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Jimma Institute of Technology
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ASSESSMENT OF ROAD TRAFFIC ACCIDENTS ALONG ADDIS ABABA-JIMMA HIGHWAY

A Research Submitted to the School of Graduate Studies of Jimma University Institute of Technology in Partial Fulfillment of the Requirements for the Degree of Master of Science in Highway Engineering

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Adviser: Fekadu Fufa (Dr.-Ing.)
Co-Adviser: Msc.Yolente C.macarubbo

November 2015

DECLARATION

I hereby declare that this submission is my own work towards the award of degree the Master of Science and, to the best of my knowledge, it contains no material previously used or published by another person or material which had been accepted for the award of similar or any other degree of the university, except where due acknowledgement had been made in the text.

Gonfa Gemeda

_____   _____

        Signature   Date

This proposal has been submitted for examination with my approval as university supervisor.

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Abstract

Road traffic accidents occur as a result of several factors associated with the traffic systems, such as road users, road environment and vehicles. Despite having low road network density and vehicle ownership, Ethiopia has a relatively high accident records. Consequently, Ethiopia is one of the nations across the globe with the highest fatality rate per vehicle. Besides road injuries and property damages due to traffic accidents, previous studies observe fatality rates in the country as exceeding 100 fatalities per 10,000 vehicles.

Road and traffic data were collected from field surveying and accident data were gathered from Pertinent police stations. Each accident spots was measured with reference to the regional administration available on the Addis Ababa-Jimma highway which was from (Sabata to Jimma Check point). During the last five years a total of 949 accidents were reported from which 474 were fatal accidents, 141 were serious injuries, and 44 were slight injuries and 290 were property damages.

The research was conducted based on the archive of traffic police data between 2010/11 and 2014/15. A questionnaire survey and field observations were also carried out to collect the required data to be performed as complement to accident analyses. In this research Statistical analysis (Karl Pearson Linear Regression Equation) was used to decide the relationship of dependent and independent variables. A study analyses include comparison of Accident Rates and Densities among different stretch of the highway

Therefore, regular assessment of the trends of traffic accidents in the country can be helpful planning strategies to reduce traffic accident rate. Thus, the purpose of this study was assess traffic road accidents along the Addis Ababa-Jimma Highway. Questionnaires were used to collect data from drivers, pedestrians, and traffic police and student traffic police. Statistical analysis of the collected data were carried out using SPSS Version 20, and the analyzed data were presented using table's graphs and figure. Accident Density and Rate per Million of Entering Vehicles (RMEVs) was calculated

It was realized that the trend of road traffic accidents were increased from year to year in the past five year period from 2010/11-2014/15.

The study recommends that in striving the road traffic accident safety improvements on this particular highway needs to adjusted human behavior to the environments of the traffic stream and fixed facilities which carry it and would seek to contrive ways and means of better traffic accommodation with planning, education, administration, data capturing, regulation, enforcement, and making capital investments in a new transport facilities and services.

KEY WORDS: Road Safety; Road traffic accidents; vehicular characteristics; Road users; *Accident Density;* the Rate per Million of Entering Vehicles (RMEVs)

ACRONYMS

AADT   Average Annual Daily Traffic

ERA   Ethiopian Roads Authority

FARS   Fatality Analysis Reporting System

FHWA   Federal Highway Administration

GNP   Gross National Product

GRSP   Global Road Safety Partner

HSIS   Highway Safety Information System

NCSA   National Center of Statistics and Analysis

NRSCO   National Road Safety Corporation

PARS   Police Accident Reports

SPNN   South peoples Nations and Nationality

SWS   South west Showa

RTA   Road Transport Authority

RTAs   Road Traffic Accidents

TRL   Transport Research Laboratory

UNTACDA   United Nation Transport and Communication Development for Africa

WHO   World Health Organization

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CHAPTER ONE
INTRODUCTION

1.1 General

 Transportation is a major generator of employment as well it plays a vital role in the distribution of goods and services from place to place nationally and internationally [1] Road transport, as one of the means of transportation, plays a key role in the nation traffic flow of developing countries and accounts for more than 95% of inter-urban transport of goods and passengers in different African countries including Ethiopia (UNTACDA, 2000). Clearly road transport has an important role in economic, social and cultural functioning of cities. But in many cities and highways today it also causing significant social and economic crisis (Shefer, 1997), which arise from the external effects of traffic system, particularly road traffic accidents, [3]

Road traffic accidents resulting in deaths and injuries occur worldwide. It was estimated that over 1.2 million people died each year on the world roads as a result of road traffic accidents [2]. According to a survey by WHO, more than 3,200 people get killed and over 130, 000 injured every day due traffic accidents across the world. Almost half of all occurred fatal accidents involve vulnerable road users, such as pedestrians, cyclists and power two wheelers [2]. Road death varies based on the level of income of each nation across our globe.   It can be observed from Figure 1.0 that more than 85% of accident fatalities occur in low and middle income countries, such as Ethiopia. Though road fatality rate in high income countries has been decreasing over the last decades, even in these countries road accidents remain one of the main causes of death, injury and disability [7].
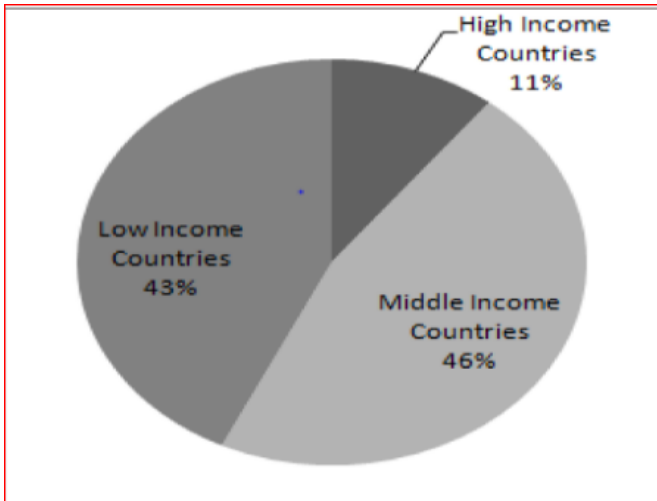
FIGURE 1. 1 ROAD TRAFFIC DEATH BY LEVEL OF INCOME [2]

TABLE 1. 1 PREDICTED ROAD TRAFFIC FATALITIES   [3]

Region	Change (%) from 2000-2020
South Asia	144
East Asia & Pacific	80
Sub-Saharan Africa	80
Middle East & North Africa	68
Latin America & Caribbean	48
Europe & Central Asia	18
Sub Total	83
High income countries	-28
Global total	66

Reports of previous studies have also indicated that human factor was responsible for the majority of RTAs [4, 5]. Statistics indicate that over 90 percent of traffic accident situations in Ethiopia can be attributed to driver errors accordingly [6]. Referred to four different groups of factors which contribute to the high accident risk of the young drivers between age of 18-30 (a) level of actual knowledge and skill; (b) amount of experience; (c) individual level of development and maturity; (d) social situation and lifestyle. Lifestyle seems to have some kinds of relationship with the driving task and driver's performance. Consequently lifestyle of a driver affects the levels of accident risk. However, lifestyle has not been studied extensively

and in depth. The general idea is that the way a driver lives, interests of a driver, personal style, morals, ideology and the like could affect the accident risk that a driver runs, and the perceptions and thoughts of a driver about traffic and driving. Moreover, we should take into account that driving style should be seen as a small piece and perhaps an expression of a broader lifestyle.

The fatal RTAs has been on the increasing rate global [7]. The increased rate of fatal RTAs worldwide has been attributed to population explosion and increased motorization. Increased motorization may be characterized briefly as the "automotive revolution", that is the motorizing of urban population especially in the developing countries [8]. The Road traffic accidents are becoming huge public safety and development obstacles. The current situation necessitates a high level political dedication and immediate action.

The important issue here is that ever increasing trend and spatial pattern of road accidents emerge following the ever increasing demands for fast movements that demand faster means of transport. This is because the need to move from place to place along with its own luggage in making a living is a human character. Such a movement of human beings and goods across a unit of geographical space for day to day activities by any means (foot, animal and/or vehicles is known as 'Traffic' [9, 10]. This has led to gradual shift of transportation from on-foot to animals and then to vehicle; and even from slower vehicle of the first generation to the fastest vehicles of the 21st generation. And such improvements in means of transport have been accompanied with Traffic congestion and in consequence with accidents.

The problems of road safety may, therefore, perhaps remain unresolved despite efforts made to reduce through appropriate road designing methods and legal enactment. Consequently, RTAs are claiming the lives of millions and caused destruction of property leading to what is known as social and economic crisis. This implies that the impact it has on human, physical and financial capital, is huge posing challenges to national development efforts. In fact, this requires planning for sustainable transport system in general and sustainable urban transport development in particular. A sustainable transport development planning requires the effort of all concerned bodies including transport authority and the community itself [11].

Various studies have indicated that Ethiopia has one of the highest fatality rates per vehicle in the world. Emergency medical systems are often poor and injury prevention programs are rarely available [12].It is in exceeding 100 fatalities per 10 000 vehicles. This should be compared with Kenya and United Kingdom, where the figure is about 19 and 2 per 10 000 vehicles, respectively. This figure can also be even big when considering the number of accidents which go unregistered. Ethiopia loses about € 50 million annually due to traffic accidents. In addition the victims are mainly public transport travelers in the working age group (18–30 years) which must pull attention from the policy makers [3]..

