/ Hypothetical values

Marginal effects after logit
y = Pr(rta) (predict)
= **.99783997**

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
moc*	.4906853	.2197	2.23	0.026	.060083	.921287	.875421
bmo*	.0303294	.02398	1.26	0.206	-.016663	.077322	.626263
minib*	-.0103111	.00932	-1.11	0.268	-.028573	.007951	.245791
pedmis*	.020223	.01774	1.14	0.254	-.014537	.054983	.710438
carts*	.0118427	.01432	0.83	0.408	-.016227	.039913	.808081
age	.0026373	.00278	0.95	0.342	-.002803	.008078	1.81481
gender*	.007524	.00853	0.88	0.378	-.009203	.024251	.801347
derexp*	.0133311	.01243	1.07	0.283	-.011031	.037693	.794613
helmet*	-.0854681	.06563	-1.30	0.193	-.214109	.043173	.185185
derspe*	.0113752	.00946	1.20	0.229	-.00717	.02992	.393939
mdw*	-.0313316	.0187	-1.68	0.094	-.067988	.005325	.488215
parksp*	.0004553	.00157	0.29	0.772	-.002629	.00354	.181818
pedsway*	-.0138413	.01568	-0.88	0.378	-.044583	.0169	.127946
inior*	.0065478	.00649	1.01	0.313	-.006171	.019266	.508418
garaging*	.002706	.00404	0.67	0.503	-.005211	.010623	.794613
capcom*	.0010944	.00163	0.67	0.502	-.002098	.004287	.23569
exclaw*	.0028551	.00309	0.92	0.356	-.00321	.00892	.191919

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Annex 4: summaries of the model

Estimation sample **logistic** Number of obs = **297**

Variable	Mean	Std. Dev.	Min	Max
rta	.8821549	.3229688	0	1
moc	.8754209	.3307984	0	1
bmo	.6262626	.4846117	0	1
minib	.2457912	.431282	0	1
pedmis	.7104377	.4543247	0	1
carts	.8080808	.3944745	0	1
age	1.814815	.6173582	1	3
gender	.8013468	.3996597	0	1
derexp	.7946128	.4046661	0	1
helmet	.1851852	.3891033	0	1
derspe	.3939394	.4894464	0	1
mdw	.4882155	.5007048	0	1
parksp	.1818182	.3863456	0	1
pedsway	.1279461	.3345936	0	1
inior	.5084175	.5007729	0	1
garaging	.7946128	.4046661	0	1
capcom	.2356902	.4251458	0	1
exclaw	.1919192	.3944745	0	1

Annex 5: Correlation matrix of coefficients of logistic model

e(V)	rta moc	bmo	minib	pedmis	carts	age	gender	derexp	helmet	derspe	mdw
rta											
moc	1.0000										
bmo	0.6833	1.0000									
minib	-0.3999	-0.5753	1.0000								
pedmis	0.4329	0.3763	-0.5095	1.0000							
carts	0.2483	-0.0247	-0.1443	0.4053	1.0000						
age	0.4367	0.2859	-0.0590	0.0811	-0.1237	1.0000					
gender	0.1665	0.2739	-0.1996	0.1154	0.0007	0.1036	1.0000				
derexp	0.5280	0.1663	-0.3374	0.1853	0.3278	0.2755	0.1021	1.0000			
helmet	-0.7210	-0.6579	0.5306	-0.4923	-0.1235	-0.2740	-0.1318	-0.4031	1.0000		
derspe	0.5645	0.3627	-0.4176	0.6598	0.5390	0.2036	0.0435	0.4512	-0.4262	1.0000	
mdw	-0.7314	-0.5370	0.5165	-0.5954	-0.3441	-0.2873	-0.4383	-0.4872	0.6797	-0.6737	1.0000
parksp	0.0962	0.0682	-0.0411	0.1574	0.0523	-0.0238	-0.1811	0.0394	-0.0225	0.1801	-0.0146
pedsway	-0.4739	-0.1185	0.2068	-0.2647	-0.2320	-0.3143	0.0626	-0.3249	0.3216	-0.3331	0.4100
inior	0.3555	0.1198	-0.1579	0.2933	0.2091	0.2220	0.2144	0.4236	-0.1502	0.5041	-0.4123
garaging	0.1328	0.2739	-0.1845	0.0894	-0.0040	0.0687	0.5119	-0.0246	0.0244	0.0009	-0.2485
capcom	0.2786	0.2817	-0.1934	0.2317	0.5010	0.1671	0.1011	0.3687	-0.2771	0.3331	-0.2875
exclaw	0.2845	0.0946	-0.1991	0.2937	0.2086	0.2865	-0.0153	0.3643	-0.2222	0.1952	-0.2090
_cons	-0.7866	-0.5539	0.3244	-0.4838	-0.4213	-0.6249	-0.3409	-0.5737	0.4621	-0.6220	0.6341

e(V)	rta parksp	pedsway	inior	garaging	capcom	exclaw	_cons
rta							
parksp	1.0000						
pedsway	-0.3819	1.0000					
inior	0.0889	-0.2489	1.0000				
garaging	-0.1059	0.1222	0.0472	1.0000			
capcom	-0.0877	0.0737	0.2399	0.1299	1.0000		
exclaw	0.2602	-0.3602	0.1515	-0.0704	0.0200	1.0000	
_cons	-0.0903	0.3341	-0.4950	-0.3581	-0.5073	-0.3814	1.0000

Annexes 6: Goodness of Model fit

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	129.272	17	.000
	Block	129.272	17	.000
	Model	129.272	17	.000

1

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	86.368[a]	.352	.683

a. Estimation terminated at iteration number 9 because parameter estimates changed by less than .001.

Classification Table[a]

			Predicted		
			RTA		
	Observed		non fatal	fatal	Percentage Correct
Step 1	RTA	non fatal	20	15	57.1
		fatal	3	260	98.9
	Overall Percentage				94.0

a. The cut value is .500

```
. estat gof
```

2

```
Logistic model for rta, goodness-of-fit test

       number of observations =       297
 number of covariate patterns =       164
            Pearson chi2(146) =    113.83
                  Prob > chi2 =    0.9774

. estat gof, group(10)

Logistic model for rta, goodness-of-fit test

  (Table collapsed on quantiles of estimated probabilities)

       number of observations =       297
             number of groups =        10
     Hosmer-Lemeshow chi2(8) =      7.06
                  Prob > chi2 =    0.5300
```

3

Logistic model for rta

Classified	True D	True ~D	Total
+	259	15	274
-	3	20	23
Total	262	35	297

Classified + if predicted Pr(D) >= .5
True D defined as rta != 0

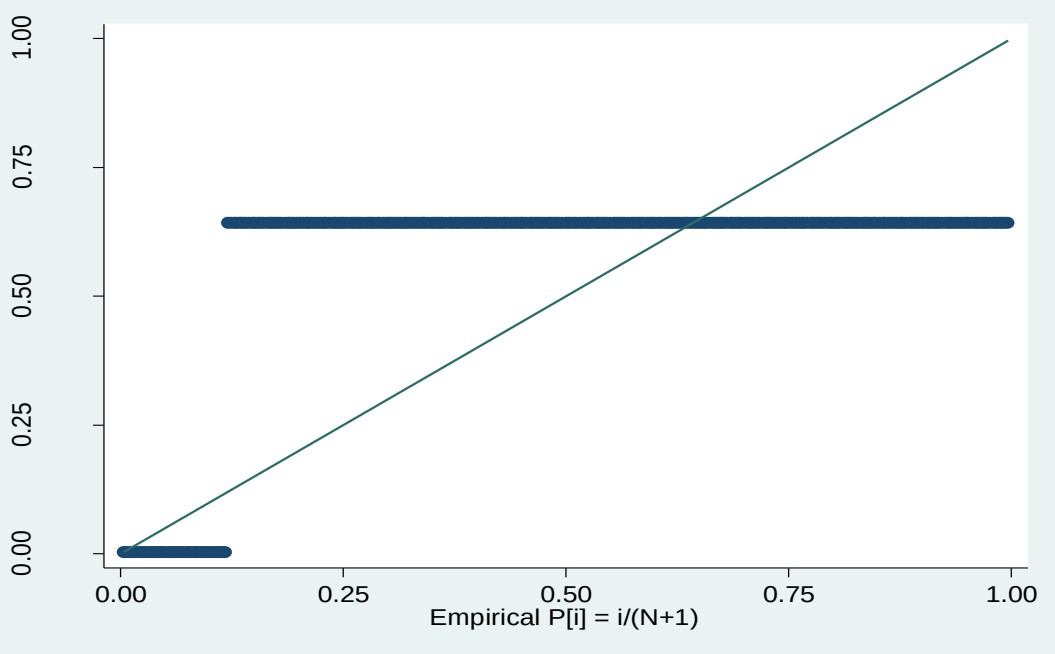
Sensitivity	Pr(+| D)	98.85%
Specificity	Pr(-|~D)	57.14%
Positive predictive value	Pr(D| +)	94.53%
Negative predictive value	Pr(~D| -)	86.96%
False + rate for true ~D	Pr(+|~D)	42.86%
False - rate for true D	Pr(-| D)	1.15%
False + rate for classified +	Pr(~D| +)	5.47%
False - rate for classified -	Pr(D| -)	13.04%
Correctly classified		93.94%