In Ethiopia, the situation has been worsened as the number of vehicles has increased and consequently due to increased traffic flow and conflicts between vehicles and pedestrians. Despite government efforts in the road development, road crashes remain to be one of the critical problems of the road transport sector in Ethiopia [13].Every year many lives are lost and much property is destroyed due to road traffic accidents in the country. The country has experienced average annual road accidents of 8115 over the past 11 years (Central Statistical Agency, [CSA], 2000/01-2010/1. In financial terms, Ethiopia, one of the poorest countries in the world, loses[14] at least 400 million Birr each year due to road accidents which was 12 million Ethiopian Birr per year on average, 15 years ago and was the third killing vector [14]. Currently, the financial estimation of property damage (excluding human deaths and injuries), is more than 15 million Ethiopian birr annually on average (CSA, 2000/01-2010/11). According to [13]. The rate of traffic accident death in 2007/08 was 95 per 10,000 motor vehicles which put the country on the extreme high side of the international road safety scene. Moreover, in the same year, the police report revealed 15,086 accidents which caused the losses of 2,161 lives and over 82 million Ethiopian birr, equivalent to US$7.3 million estimated cost of property damage (US$1 =11.34 Ethiopian Birr). And, up to 2005/06, traffic accidents and fatalities increased at 17 % and 10 % per year respectively although there is a decreasing decline in these respect. There were 2.84 road accident fatalities per 100,000 populations in the same year [13].

There are various causes of road accidents in Ethiopia. The two main contributors are the incapacity or failure of the drivers adding on the ineffective policies and the generally awkward road and vehicle conditions.

The latter include the absence of proper law and regulation, Insufficient law enforcement, unavailability of pedestrian facilities, high volume of pedestrian traffic, narrow bridges, inadequate view distances of curves, road curvature, absence of proper traffic signs, and faded road markings; while the former includes drivers' lack of proper training and awareness of traffic rules and regulations, lack of driving skills, fatigue, violation of speed limit, etc.. Considering the extent road accidents and the extremely low performance of the Ethiopian Road and Traffic Authority to calm the situation, the government should start reorganizing the whole institution in a way it could regularly be evaluated, improved and also in a way good performance can be rewarded while corruption and low performance can be penalized. The Ethiopian Road and Traffic Authority claims to be functioning while the amount of accidents exponentially grows with time and the traffic low enforcement people get more and more corrupt [12].

Among the things which can be done effectively are: prohibition of road side parking on undesignated areas, increase the number of suitable traffic and pedestrian signs, firm traffic law enforcement and speed control, trainings on road use for pedestrians, strict control on narcotics such as alcohol and Khat, Stricter control on professional drivers[15].

1.1 Definition of the Problem

Road accident in Ethiopia is one of the worst accident records in the world, as expressed per 10, 000 vehicles. Moreover, road accidents are concentrated in Addis Ababa which is the capital city of Ethiopia and Oromia region accounting for 58 per cent of all fatalities and two-third of all injuries[16].reported that while Addis Ababa has the largest number of road accidents, Oromia has the largest number of fatalities. Oromia has two-third more fatal accidents than Addis Ababa. Not only the traffic accidents are concentrated in Addis Ababa city and Oromia region but also the volume of motorized traffic are very high as compared to the other parts of the country.

1.2 Problem Statement

The costs of fatalities and injuries due to Road Traffic Accidents (RTAs) have a tremendous impact on societal well-being and socioeconomic development. RTAs are among the leading causes of death and injury worldwide, causing an estimated 1.2 million deaths and 50 million injuries each year [2]. Ethiopia has the highest rate of RTAs, owing to the fact that road transport is the major transportation system in the country. The Ethiopian traffic control system archives data on various aspects of the traffic system, such as traffic volume, concentration, and vehicle accidents. With more vehicles and traffic, the capital city of Addis Ababa takes the lion's share of the risk, with an average of 20accidents being recorded every day and even more going unreported.

The basic hypothesis of this research is that accidents are not randomly scattered along the road network, and that drivers are not involved in accidents at random. There are complex circumstantial relationships between several characteristics (driver, road, car, etc.) and the accident occurrence. As such, one cannot improve safety without successfully relating accident frequency and severity to the causative variables In connection with the above facts road traffic accidents on Addis Ababa – Jimma Highway have increased over the years in a disturbing rate in terms of both the direct economic loses and the social lives. This observation is supported by Oromia Region Police Road Traffic accident Statistics, Gurage Zone, Yem Spatial Woreda and Jimma zone Police report of accident statistics which shows that 949 accidents occurred in the years between 2010/11 to 2014/15 Costs of property damage in Birr 33,331,780.00 for property damage accidents only. The number of victims treated in hospital, health center and clinics also show upward trend several factors contribute to this situation; some are related to the unsatisfactory design and layout of roads, sidewalks and road furniture. Other problems are related to the poor condition of vehicles that travel on the roads. Most importantly, there is a general trend among drivers and pedestrians of non-compliance with traffic rules and regulations. The situation is further aggravated by deficiency in traffic rules and regulations and a lack of serious enforcement. Politicians, government bodies and societies at large know little about the magnitude of road accidents and associated factors. Thus, this study provides an initial indication of road accident problems on the Highway.

Road accidents and their consequences cannot be fully eliminated, but they can be reduced drastically. Reduction in accident rates comes as a result of actions on many fronts, including more disciplining of the drivers and pedestrians, safer vehicles, and safer roads through education, engineering, and enforcement. Safety can also be enhanced by institutional measures, such as improvement in coordination and integration of safety activities, and safety research and developments. In addressing road safety problems all these measures need to be examined and assessed comprehensively.

1.3 Research questions

1. What are the contributing factors related to road users, road and road sides, vehicles factors and road safety decision making.

2. What are the pattern of road traffic accident along Highway from Addis Ababa to Jimma

3. What are the understanding of pedestrians, drivers, cyclists and school Children with regard to traffic rules and regulations

4. What are the consequence of road traffic accidents on this Highway

5. What are the measures taken to reduce the Road traffic Accidents

1.4 Objective
1.4.1 Main Objective

> ➢ To assess the trend of road traffic accidents from Addis Ababa to Jimma Highway (from Sabata to Jimma check point) for the period from 2010/11 to 2014/15.

1.4.2   Specific objectives

1. To identify causes of road traffic accidents related to road users, vehicular characteristics, road environment and road safety;

2. To determine the trends of road traffic accidents along the highway;

3. To identify the level of understanding of pedestrians, drivers, cyclists and school Children with regard to traffic rules and regulations.

4. To analyze the effects of road traffic accidents on the socio-economic of the community;

5. To arrive at some possible solutions and counter measures that will contribute in reducing the problems of road traffic accidents.

1.5 Significance of the Study

The findings of this study could be important to understand in depth the complex nature of the road traffic accidents along the highway. So that the outcome of the study could be used as a starting point to design countermeasures for the reduction of the frequency of the occurrence of road traffic accidents. In addition, the findings would enable law enforcement at different levels of responsible government organization that can facilitate road improvements, vehicle inspections and initiate programs to educate the stakeholders. The results of the study can serve also as data base of road traffic accidents along the highway.

1.6 Justification

Various studies have indicated that Ethiopia has one of the highest fatality rates per vehicle in the world. It is in exceed of 100 fatalities per 10 000 vehicles. This should be compared with Kenya and United Kingdom, where the figure is about 19 and 2 per 10, 000 vehicles, respectively with the above objectives, this research will help in beating down the death and injury rates cause by road traffic accidents (RTAs), hence reducing this cost of G.N.P

1.7 Scope and Limitation of the study

The scope of the study is limited to Addis Ababa-Jimma road, which is from Addis Ababa, near to Sabata, up to JimmaTown near checking point 347 kilometers with a total length of 323 kilometers. Besides, the study focuses on its direction in identifying black spot and/or sections along the route. Countermeasures were proposed for most dangerous sections/spots only.

The availability of road accident data in this country is usually difficult to come by and even if it is obtained, the information on it is normally scanty. It is believed that not all accidents are reported to the police for records to be made on them due to human nature and Ethiopian hospitality attitude. Also, it is possible that the police might not have filled the accident report form for all accidents which might have been reported to them. It is therefore imperative to admit that the data provided by Police Commission might be under recorded. However, there is enough evidence from the various researchers who have used road accident data from Police Commission and Hospital that their data is reliable and representative [17].

1.8 Organization of the Thesis

The paper is organized in five chapters. The first chapter is an introductory part, which contain the problems, the research questions, and objectives, Significance of the study, limitation of the study and definition of terms. Chapter two highlights review of studies on road traffic accidents. Chapter three elaborates the methodology of the study, which discusses physical setting of source of data's, data collection technique, data collection procedure and Statistical analysis. Chapter four contains secondary data analysis from different source and causes contributing to road traffic accidents are discusses in this chapter. This Chapter also contains the analysis of primary data's which were obtained through Questionnaires Finally chapter Five the Discussion, conclusion and some possible remedial measures for accidents are recommended in this chapter .

CHAPTER TWO
LITERATURE REVIEW

2.1 General

In social health aspects, road accidents will change its rank in the order of disease burden in a short period of time. While it was number nine in 1998, it is expected to be ranked number three in the year 2020 According to [2]. Deaths from non-communicable diseases are expected to climb from 28.1 million a year in 1990 to 49.7 million by 2020 - an increase in absolute numbers of 77%. Traffic accidents are the main cause of this rise. "The Magnitude of the Problem" - On average in the industrialized countries, and also in many developing countries, one hospital bed in ten is occupied by an accident victim. Traffic accidents are a major cause of severe injuries in most countries [12].