Annex 7: Hetroscedasticity

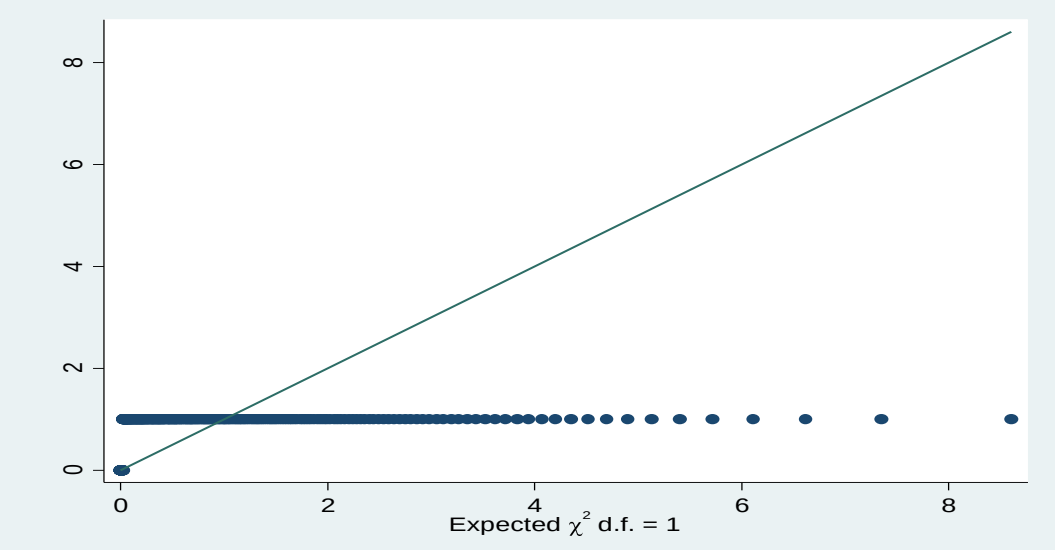
Before running robust in Logistic regression model

```
. predict hettest
(option xb assumed; fitted values)

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of rta

         chi2(1)      =   104.52
         Prob > chi2  =   0.0000
```

Annex8: Normal probability of accident distribution graph appropriate



Annex 9: Chi-squired probability accident distribution graph



Annex 10: Questions for data collection to identify the major determinants of traffic accident in case of Hosanna town

I. Answer the following questions by ticking '√" under "yes" or "no" and give reason for your answers in short.

no	Variable	Interview questions	Response	
			Yes	no
1	Road Traffic accident	Do you think that the road traffic accident is a serious issue in Hosanna town? (Respondents are selected residents) Why…… ……		
		If you are a victim of traffic accident, which type of traffic accident did you get: Fatality/Death	-	-
		Injury/ Bodily harm		
		Material loss		
		Which type of traffic accident is more common in Hosanna town? Fatality/Death	-	-
		Injury/Bodily harm		
		Material loss /Material damage		
		What is the reason for your choice? ----------		
		Which type of vehicle(s) is/are cause high number of road accidents in the Hosanna town?	-	-
2	Motor cycle	Is motor cycle account for high number of road traffic accident in Hosanna town? If your answer is "yes" why? ……		
3	Bajaj motor	Is Bajaj motor account for high number of road traffic accident in Hosanna town? If your answer is "yes" why? ……..		
4	Minibuses	Is minibus account for high number of road traffic accident in Hosanna town? If your answer is "yes" why?		
5	Pedestrians	While you walk on the street:	-	-
		Do you walk always by using your left hand side of the road?		
		Do you walk always by using your right hand side of the road?		
		Do you use both right and left hand sides of the road indifferently?		
		Do you watch your left and right hand sides of the road seriously before you crossing the road?		
		Do you cross the road always by using zebra?		
		Do you cross the road at anywhere convenient?		
6	Carts	Are there any carts which pulled by animals on the road of the town? If ''YES'', are they the case for traffic accident in Hosanna town?		

no	Variable	Interview questions	Response	
			Yes	no
7	Age	Which aged individuals are more vulnerable in accident in Hosanna Town? Less than 19 Greater than 19 and less than 46 Greater than 48		
8	Sex	Who is more vulnerable in accident in hosanna town? Male. If your answer is "yes" why? Female. If your answer is "yes" why?		
9	Derive r Experience	Do you think most of the drivers have an experience in driving? Do you think most of the drivers have no enough experience on the driving? Do you think most of the drivers keep their way while they are derive? Do you think most of the derivers give respect to the passengers?		
10	helmet	Do you think most of motor cyclists wear helmet when they derive in Hosanna town? If your answer is "no" what is the reason? ----------		
11	Deriving speed	Do you think that the derivers speed is one of the cases for accident in this town? Do you think that the derivers keep enough gaps from other cars? Do you think that the derivers give priority to passengers? If you have any comment on deriving speed. ---------- ----------		
12	Multi directional way	Do you think that the multi directional ways locations are more accidental locations in this town? Is there safe traffic controlling mechanism in multi directional ways locations?		
13	Parking space	Do you think that there are enough parking spaces on the sides of main road ways of Hosanna town? If your answer for above question is **no,** do you think that lack of enough parking space is one of the case for traffic accident? If you have any comment on parking space forward it ----------		

no	variable	Interview questions	Response	
			Yes	No
14	Pedestrian sideway	Do you think that there is safe road sideway to pedestrians in Hosanna town? If you have any comment on Pedestrian sideway forward it ----------		
15	Institution	Do you think that the locations of institution/organizations on the road sides are more accidental places in Hosanna town? If your answer is "yes" mentioned them ----------		
16	Garaging	Do you think that the garaging on the road sides are the cases for accident in this town? Do you think that the garaging on the road sides are reduces the road safety? If you have any comment on Garaging forward it ----------		
17	Capacitating officials and community in road safety	Do you think that the people in Hosanna town have awareness about road safety? As road user did you got a chance of education on the road safety in Hosanna town? Do you believes that the trained and sufficient traffic police distribution in Hosanna town? Do you think that the derivers acts on their daily activities as professional?		
18	Enforcement or exercising the law	Do you think that any driver who violate traffic law punished by traffic police in hosanna town? Do you think that deriver fear or give respect to traffic law in hosanna town?		

- What you suggest and/or what will reduce traffic accident in Hosanna town?

Annex11: Focus group discussion to identify the major determinants of traffic accident in case of hosanna town

Direction II: Focus group discussion

Date----------Age---------- Sex----------

Educational background ---------- Working experience----------

1. Do you think road traffic accidents are serious problem in Hosanna administrative town? If your answer is "yes" what are the major cases?

2. How do you compare the magnitude of road traffic accidents in Hosanna administrative town to those of other Districts in the region? ----------

---

3. How do you normally control vehicles' which have no plate code? ----------

---

---

4. Are there any problems in getting immediate information after the motorized or non-motorized accident has occurred? What are the problems? ----------

---

5. What are your recommendations and opinions on strategies of reducing the road traffic accident in Hosanna? ----------

---

7. What measures do you take to reduce traffic accidents in Hosanna town?

---

8. Are there any problems on implementing traffic safety measures in Hosanna? ----

---

---

9. Who do you think should be responsible for traffic accident in case of Hosanna town?----------

---

10 .what factors do you think facilitate the occurrence of road traffic accident in Hosanna town?