Developing countries have nearly four times the number of deaths from these causes as the developed world. Road traffic accidents are a perfect example of a 'disease of development' which is far more prevalent in developing countries than in developed ones. Because they are perceived as 'disease of development', road traffic accidents and related injuries tend to be under-recognized as major health problems in developing countries [18].

TABLE 2. 1 DISEASE BURDEN OF THE WORLD (DALY'S LOST) FOR 10 LEADING CAUSES, IN 1998AND 2020

Disease or Injury			
Rank	1998	Rank	2020
1	Lower respiratory infection	1	Ischemic heart disease
2	HIV/AIDS	2	Univocal major depression
3	Prenatal condition	3	Road Traffic Accidents
4	Diarrhea diseases	4	Cerebra vascular disease
5	Univocal Major depression	5	Chronic obstructive pulmonary
6	Ischemic heart disease	6	Lower respiratory infections
7	Cerebra vascular disease	7	Tuberculosis
8	Malaria	8	War
9	Road Traffic Accident	9	Diarrhea disease
10	Chronic obstructive pulmonary disease	10	HIV/AIDS

Source: A 5 –Year WHO Strategy for Road Traffic Injury Prevention (2001) the total economic costs are also highest when we measure the productivity lost and expenses incurred because of road traffic accidents. TRL's 2000) crude estimates suggested that the annual cost of road accidents in 1999/2000 was about 1% of the GNP in developing countries, 1.5% in transitional countries, and 2% in highly motorized countries.

Based upon Federal roads prioritization criteria, the Road Sector Development Program consists of the following federal road components: rehabilitation of 728 kilometer of trunk roads, upgrading of 5023 kilometer of trunk and link roads, construction of 4331 kilometer of new link roads, heavy maintenance of 4700 kilometer of asphalt and gravel roads and routine Maintenance of 84649 kilometer of road network [19].

Indicators	Budge year					
	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Federal and regional total road length(km)	49,000	51,636	54,818	58,211	61,771	64522
Length of Woredas all-weather road (km)	0	9,568	24,299	40,044	55,790	71,522
Kebeles connected to all-weather roads (%)	39	48	63	78	93	100
Average Time taken to reach nearest all-weather road (hrs)	3.7	3.0	2.3	1.9	1.6	1.4
Area further than 5km from all-weather roads (%)	64.1	57.3	48.7	40.9	34.3	29.0
Area further than 2km from all-weather roads (%)	83.7	80.0	75.0	70.0	65.2	61.0
Road density (Km/1,000km^2) [1]	44.5	55.6	71.9	89.3	106.9	123.7
Road density (Km/1,000 population) [6]	0.64	0.78	0.98	1.18	1.37	1.54
Roads in acceptable (Fair + Good) Condition[2] (%)	79.7	81.3	83.0	84.6	85.9	86.7
Number of Project operated/carry out by domestic contractors (%)	58	61	64	67	70	73
Average vehicle Km of travel (million km)	9.6	10.1	10.6	11.1	11.7	12.3

[1] *including URRAP roads*
[2] *excluding URRAP roads*
[6] *assuming the population size of Ethiopia being 76 million in 2009/10 with a population growth rate of 3 percent*

TABLE 2. 2 SUMMARY OF ROAD SECTOR TARGETS

Source: Federal roads prioritization criteria, the Road Sector Development Program

There has been considerable research conducted over the last few decades focused on predicting motor vehicle crashes on transportation facilities. Road accident rates in Ethiopia are amongst the highest in the world. Over 2,000 persons are killed in road accidents every year. The number of persons who are injured by road accident every year is more than twice this figure.

One of the first writers, (William Haddon, 1968) had inspired safety professionals when he talked about road transport as an ill-designed, "man-machine" system needing comprehensive systemic treatment and he defined three phases of the time sequence of a crash event –pre crash, crash and post-crash as well as the epidemiological harmony of human, machine and environment that can interact during each phase of a crash,

TABLE 2. 3 THE HADDON MATRIX

Phase		Human	Vehicle and Equipment	Environment
Pre-Crush	Crash prevention	-Information attitudes -Impairment police enforcement	-Road worthiness - Lighting - Braking - Handling -Speed management	-Road design & road layout -Speed limits -Pedestrian facilities
Crush	Injury prevention during the crash	-Use of restraints	-Occupant restraints &other safety devices -Crash-protective design	Crash-protective roadside objects
Post Crush	Life sustaining	-First aid skill -Access to medics	-Ease of access -Fire risk	-Rescue facilities -Congestion

Source**:** World report on road traffic injury prevention: summary, 2004 Geneva

This work led to substantial advances in the understanding of the behavioral, road-related and Vehicle-related factors that affect the number and severity of casualties in road traffic. Building on Haddon's insights, the "systems" approach seeks to identify and rectify the major sources of error or design weakness that contribute to fatal and severe injury crashes, as well as to mitigate the severity and consequences of injury by: - reducing exposure to risk;

- preventing road traffic crashes from occurring;

- reducing the severity of injury in the event of a crash;

- reducing the consequences of injury through improved post-collision care.

Road traffic injuries are the major public health and development challenges that will worsen if effective steps are not taken to curb it. Road traffic crashes affect not only the health of individuals but also their family members, as it can drive households into poverty when they struggle to cope with the long term consequences of the events, including the costs of medical care, rehabilitation and loss of family's breadwinners [2]. RTAs have also a huge strain on national health systems, many of which already suffer from woefully inadequate level of resources.

Most road accidents are due to the lack of driver's adherence to the traffic safety regulations. However, some road accidents can be related to road conditions and Characteristics. In this respect ERA has already carried out an exercise of accident black spots identification on the existing road network and design for remedial works to improve safety at these sites will be undertaken by ERA. The recent World Bank and its Global Road Safety Facility review of Road Safety Management Capacity in Ethiopia identified a number of difficulties and shortcomings that was slowing down road safety progress these include [7].

- Better road safety coordination and cooperation at all levels;
- Outdated or missing road traffic legislation (although some laws have been modified and additional ones have been prepared for proclamation);
- Bodies with road safety responsibility having insufficient personnel with road safety knowledge, know-how and adequate training;
- Serious lack of equipment (and training in its use) for traffic law enforcement and also for emergency services;
- Lack of a uniform highway patrol system for the main roads makes consistent traffic law enforcement difficult;
- Inadequate road safety planning, lack of target setting and established procedures for monitoring and evaluation. The system for accident data reporting is "basic" and may not provide complete picture of the accident situation (but an improved system is being developed and implemented).

Cost estimation procedures and data for different accident types and severities are missing making it difficult to prioritize road safety interventions using cost-benefit analysis. There is obviously no single solution to these difficulties. Many different actions are needed and these have been developed into the NRSCO Short and Medium Term Road Safety Programs. Some of these actions or activities can be funded by Government, whilst donor assistance will be beneficial Practice in Ethiopia, the posted speed is 30 kph in towns since the roadways are often used by mixed traffic, especially pedestrians and animal drawn carts. Observations at some sites indicate that there are many inconsistencies in design speed as well as posted speed [7]. And passing lanes are rarely provided.

2.2 Impact of Road Traffic Injuries

The effect of road traffic injuries can be both direct and indirect on individual, families, employers and society at large. It is undoubtedly true that even when only one person is involved in a road crash, the entire household will be affected financially, socially and emotionally. In a recent hospital base study of traumatic brain injuries, it was observed that nearly 30% of patients were lading poor quality of life [20]. Several health problems depending on age, sex, several and nature of injuries, availability and accessibility of care influence disability and recovery from injuries. In the present survey, nearly 1/3rds of the surveying injury members were suffering from posttraumatic problems of depression anxiety, fear suicidal tendencies alcohol problems following injury, which were directly attributed to injury itself apart post injury disabilities. Large number of the children had become orphans or had lost one of their parents, depriving them of psychosocial stability and socioeconomic support dude road traffic injuries.

The direct economic costs incurred costs incurred by family are for medical expenses in a major way. Legal expenses along with cost of damaged vehicles and subsequent repairs can be huge and phenomenal Medical costs include per hospital, hospital and post hospital expenditure for survivors. In situations where health care is subsidized as in any developing countries. There are difficult to measure due to methodological problems. The out of pocket expenses' every a period of time and are determined by exact and nature of injuries along with availability and accessibility to care. The resulting effect of crash not only includes direct out

of pocket expense to the sudden emergency, damage to goods and properly and long term rehabilitations costs.

The social burden and impact of RTAs is huge phenomenal and more so in developing countries due to absence of social support systems and low levels of income. The sudden death of an economically productive person often places major and long-terms responsibilities on other family member. This often forces others to seek jobs, get employed in low paying jobs resulting in poor self-esteem and disappearing confidence. Children often miss education of will be forced to take up employment to lead the family. The dissatisfaction resulting from long term and length criminal/ legal proceedings is often fearsome. To meet emerging economic hardship families have to make loans (at exorbitant rates with private money lenders at high rates of interest and sell meager family assets (anything that is with them). Majority of the traffic victims decrease their income. In addition to this, many people were dissocialized from social engagements like weddings, and other ceremonies due road traffic accidents.