1. In terms of Vehicles ----------

2. In terms of environment road network----------

3. In terms of Peoples behavior----------4.

In terms of legislation and regulations ----------

---

11. What do you say about alternative ways of pedestrians and carts pulled by animals in Hosanna town?

Annex 12: Interview guide questions with traffic officers on duty to identify the major determinants of traffic accident in case of hosanna town

Direction III: Interview with traffic officers

Date---------- Age---------- Sex----------

Rank---------- Working experience----------

1. Do you think road traffic accidents are important problem in Hosanna administrative town?

2. How do you compare the magnitude of road traffic accidents in Hosanna administrative town to those of other Districts in the region? ----------

---

3. How do you normally control vehicles which have no plate code? ----------

---

---

4. Are there any problems in getting immediate information after the motorized or non-motorized accident has occurred? If there is problems what are the problems?

6. What are your recommendations and opinions on strategies of reducing the road traffic accident in Hosanna? ----------

7. What measures do you take to reduce traffic accidents in Hosanna?

---

8. Are there any problems on implementing traffic safety measures in Hosanna? ----
---

9. Who do you think should be responsible for traffic accident?

---

10 .what factors do you think facilitate the occurrence of road traffic accident in Hosanna?

1. In terms of Vehicles ----------
---

2. In terms of environment road net work----------
---

3. In terms of Peoples behavior----------
---

4. In terms of legislation and regulations----------
---

10. What do you say about alternative ways of pedestrians and carts pulled by animals in Hosanna town?

Annex 13: Translated questionnaires by the language of the study area (checklists in Amharic).

በጅማ ዩንቨርሲቲ በቢዚናስና ኢኮኖሚክስ ኮሌጅ በኢኮኖሚክስ የትምህር ክፍል ተመራቂ ተማሪ(ዎች) ለዲህረ ምረቃ ማሚያ ሳይንሳዊ ጥናት በሀዲያ ዞን በሆሳዕና ከተማ ውስጥ ለማድረግ **ከተመረጡ የከተማው ማህበረሰብ አካላት የናሙና መረጃ ለመሰብሰብ የሚረዱ መጠይቆች፤**

<u>ዕዛዝ አንድ</u>፤ ከዚህ በታች ለተጠየቁ ጥያቄዎች አዎ ወይንም አይደለም ለማለት ‘√’’ ይህንን ምልክት ይጠቀሙ፡፡ ለምሰጡት ምላሽ በተቻለ መጠን በአጭሩ ማብራሪያ ይስጡ፡፡

ዕድሜ ----------ጾታ ---------- የትምህርት ደረጀ ---------- የሥራ ልምድ ----------

-

ተ.ቁ	የቀረቡ ጥያቄዎች	ምላሽ	
		አዎ	አይደለም
1	በሆሳዕና ከተማ ውስጥ የትራፊክ አደጋ ጉዳይ አሳሳቢ እየሆነ ነው ወይ? (ለተመረጡ የከተማ ነዋሪዎች)		
	ምላሽዎ አዎን ከሆነና ተጨማሪ ማብራሪያ ካለዎ ይስጡ ----------		
	በእርስዎም ሆነ በቤተሰብዎ የትራፊክ አደጋ አጋጥሞ የሚያውቅ ከሆነ የአደጋው ዓይነት ዬቱ ነው?		
	የሞት አደጋ		
	የአካል ጉዳት		
	የንብረት ውድመት		
	በሆሳዕና ከተማ ውስጥ በብዛት የሚታወቀው የትራፊክ አደጋ ዓይነት ዬቱ ነው?		
	የሞት አደጋ		
	የአካል ጉዳት		
	የንብረት ውድመት		
	ይህ ለምን ሊሆን ቻለ? ማብራሪያ ካለዎ ይስጡ ----------		
2	በከፍተኛ ደረጀ የትራፊክ አደጋን እያስከተለ ያለው የተሽከርካሪ ዓይነት ዬቱ ነው?		
	ሞቶር ሳይክል		
	ይህ ለምን ሊሆን ቻለ? ማብራሪያ ከለዎ ይስጡ ----------		
3	ባጃጅ ሞቶር		
	ይህ ለምን ሊሆን ቻለ? ማብራሪያ ካለዎ ይስጡ ----------		