2.3 Fatality Analysis Reporting System (FARS)

The Fatality Analysis Reporting System (FARS) was conceived and developed by the National Center of Statistics and Analysis (NCSA) in 1975. It contains data on all fatal traffic crashes. FARS was developed in order to assist traffic safety professionals in identifying traffic safety problems and evaluating motor vehicle safety standards and highway safety initiatives. The so-called FARS forms are completed, which include the following information Police Accident Reports (PARS), Driver licensing files, Vehicle registration files [21].

Highway Department data, Vital Statistics, Death Certificates Hospital/Coroner/Medical reports In order for a crash to be included in FARS, it must involve a motor vehicle travelling on a traffic way and result in the death of a person (either an occupant of a vehicle or a non-motorist) within 30 days of the crash. Detailed descriptions of each fatal crash reported are included in FARS files. For each case more than 100 coded data elements that characterize the crash are included. These include elements that characterize the crash, the people involved and the vehicles. In greater detail, the data elements are reported on four forms as follows:

Accident form: contains the time but not exactly the location of the crash, first harmful event and the number of vehicles and people involved. Vehicle and driver forms: contains data of the Accident, vehicle type, most harmful event, drivers' license status and initial and principal impact points. Person form: contains data on each person involved in the crash, such as age, gender, and role in the crash, injury severity and restraint use. Finally, FARS incorporates a variety of information on alcohol related crashes with data such as overall crash alcohol estimates and driver and non-occupant Blood Alcohol Estimates (BAC) [22]

2.4 Highway Safety Information System

The Highway Safety Information System (HSIS) was developed by the Federal Highway Administration (FHWA). The FHWA proceeded in the development of this database due to the need for a database that would serve as a tool to assist highway engineers and administrators in the decision-making process. The need for an understanding of how safety is affected by the geometric design of the roadway, the use of traffic control measures and the size and performance capabilities of the vehicles led to the development of the HSIS. In brief, some of the data files include the following information:

• Crash: contains type of accident, vehicle types, sex and age of occupants, accident severity and weather conditions.

• Roadway Inventory: contains information for types of roadway, number of lanes, lane width, rural urban designation and functional classification.

• Traffic Volume: contains Annual Average Daily Traffic (AADT) data. Intersection: contains traffic control type, intersection type, and signal phasing and turn lanes.

The above data can be used to analyze many safety problems. Modeling efforts to attempt to predict future accidents through roadway and traffic factors can be one application where the HSIS can be very beneficial. In terms of the extraction of data, the Statistical Analysis System (SAS) format is used, as is the case in the GES Database. Only police reported accident data maintained highway system are included in the HSIS [23]. Factors on their own, account for 75 - 80% of accidents. Typical road and environment deficiencies are those, which provide misleading visual information, or insufficient or unclear information to the road users. Only occasionally accidents are caused solely by bad design. Human factors include excessive speed

for the conditions, failing to give way, improperly overtaking or following too close and general misjudgments by both driver and pedestrian.

There are two basic types of road accident, which by definition have to involve a vehicle, are: personal injury and damage only. A personal injury accident (PIA) is an accident involving an injury. The PIA refers to the accident as the event, and may involve several vehicles and several causalities (persons injured). The accident must occur in the public highway, including footways, Analysis of road traffic accidents on the highway and become known to the police within 30 days of its occurrence. Causality is a person killed or injured in accident. Causalities are subdivided into killed (causality who dies within 30 days of accident but excluding confirmed suicides), seriously injured (an injury for which a person is detained in hospital as an in – patient), and slightly injured (an injury of minor character such as a sprain, bruise or cut). Drivers have legal obligations for reporting accident [24]

2.5 Studies done on Road traffic accidents

Casualties from Road Traffic Accidents have been a serious concern of researchers in traffic safety. Models have also been used to study injuries and deaths due to Road Traffic Accidents. For instance, Harvey and Durbin (1986) applied structural time series method to the monthly data series of the numbers killed and seriously injured in Great Britain from January 1969 to December 1984. The results demonstrated the effectiveness of the introduction of seat belt legislation.

Jacobs (1986) carried out an analysis of road traffic accident fatalities in 20 developing countries for different years using linear regression and established significant relationships between fatality rates and level of vehicle ownership (see also Valli 2006). Zlatoper (1984) investigated the causes of motor vehicle deaths in the United States for 1947 – 1980. He also used linear regression models to explain total motor vehicle deaths, vehicle occupants' deaths and pedestrian deaths. He found that disposable income and driving speed had statistically significant effects on increasing the three types of highway deaths.

Balkin and Ord (2001) applied a stochastic structural equation modeling approach to predict the effect of speed limit changes on the number of fatal crashes on both urban and rural

interstate highways in the United States. They found that the view that higher speeds mean more fatalities could not be universally supported.

Bunn et al. (2003) sought to assess whether area-wide traffic calming schemes could reduce crash related deaths and injuries. They used data from Transport Research Information Service, International Road Research Documentation and other sources on deaths, injuries and traffic crashes. The study showed that area-wide traffic calming in towns and cities has the potential to reduce traffic injuries.

Abbassi (2005) studied road accidents in Kuwait using an Autoregressive Integrated Moving Averages (Box Jenkens) model and compared it with the Artificial Neutral Networks (ANN) Analysis to predict fatalities of the Road Traffic Accidents in Kuwait. He found that ANN was better in case of long term series without seasonal fluctuations of accidents or autocorrelation components. Also,

Ismaila et al. (2009) attempted to model Road Traffic Accidents deaths and injuries on Nigerian roads using data collected for 1960 – 2006. They found that out of the eleven models available in SPSS 16.0 statistical package, namely, linear, logarithmic, inverse, quadratic, cubic compound, power, S, Growth, exponential, Logistic; the cubic equation had the best fit for predicting the number of injuries and number of deaths.

Van et al. (2006) used capture-recapture method to estimate non-fatal Road Traffic Injuries (RTI) in Thai Nguyen, Vietnam. The capture-recapture method is based on matching two independent samples to arrive at an estimation of the total. The method was applied using the combined records of police sources and hospitals in Thai Nguyen city to estimate more accurately non-fatal RTIs. They found that with limited resources in establishing and maintaining routine reporting systems, the capture-recapture method may be an affordable alternative to evaluate road traffic injuries in developing countries.

Fatim et al. (2007) estimated the annual incidence patterns and severity of unintentional injuries among persons over 5 years of age in Pakistan using data from National Health Survey of Pakistan (NHSP 1990 – 1994). Through a two stage stratified design, 18,315 persons over 5 years of age were interviewed to estimate the overall annual incidence, patterns and severity of unintentional injuries for males and females in urban and rural areas. They found that there

is a high burden of unintentional injuries among persons over 5 years of age in Pakistan. The results were found useful to plan further studies and priorities prevention programs on injuries nationally and for other developing countries with similar situation.

Nasr (2010) studied deaths resulting from road accidents in Pakistan for both rural and urban areas using regression model that attributed accidents to weather condition, driving skills, condition of the vehicle, length of roads and number of population in the different regions and adherence to car insurance. He found that while total accidents had grown by 10 per cent during the period 1998 – 2008 the rate of growth in fatal accidents was even worse as it grew by 16 per cent.

However, Raeside (2004) had suggested the use of models based on Broughton's (1991) approach to produce predictive distribution based on numbers rather than rates per some million vehicle – kilometer driven. The models do not incorporate traffic volumes. The approach used annual data series of the number of total, serious and slight casualties for Great Britain and modelled the series using autoregressive and linear trend terms. This study attempts to use Raeside's approach with modifications to suit local conditions of Nigeria. It is believed that applying the model to a developing country will fill an important gap in research efforts.

2.6 Current Situation of Road Safety

A recent study [25]. Has shown that the country's traffic accidents and fatalities have increased in the last five years. The total traffic accidents increase from15.61 to 22.46%. The situation is likely to be even more severe than shown in the statistics due to the possible significant under-reporting.

2.6.1. Road Accident Recording Systems in Ethiopia

Regional departments of the Traffic Police are responsible for the recording of all traffic accidents under their jurisdictions. The Federal Police Commission is responsible for national accident data compilation and processing. In each Region's Woreda Police Station, accident data are reported manually. The traffic police accident data form contains accident classification, date, time, day of the week, year, age of the driver, sex, education of the driver, ownership of the vehicle, service year of the vehicle, defects of the vehicle, location of

accident, road traffic condition, road surface condition, road junction type, weather and illumination condition, collision type, and property damage and parties injured (age, sex, physical fitness and the like).

Monthly reports are submitted to pertinent the Region Police Commissions. A Quarter report from the Region Police Commission will then be submitted to the Federal Police Commission to generate national accident statistics. In Ethiopia, much of the information is needed for the traffic police's own activity, primarily, to enforce the law and carry out prosecutions. Some of the accident data are of no direct interest or use to the police, but are vital to the work of other organizations.

Generally Data recording system in Ethiopia was very poor and not modern system especially in woreda and Zonal level. When I was collecting road Traffic accident data at Gurage zone, Yem Special woreda of SPNNR and Jimma Zone police Commission office Some area No data's was found before Four years and some areas the cause of accidents and the location were not recorded properly.