ተ.ቁ	የቀረቡ ጥያቄዎች	ምላሽ	
		አዎን	አይደለም
4	ሚኒባስ ወይንም ታክስ ይህ ለምን ሊሆን ቻለ? ማብራሪያ ካለዎ ይሰጡ ---------- ሌላ		
5	እርስዎ በእግር መንገድ ስጓዙ የተሽከርካሪ መንገድ አጠቃቀም ምን ይመስላል?		
6	ዘውትር የመንገድዎን የግራ ጠርዝ በመያዝ ይጓዛሉ? ዘውትር የመንገድዎን የቀኝ ጠርዝ በመያዝ ይጓዛሉ? የመንገድዎን የቀኝም ሆነ የግራ ጠርዝ ሳያማርጡ በአንዱ ጠርዝ ይጓዛሉ? ዘወትር መንገድ በሚያቋርጡበት ወቅት የመንገዱን ግራና ቀኝ በጥንቃቄ አይተውና ተሽከርካሪ አለ መኖሩን በትክክል አጠርተው ነው ወይ መንገድ የምያቋርጡት? መንገድ በሚያቋርጡበት ወቅት በመንገዱ ላይ ዜብራ ያለበትን ቦታ ፈልገው ያቋርጣሉ ወይ?		
7	በሆሣዕና ከተማ ተሽከርካሪዎችና በእንስሳት የሚሳቡ ጋሪዎች አንድ መንገድን በጋራ ይጠቀማሉ? በእንስሳት የሚሳቡ ጋሪዎች ካሉ ለትራፊክ አደጋ መንስኤ እየሆኑ ናቸው ወይ? በእንስሳት የሚሳቡ ጋሪዎች ለትራፊክ አደጋ መንስኤ እየሆኑ ከሆነ በእንስሳት ለሚሳቡ ጋሪዎች አማራጭ መንገድ የላቸውም ማለት ነው? ተጨማሪ ማብራሪያ ካለዎ ይስጡ ----------		
8	ለትራፊክ አደጋ ይበልጥ ተጋላጭ የሆኑት ግለሰቦች በዬትኛው የዕድሜ ክልል ያሉ ናቸው ይላሉ? ከ15 ዓመት ዕድሜ በታች ያሉ ህፃናት ከ16 ዓመት ዕድሜ የሚበልጡ እና ከ48 ዓመት ዕድሜ የሚያንሱ ወጣቶች ከ48ዓመት ዕድሜ የሚበልጡ ጎልማሶችና ሽማግሌዎች		
9	በሆሣዕና ከተማ ለትራፊክ አደጋ ይበልጥ ተጋላጭ እየሆኑ ያሉት ወዶች ወይንስ ሴቶች? ወንዶች ሴቶች		
10	በሆሣዕና ከተማ ያሉ አብዛኞቹ አሽከርካሪዎች በቂ የማሽከርካር ልምድ ያላቸው ናቸው ትላለህ? በሆሣዕና ከተማ ያሉ አብዛኞቹ አሽከርካሪዎች በቂ የማሽከከርካር ልምድ የሌላቸው ናቸው ትላለህ? በሆሣዕና ከተማ ያሉ አብዛኞቹ አሽከርካሪዎች ለእግረኞች ቅድሚያ ይሰጣሉ?		