CHAPTER THREE
METHODOLOGY

Administratively, Ethiopia is comprised of nine states and two cities. Regional administrations consolidate the regional reports and submit them to `the Federal Police Commission. The crash data base variables include time of day, day of week, education, age and gender of drivers, driving experience, driver's relationship with vehicle (employee/owner/other), vehicle service years, vehicle type, vehicle ownership, road type, land use, median and junction types, terrain, pavement type, pavement conditions, illumination, weather conditions, casualty type, and reason for the crash. Vehicle population data was also obtained from the Ethiopian Transport Authority on the numbers of vehicles in different categories.

ADT Data from ERA was obtained to calculate the VMEV. Then, road crashes were characterized using descriptive analysis to examine the relationships among factors and to identify possible causes and contributing factors. An analysis of time variation of crashes was carried out to identify the most crash-prone hours of the day in order to propose enforcement measures to address the situation. Demographic factors of road users were characterized, as well as road environment factors, crashes by collision and vehicle types.

The method used when collecting, processing and analyzing the gathered information can be either quantitative or qualitative research method. The researcher collected numerical data (data in the form of numbers) and analyzed it using statistical methods.

Qualitative research methods: collect qualitative data (data in the form of text, images, sounds) drawn from observations, interviews and documentary evidence, and was analyzed it using qualitative data analysis method [10]. Qualitative methods tend to be more appropriate in the early stages of research and for theory building. Quantitative methods tend to be more appropriate when theory is well developed, and for purposes of theory testing and refinement. In practice, no research method is entirely qualitative or quantitative. For example, a survey may collect qualitative as well as quantitative data using open-ended questions; an experiment may include observations of participant behavior as well as measures of response time and accuracy. This study incorporated quantitative data (e.g. system usage statistics) as well as

qualitative data (e.g. interviews with users).The selection of an appropriate research method is critical to the success of any research project, and must be driven by the research question and the state of knowledge.

The nature of the study required both quantitative and qualitative information to reach a good understanding of road traffic accident causes and trends and to make good measurements. Both kinds of methods have also been used to support conclusions made in the thesis. Mixing qualitative and quantitative research methods is called triangulation method. While most researchers develop expertise in one style, the two types of methods have different, complementary strengths and when used together can lead to a more comprehensive understanding of a phenomenon. [21]

This study was done based on both peer reviewed and reviewing the existing literature. An active search for informal and formal information about RTAs in the country was done to analyses the RTAs problem.

3.1 The Study Site

The study site is on the road from Addis Ababa to Jimma about 323 km from near Sabata up to check point near to Jimma town. The road is a two-lane, two-way highway with high standard in the country. Fertile land which is suitable for agriculture is located along the route especially large scale farmers of flowers and other plants, and also teff growing farmers are inhabited at the sides of the road. In general, the road connects the capital city of the country to origin and coffee producing South West of the Countries and also to the main agricultural potential of the SPNN the road traverses through Wolkite, Woliso up to Sabata towns.
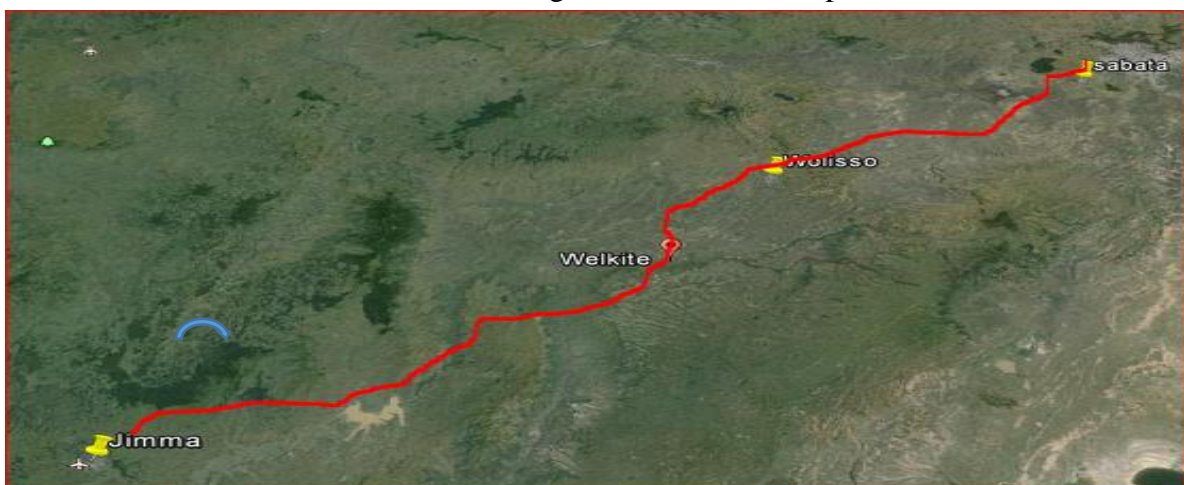
FIGURE 3. 1 MAP OF THE STUDY ROAD: ADDIS ABABA-JIMMA ROAD

3.2 Sources of Data

The types of data used in this study were primary data(Questionnaires, interview) and secondary data.(are obtained from the Ethiopian Federal police Commission police accident files of Jimma Zone police Department, Oromia Regional state police commission, and Several techniques was employed to collect primary data. Some of these include: attitudinal surveys involving structured questionnaires, field observations of vehicle flows and real road situations. In this study, four structured attitudinal type of questionnaires were designed. The first was completed by the pedestrians, the second by School traffic, the third by drivers and the fourth by cyclists.

The questionnaires were designed to allow the researcher to identify the most profound difficulties and traffic safety problems that road users face while moving along and crossing the roads of the town and rural area. It is also designed to serve the researcher to identify the level of adherence and understanding of traffic regulations of the individual person being interviewed. In addition, the questionnaires were designed to allow the researcher to provide measures of the traffic experience, perception, attitude as well as stated driving and road crossing behavior of drivers, children, pedestrians and cyclists.

3.3. Data Collection Techniques

The data or information collected by the researcher were both primary, i.e. the researcher collected the material himself, and secondary, i.e. already documented material were used as a data source, which were done in either quantitative or qualitative way. In this thesis, both the primary and secondary data were used

Traffic accident data from Federal Traffic Police Bureau was collected. Field survey is attempted for the collection of actual traffic flow of vehicles in the selected network. For the field data collection a tally procedure is followed to count the number of vehicle, which pass a given point. Continuous data is collected, and it is grouped in to ten-minute data, for the daily record.

3.4 Population Size

The population for this research was drivers, pedestrians; school traffic safety and road cyclist in order to select and fix sample `size or sample populations the researcher first assessed the recorded traffic police accident data and conducted pilot surveys on the Highway for 10 days (Sunday to Wednesday) in July, 2015. During the time of preliminary survey on the Highway the researcher decided 30 pedestrians, 30 motor vehicles driver, 20 cyclists, 20 school traffic safety to take as a sample from these different sites, the above sample size would give a clear picture of traffic accident problems on the Highway from Addis Ababa to Jimma. Therefore, in this study a total of 100 respondents were chosen randomly, and they were given the questionnaires at different times.

3.5 Study Variables

Dependent Variables

- Road Traffic Accidents

In dependent Variable

- Road users: Pedestrian, Drivers, Cyclist
- Vehicular performance
- Road condition

The sampling method was non-probability sampling which selected because of limited size of the population on the Highway .The sample size for the study was estimated using the formula for estimating single proportion at 95% confidence interval (CI) level.

3.6 Data Collection Process

Questionnaires was used as the instrument to collect data. The questionnaire was sent to the data collector. The request forms to complete the questionnaire are attached in the list of dummy tables. To ensure the correct departments are engaged the data collector follows the data collection procedure in accordance of ethical consideration. to test the magnitude of relationship between dependent variable and independent variables, simple linear regression model was used.

3.7 Statistical analysis

After the data collection, the next step was the statistical analysis which included several tests. Beyond the descriptive statistics, the data were analyzed with the principal component method (factor analysis) as well as with the stepwise logistic regression method. The principal component analysis (PCA) was chosen due to two main reasons; first in order to find the latent variables (factors) and second in effort to reduce the large number of the variables. In order to characterize the populations of accidents, statistical analysis was applied to determine the Uniformity of the collected data. The arithmetic mean, standard deviation and coefficient of variation of the accident data were calculated for each scheme. The arithmetic mean and standard deviation were used to compare the total accidents on the route with the black spot sites. This helps to know which accidents are significantly higher compared to accidents of other locations (black spot sites).Accident rates were also calculated for each scheme, link and junction with relation to some of the geometric design parameter and traffic factors. Accident rate is defined as follows [4]

$$A \text{ (road section)} = A \times 10^6 365 \times T \times AADT \times L$$

$$A \text{ (junction)} = A \times 10^6 365 \times T \times AADT$$

Where,

A (road section) = accident rates per million vehicle-kilometer on road sections,

A (junction) = accident rates per million vehicle entering a junction,

A = number of reported accidents,

T = time frame of the analysis, (years);

AADT = average annual daily traffic; and

L = length of the road section, in kilometer

The above formulae were also applied to determine the accident rates at the black spots. And Site accident investigations were done. Systematic and regular inventories of traffic accident densities per street type are needed to determine the characteristics of the sections of a road network (which show the highest number of accidents) along the Highway

$$AD = \frac{TA}{RLK \times TAY}$$

AD = Accident Density

AT = Total Accident along a particular Highway Section

RLK = Road length in kilometer

TAY = Total Accident Years.

The average accident density for each Section of the highway from Addis Ababa to Jimma was calculated to know the accident density and the following average accidents per kilometer per annum have been obtained.

Use SPSS Version 20 for the data analysis

The Rate per Million of Entering Vehicles (RMEVs) is the number of accidents per million vehicles entering the study location during the study period were Calculated. It is expressed as

$$RMEV = \frac{A \times 1,000,000}{V}$$

RMEV = Accident Rate per Million Entering Vehicles

A = Total Number of Accidents occurring in 5 years at the location

V = Average Daily Traffic (ADT) x 365

3.8 Data Quality Assurance

After data collection process, the data were checked for completeness and any incomplete or misfiled questionnaires were sent back to the respective data collector for correction.

CHAPTER FOUR

DATA ANALYSIS

4.1 Introduction

This chapter presents a background on some of the data that were used for the purposes of this thesis. The data included in this chapter is an overview of the national accident trends and statistics for the past five years. It is important to note that data presented below were not used in the development of the accident rates. Part of the data presented served as a fundamental background in order to understand the national trends and definitions of various variables closely related with the development of the accident rates. In order to construct the statistical foundation for the development of the safety model, a variety of sources were considered as a source of data. Such Sources included Transportation Statistics The social and psychological impact of road traffic accidents in the study areas, human suffering for victims and their families of road traffic–related injuries is incalculable. There are endless repercussions: families break up; high counselling costs for the bereaved relatives; no income for a family if a breadwinner is lost; and thousands of dollars to care for injured and paralyzed people. On top of that, road traffic accident is remains as the major causes of mental health problem (WHO, 2004).

4.2 Accident Statistics

Every year the Ethiopian Federal Police Bureau Collect and Compile several documents that summarize various road traffic accident issues. In this section, some of the available data will be discussed, together with some summarized tables and graphs

As the a socio-economic status of Ethiopia's regions and towns change, road traffic accidents are bound to increase and assume greater importance as a cause of deaths, injuries and property damage. This observation is supported by the Federal Police Traffic data, which shows that the number of road traffic accidents increased from 1852 in 2010/11 to 2664 in 2014/15, an increase of nearly 812 at a national level and the number of accidents Grew up every years

4.3 Under-Reporting of Road Accidents:

 All road accidents, even property damage accidents, are required to be reported. Yet, the traffic police officials of different Zones and districts readily acknowledged during the discussion that not all accidents are reported to them and their statistics greatly underestimates the extent of the true accident situation. To support the idea of under reporting of accidents on this highway, the writer designed the questions for pedestrians, drivers and cyclists as and their responses were as follows.

As shown on questionnaires, almost 36.7 percent of pedestrians, 25 percent of drivers and 54 percent of cyclists replied that as they faced or observed accidents while moving on the highway. Out of these, only 81.8 percent of pedestrians 80 percent of drivers and 24 percent of cyclists have reported immediately to the police. This implies that not all road accidents are perceived as crimes and many road users prefer to settle claims immediately and not involve the police. In addition, the current reporting procedures do not make it easy for road accidents to be reported to the police. Accident investigator traffic police are few in number and they have no mobile patrols. Accordingly, if a party wants to report an accident, they must go to the police station and request it to be reported.

4.3 The magnitude of RTAs in Ethiopia (2010/11-2014/15) in terms of Severity

The chart below illustrates the grave circumstance and repercussions of RTAs on individuals on in Ethiopia. As it shown, in Ethiopia road traffic accidents are neglected causes of morbidity and mortality which leads a lot of people to death and permanent impairment. However, the

figure below does not represent total number of RTAs in the Country, a lot of number of accidents left unreported or underreported due to shortage of traffic personnel
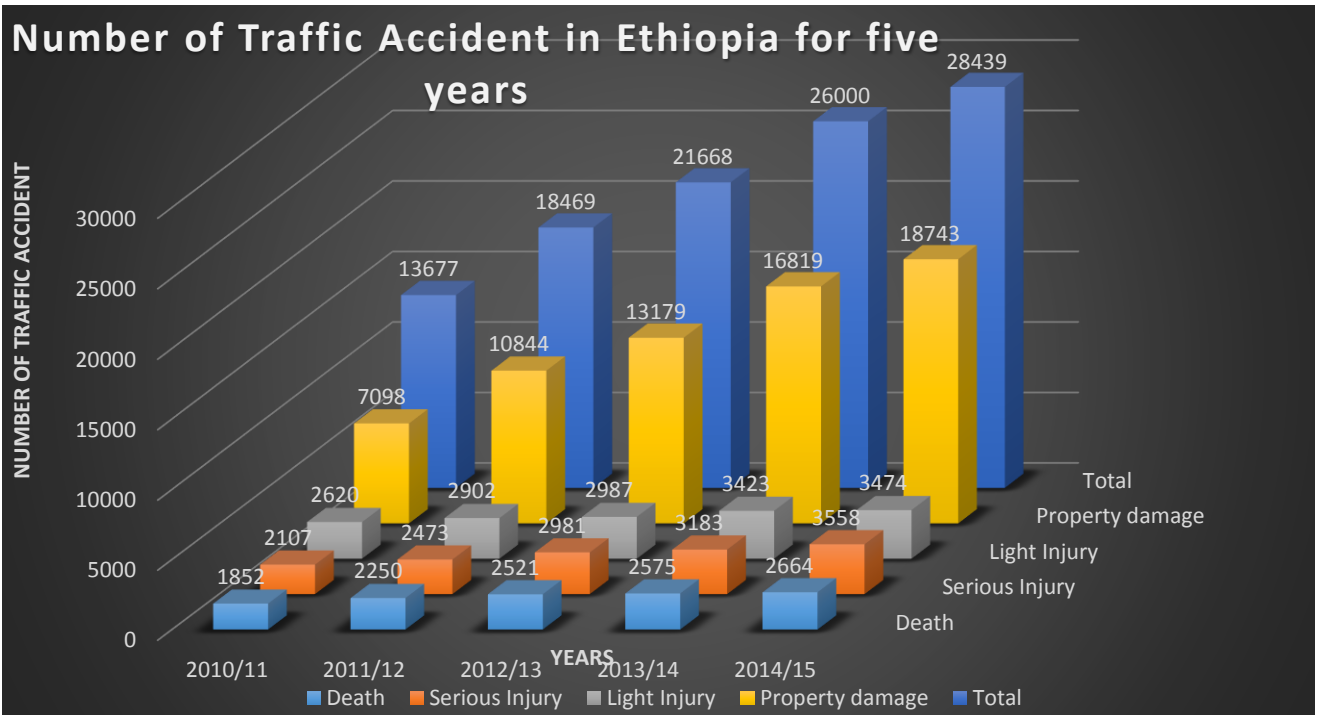
FIGURE 4. 1 TOTAL ROAD TRAFFIC ACCIDENT IN ETHIOPIA IN THE YEAR 2010/11-2014/15
Source: -Federal Police Commission, Road Traffic Accident Statistics Office, 2015

Morbidity due to injuries from road traffic crashes cause considerable human suffering of victims and their relatives. Relatives or family members of victims experience continuous absence from work, sorrow, suicidal feelings and anxiety attacks. In many developing countries, the costs of prolonged medical care, the loss of the family bread winner, the cost of a funeral, and the loss of income due to disability can push families into poverty; this in turn creates new social status or meaning to survivors. Moreover, drivers who are involved in accidents suffer a number of adverse consequences even if they are not injured. For example, a driver may be prosecuted for negligence or even manslaughter as a result of an accident. In relation to the number of accident increasing every years as shown below.
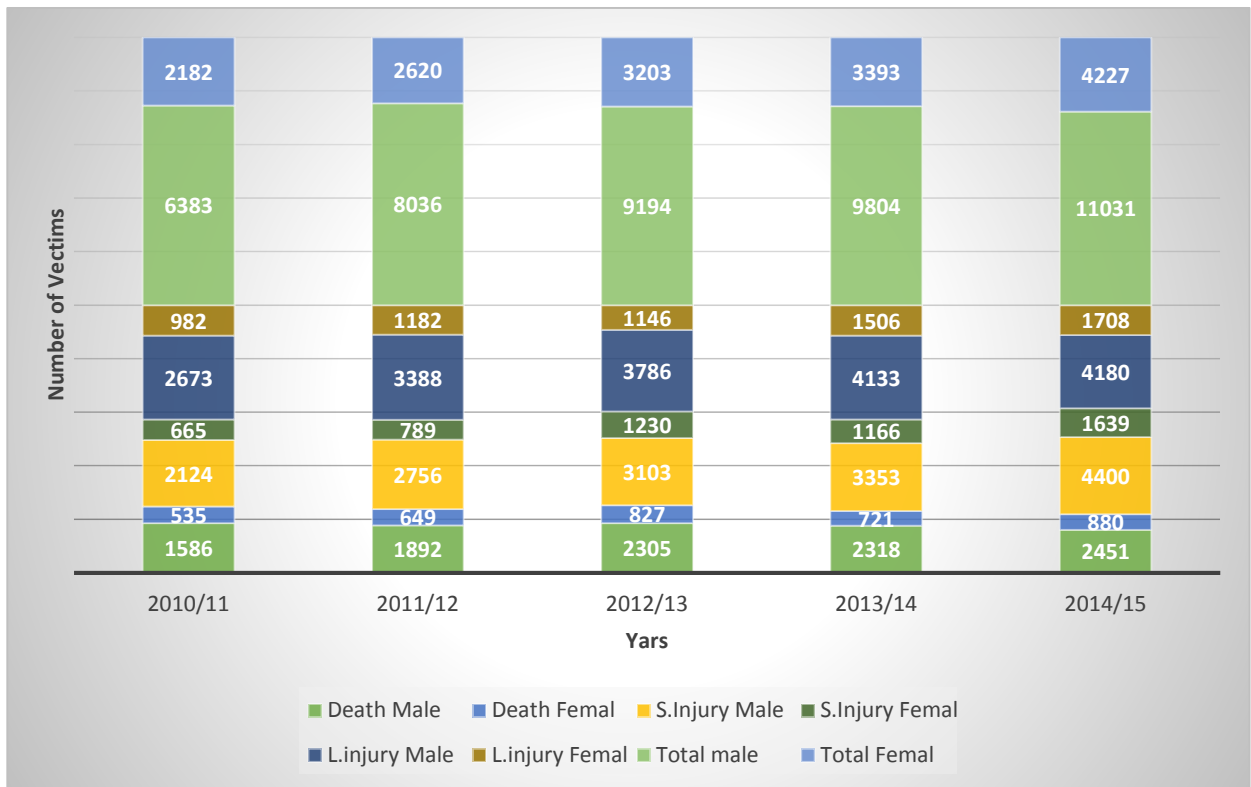
FIGURE 4. 2 TOTAL VICTIMS OF ROAD TRAFFIC ACCIDENT IN ETHIOPIA IN THE YEAR 2010/11-2014/15