	የቀረቡ ጥያቄዎች	ምላሽ

ተ.ቁ		አዎን	አይደለም
11	በሆሣዕና ከተማ ያሉ አብዛኞቹ የሞቶር ሳይክል አሽከርካሪዎች የአደጋ መከላከያ ቆብ ይጠቀማሉ? መልስዎ አይደለም ከሆነና ተጨማሪ ማብራሪያ ካለዎ ይስጡ ----------		
12	በሆሣዕና ከተማ የአሽከርካሪዎች ፍጥነት አንዱ የትራፊክ አደጋ መንስዔ ነው ይላሉ? በሆሣዕና ከተማ ያሉ አሽከርካሪዎች በተሽከርካሪዎቻቸው መካከል በቂ ርቀት በማስቀረትና ግጭት እንዳይፈጠር በማድረግ አደጋን ተከላክለው ያሽከረክራሉ? የአሽከርካሪዎችን ፍጥነት አስመልክቶ ተጨማሪ ማብራሪያ ካለዎ ይስጡ ---------- ----------		
13	በሆሣዕና ከተማ ያሉ መስቀለኛ ቦታዎች የትራፊክ አደጋ የሚበዘባቸው ቦታዎች ናቸው? በሆሣዕና ከተማ ባሉ መስቀለኛ ቦታዎች በቂ የትራፊክ ቁጥጥር ይደረጋል? ተጨማሪ ማብራሪያ ካለዎ ይስጡ----------		
14	በሆሣዕና ከተማ ባሉ ዋና ዋና መንገዶች ተሽከርካሪዎችን አቁሞ ለማቆያት የሚያስችል ምቹ ሁኔታ አለ? በሆሣዕና ከተማ ተሽከርካሪዎችን አቁሞ ለማቆያት የሚያስችል ምቹ ሁኔታ የሌለ ከሆነ ለትራፊክ አደጋ መንስዔ እየሆነ ነው ወይ? ተጨማሪ ማብራሪያ ካለዎ ይስጡ----------		
15	በሆሣዕና ከተማ ለእግረኞች የሚሆን ምቹ መንገድ ከተሽከርካሪዎች መንገድ ተለይቶ አለ ወይ? ተጨማሪ ማብራሪያ ከለዎ ይስጡ----------		
16	በሆሣዕና ከተማ ውስጥ በተሽከርካሪዎች መንገድ ዳር የሚገኙና በተደጋጋሚ የትራፊክ አደጋ የሚከሰትባቸው ቦታወዎች የሆኑ መንግሥዊና መንግሠታዊ ያልሆኑ ተቋማት አሉ? ተጨማሪ ማብራሪያ ካለዎ ይስጡ---------- ---------- ---------- ---------- ---------- ----------		

ተ.ቁ	የቀረቡ ጥያቄዎች	ምላሽ	
		አዎን	አይደለም
17	በሆሣዕና ከተማ ውስጥ በተሽከርካሪዎች መንገድ ዳር (ላይ) የሚሰጥ የጋራዥ አገልግሎት አለ? በሆሣዕና ከተማ ውስጥ በመንገድ ዳር (ላይ) የሚሰጥ የጋራዥ አገልግሎቶት ለትራፊክ አደጋ መንስዔ እየሆኑና የመንገድ ዳህንነትን እያቀነሱ ናቸው? ተጨማሪ ማብራሪያ ካለዎ ይስጡ---------- ----------		
18	የሆሣዕና ከተማ ማህበረሰብ (ለምሳሌ፡- ቤተሰብዎ) ስለ መንገድ አጠቃቀም በቂ ግንዛቤ ትምህርት አግኝተዋል ብለው ያምናሉ? እርስዎ የሆሣዕና ከተማ ነዋሪ እንደ መሆንዎ መጠን ስለ መንገድ አጠቃቀም የግንዛቤ ትምህርት አግኝተው ያውቃሉ? በሆሣዕና ከተማ ውስጥ የመንገድ ዳህንነት ሥራን በመሥራት እያገለገሉ ያሉ ባለሙያዎች የዘወትር ተግባሮቻቸውን የትራፊክ አደጋን በሚቀንስ መንገድ በዕውቀት እየመሩ ናቸው ብለው ያምናሉ? ተጨማሪ ማብራሪያ ካለዎ ይስጡ---------- ---------- ---------- በሆሣዕና ከተማ ውስጥ አሽከርካሪዎች በየዕለት የሥራ እንቅስቃሴዎቻቸው ጥሩ ሙያዊ ሥነምግባር ተላብሰው እየሠሩ ናቸው ብለው ያምናሉ? ተጨማሪ ማብራሪያ ካለዎ ይስጡ---------- ---------- ----------		
19	በሆሣዕና ከተማ ውስጥ ሕግ የሚጥሱ አሽከርካሪዎችን ሁሉ በሕግ ማስከበርያ ደንብ መሠረት የእርምት እርምጃን የትራፊክ ፖሊሶች እየወሰዱ ናቸው ብለው ያምናሉ? በሆሣዕና ከተማ ያሉ አብዘኞቹ አሽከርካሪዎች የትራንስፖርት ሕግን ያከብራሉ ብለው ያምናሉ? ተጨማሪ ማብራሪያ ካለዎ ይስጡ---------- ----------		