Source: -Federal Police Commission, Road Traffic Accident Statistics Office, 2015

4.4 Property Damaged Accidents only

The consequences of road traffic accidents have both social and economic impacts. One of the major economic impacts caused by road traffic accidents is damage on property. The main cost component in damage to property is the value represented by crashed vehicles Property damage, however, also includes damage caused to objects inside the vehicles, such as cargo, and damage to objects outside the vehicles, such as, roadside furniture (sign posts, guardrails, etc.) and fixed property (fences, houses, etc.).The amount of damage on property usually depends on the number of accidents. The higher the number of road traffic accidents the larger the damage on property. Generally five years data indicates that property damage only increases from year to year.

FIGURE 4. 3 ROAD TRAFFIC ACCIDENT OBSERVED DURING FIELD SURVEY
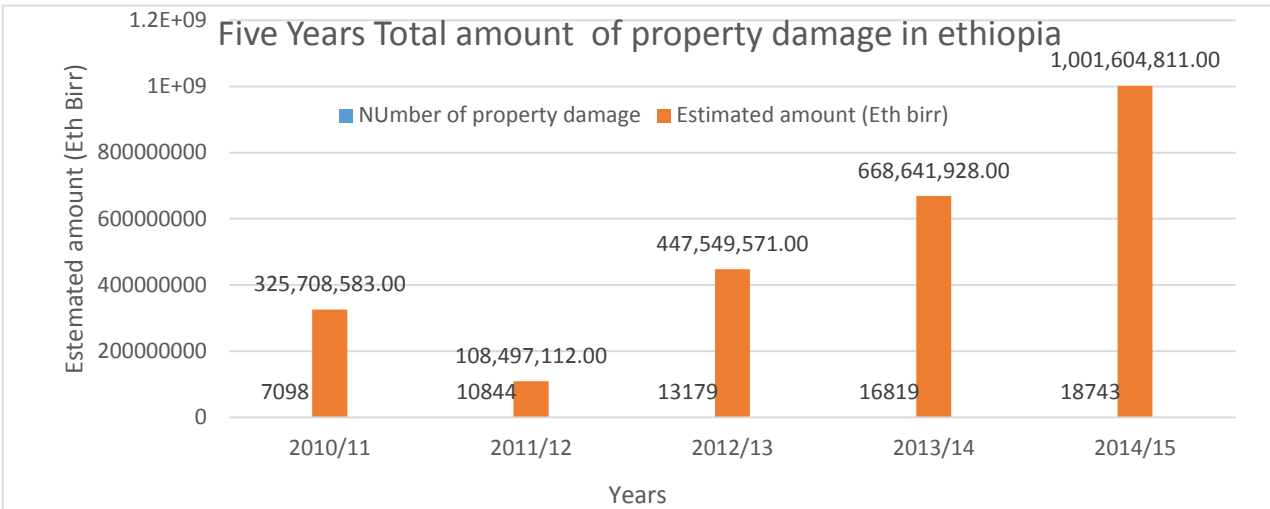
FIGURE 4. 4 PROPERTY DAMAGE IN ETHIOPIA IN THE YEAR 2010/11-2014/15

Source: -Federal Police Commission, Road Traffic Accident Statistics Office, 2015

4.5 The magnitude of RTAs in Oromya (2010/11-2014/15)

Road traffic Accidents in terms of Age of drivers causing accident in Oromia region is shown below. More accidents had occurred between the age group 18-30 years followed by the age group between 31-50. This indicates that Day time is the highest accident time occurred. Comparatively the number of vehicles using night time was small

TABLE 4. 1 ROAD TRAFFIC ACCIDENT WITH LIGHT CONDITION FROM 2010/11-2014/15 IN OROMIA REGION

S.No.	Light Condition	Cause of Accident				
		Fatality	Heavy injury	Light injury	Property Damage	Total
1	Day Light	980	1014	797	1900	4691
2	Night	1776	1419	1517	2173	6885
3	Morning	956	455	625	1418	3454
4	Night with traffic light	342	253	257	926	1778
5	Night with week traffic light	947	437	416	1189	2989
6	Night no traffic light	966	817	1246	1462	4491
7	Other	395	51	143	418	1007
Total		6362	4446	5001	9486	25295

Source: Oromya Police Commission, Road Traffic Accident Statics Office, 2015

FIGURE 4. 5 NUMBER OF ACCIDENT OCCURRED OROMYA REGION BY AGE GROUP IN THE YEAR 2010/11-2014/15

Drivers causing accident by age group in Oromya from

	Under-18	18-30	31-50	Over-51	Unknowing
Fatality	412	2445	1644	338	178
Heavy injury	187	1633	949	589	124
Light injury	179	1675	1402	484	161
Property damage	632	3059	2604	908	634
Total	1410	8812	6599	2319	1097
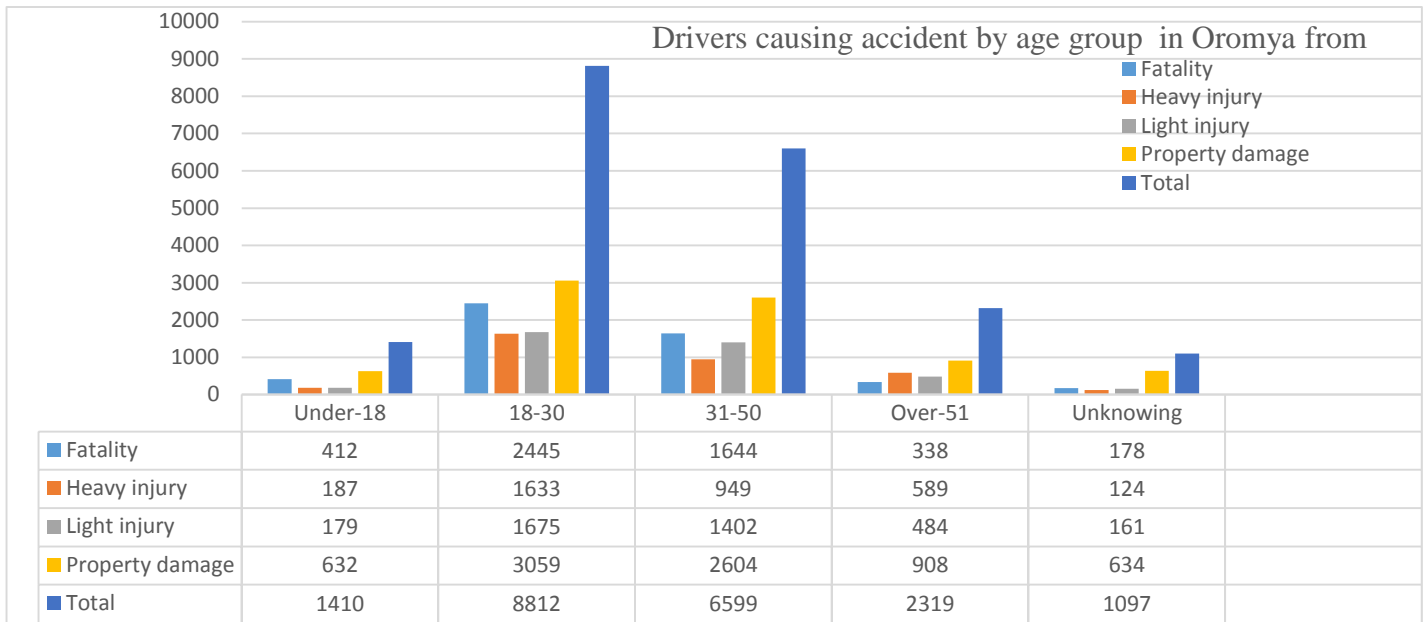
Source: Oromya Police Commission, Road Traffic Accident Statistics Office, 2015
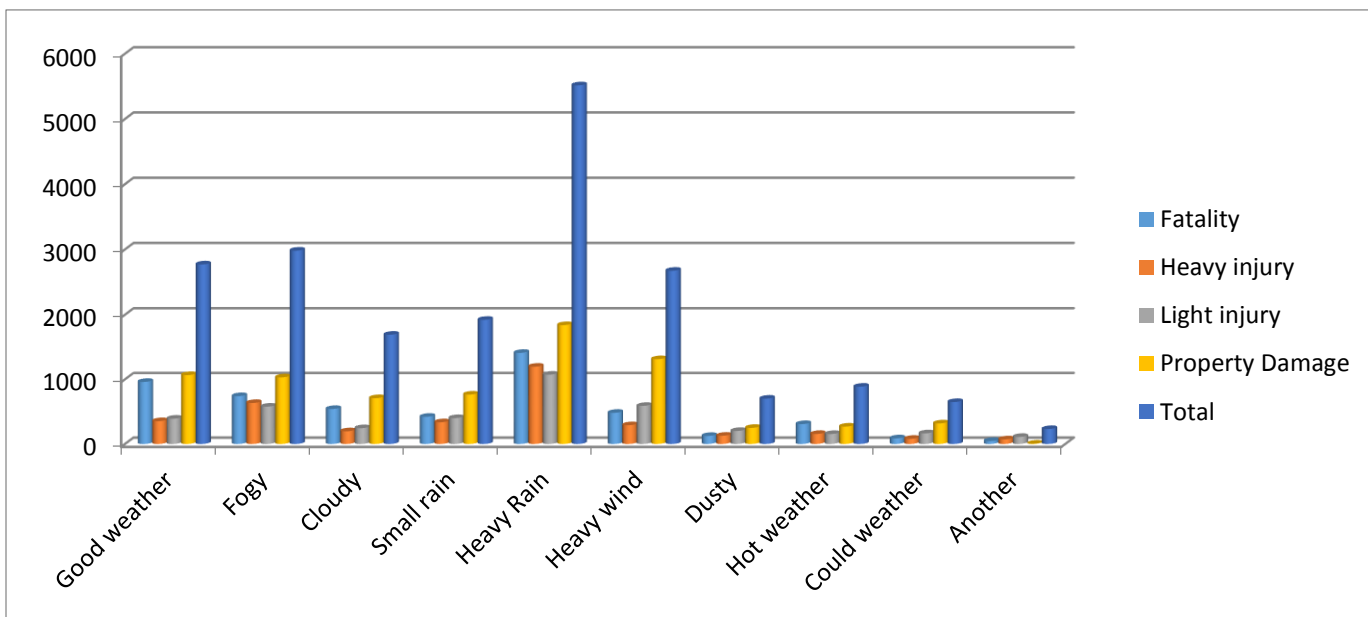
FIGURE 4.6 NUMBER OF ACCIDENT OCCURRED IN OROMYA REGION BY WEATHER IN THE YEAR 2010/11-2014/15