በእርስዎ በኩል የትራፊክ አደጋን ለመቀነስ ይጠቅማል የሚሉ ምክር ወይንም አስተያት ካለዎ ይስጡ----------
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በጅማ ዩንቨርሲቲ በቢዚናስና ኢኮኖሚክስ ኮሌጅ በኢኮኖሚክስ የትምህርት ክፍል ተመራቂ ተማሪ(ዎች) ለዲህረ ምረቃ ማሟያ ሳይንሳዊ ጥናት በሀዲያ ዞን በሆሳዕና ከተማ ውስጥ ለማድረግ አጋዥ መረጃዎችን ከከተማው ማህበረሰብ ለመሰብሰብ የሚረዱ የቡድን ውይይት እና ከትራፊክ ፖሊስ አባላት ጋር ቃላ- መጠይቅ ለማድረግ የተዘጋጁ ጥያቄዎች

<u>ትዕዛዝ</u> ሁላት፤ የቡድን ውይይት

ዕድሜ ----------ጾታ ---------- የትምህርት ደረጀ ---------- የሥራ ልምድ --------

1. በሆሳዕና ከተማ የትራፊክ አደጋ አለ ወይ? ካለስ ዋና ዋና መንስዔዎቹና አሳሳቢነት ደረጀቸው እንዴት ይገለፃል?
2. በሆሳዕና ከተማ ውስጥ ያለው የትራፊክ አደጋ ከሌሎች አቻ የክልሉ ከተሞች አንፃር ስናነፃፅር ምን ደረጀ ላይ አለ ማለት ይቻላል? ለምን?

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3. በሆሳዕና ከተማ ውስጥ የምንቀሰቀሱ ሠሌደ የሌላቸው ተሽከርካሪዎች አሉ? ካሉ በእነዝህ ተሽከርካሪዎች ላይ ቁጥጥር የሚደረገው በምን መልኩ ነው?

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4. በሆሳዕና ከተማ ውስጥ የትራፊክ አደጋ ሞተር ባላቸው ወይንም ሞተር በሌላቸው ተሽከርካሪዎች ስደርስ የአደጋው መረጃ በትክክል ይያዛል ብለው ያምናሉ? ካልሆነ ለምን?

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5. በሆሳዕና ከተማ ውስጥ እየደረሱ ያሉትን የትራፊክ አደጋዎችን ለመቀነስ በሚመለከታቸው ባለድርሻ አካላት ሁሉ ምን እየተሠራ ነው?

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6. የሆሳዕና ከተማን የትራፊክ አደጋ ለመቀነስ አጋዥ ይሆናሉ ብለው የምያምኑ አማራጭ ሀሳቦች አሉ? ካሉ ይዘርዝሩ

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7. የትራፊክ ደንብን ተግባራዊ ከማድረግ የሚያደናቅፉ ተግደሮቶች በሆሳዕና ከተማ አሉ? ካሉ ይዘርዝሩ

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8. በሆሳዕና ከተማ እየደረሱ ላሉ የትራፊክ አደጋዎች ተጠያቅ የሚሆነው አካል ማን ነው ይላሉ? ለምን?

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9. በሆሳዕና ከተማ የትራፊክ አደጋ ከጊዜ ወደ ጊዜ እየቀነሰ ነው? ካልሆነ እንዳይቀንስ ምክንያ እየሆኑ ያሉ ጉዳዮች፡-

ሀ. ከተሽከርካሪዎች አንፃር እንዴት ይገለፃል?

ለ. ከመንገዱና የመንገዱ አካባቢ ከመሰነከል ነፃ ከመሆን አንፃር እንዴት ይገለፃል?

ሐ. ከከተማው ማህበረሰብ የመንገድ አጠቃቀም አንፃር እንዴት ይገለፃል?

መ. ከሀገርቱ የበላይ ሕግና ከትራፊክ ደንብ ማስከበር አንፃር እንዴት ይገለፃል?

ሠ. በሆሳዕና ከተማ ውስጥ በዋና ዋና መንገዶች አካባቢ ያለው የእግረኞችና በእንስሳት የሚሳቡ ጋሪዎች አማራጭ መንገድ ጉዳይ እንዴት ይገለፃ? ----------

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Figure 5.1: photos of some road users and its' environment condition in Hosanna Town (2017)