Source: -Jimma Zone, Yem Woreda, Gurage and Woliso Zone Police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15 Compiled by the researcher

4.6 Distribution of RTAs on the Highway from Addis Ababa to Jimma (2010/11-2014/15)

On the highway from Addis Ababa to Jimma which was the study area the road traffic accident was categorized as shown below.

4.6.1 Variations of Traffic Casualties by Sex and Age Groups

On the Highway from Addis Ababa to Jimma, the road traffic accident risk for male population is by far higher than that of females. The data collected accidents caused by male accounted for about 99.58percent of the whole casualties.

TABLE 4.2 DISTRIBUTION OF NUMBER OF CASUALTY BY SEX GROUP BETWEEN 2010/11 TO 2014/15

S.No.	Sex	Cause of Accident				Total	%
		Fatality	**Heavy injury**	**Light injury**	**Property Damage**		
1	Male	473	140	42	290	**945**	**99.58**
2	Female						
3	Unknown	1	1	2		**4**	**0.42**
Total		**474**	**141**	**44**	**290**	**949**	**100**

Source: -Jimma Zone, Saja Woreda, Gurage and South West Showa Zone Police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

The distribution of road traffic accident victims varies with age, mainly depending on their amount of exposure and degree of safety awareness As can be seen in Table 4.3, the road accident risk is very high among the male work- force (18-30 age group), which accounts for 59.43 percent of all casualties on the highway

TABLE 4. 3 DRIVERS CAUSING ACCIDENT AT DIFFERENT AGE GROUPS BETWEEN 2010/11-2014/15

S.No.	Age	Accident Caused				Total	%
		Fatality	Heavy injury	Light injury	Property Damage		
1	Under-18						
2	18-30	255	83	35	191	**564**	**59.43**
3	31-50	186	45	5	95	**331**	**34.88**
4	Over-51	2	13	2	4	**21**	**2.21**
5	Unknowing	31		2		**33**	**3.48**
Total		**474**	**141**	**44**	**290**	**949**	**100.00**

Source: -Jimma Zone, Saja special Woreda, Gurage Zone Police and South West Showa Zone police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

4.6.2 Educational level of Drivers' Causing Accident

The distribution of road traffic accident varies with educational level, mainly depending on their amount of exposure and degree of safety awareness As can be seen in Table 4.4 the road accident risk is very high among the of the accidents were Caused by drivers with educational level of High school, which accounts for 42.9% percent of all casualties on the highway were caused by drivers with educational level Secondary and Elementary School. Which Accounts 25.2% and 15.6% of total casualties.

TABLE 4. 4 EDUCATIONAL LEVEL OF DRIVERS' CAUSING ACCIDENT ALONG THE HIGHWAY

S.No.	Educational level	Cause of Accident				Total	%
		Fatality	Heavy injury	Light injury	Property Damage		
1	Illiterate	12				12	1.26
2	Read & write	5		4	2	11	1.16
3	Elementary	80	11		57	148	15.6
4	Secondary	107	24	10	99	240	25.29
5	High school	196	85	10	117	408	42.99
6	college	27	21	18	15	81	8.54
7	Unknowing	47		2		49	5.16
Total		474	141	44	290	949	100

Source: -Jimma Zone, Saja Woreda, Gurage and South West Showa Zone Police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

TABLE 4. 5 EXPERIENCE LEVEL OF DRIVERS' CAUSING ACCIDENT ALONG THE HIGHWAY

S.No.	Experience	Cause of Accident				Total	%
		Fatality	Heavy injury	Light injury	Property Damage		
1	None	5	2		2	**9**	**0.95**
2	Less than 1 year	9		2	25	**36**	**3.79**
3	1-2 years	8		1	18	**27**	**2.85**
4	2-5 years	30	22	13	100	**165**	**17.39**
5	5-10 years	37	7	7	77	**128**	**13.49**
6	More than 10 years	8	1		18	**27**	**2.85**
7	Unknowing	377	109	21	50	**557**	**58.69**
Total		**474**	**141**	**44**	**290**	**949**	**100**

Source: -Jimma Zone, Saja special Woreda, Gurage Zone Police and South West Showa Zone police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

Road traffic accidents along this highway were also categorized based on the age of the vehicles which indicates that, about 56% of accidents were caused by vehicles whose age were not known, 22.34% of accidents were caused by vehicles whose age were 5-10years and 10%% of the accidents were caused by vehicles whose age were 2-5 years since they started work, respectively. In other wards about 33% of the accidents were caused by vehicles less than 10 years old, since manufactured.

TABLE 4. 6 NUMBER OF ACCIDENT WITH THE AGE OF VEHICLES ON THE HIGHWAY

S.No.	Years of service	Cause of Accident				Total	%
		Fatality	Heavy injury	Light injury	Property Damage		
1	Up to 1year	14		1	11	26	2.74
2	1-2 years	16	20		23	59	6.22
3	2-5 years	35	11	7	50	103	10.85
4	5-10 years	27	36	14	135	212	22.34
5	More than 10 years	4			12	16	1.69
6	Unknowing	378	74	22	59	533	56.16
Total		474	141	44	290	949	100

Source: -Jimma Zone, Saja special Woreda, Gurage Zone Police and South West Showa Zone police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

4.6.3 Distributions of Road Traffic Accidents between days of a week

These two days are market days on many parts of the highway and people from nearby rural area come to sell their agricultural produce and buy industrial commodities. During these days, the numbers of non-motorized traffic as well as the number of pedestrians was high. However, pedestrian walk way and non-motorized lane for animal drawn carts are not provided

Table 5.7 describes that, there is a slight variation in the occurrence of RTAs among the Days of week on the highway from jimma to Addis Ababa. Comparatively, Weekends of the week are highest their RTA panorama on the highway from 2010/11 to 2014/15 where they contribute (17.28%) and (16.86%) respectively of the total crashes during the study period. This could be mainly due to the effect of weekend recreation.

TABLE 4.7 DISTRIBUTIONS OF ROAD TRAFFIC ACCIDENTS BETWEEN DAYS OF WEEK

S.No.	Day	2003	2004	2005	2006	2007	Total	%
1	Monday	15	14	20	19	23	91	9.59
2	Tuesday	18	22	23	31	26	120	12.64
3	Wednesday	33	35	36	33	27	164	17.28
4	Thursday	28	26	25	31	29	139	14.65
5	Friday	20	23	21	21	26	111	11.7
6	Saturday	30	32	30	33	39	164	17.28
7	Sunday	29	30	31	33	37	160	16.86
Total		173	182	186	201	207	949	100

Source: -Jimma Zone, Saja special district, Gurage Zone Police and South West Showa Zone police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

4.6.4 Distributions of Road Traffic Accidents between hours of a day

As shown in Table 5.8 the distribution of road traffic accidents throughout the day was not the same. There are hours in which the concentrations of road traffic accidents were relatively high. These hours on This Highway are1000-1200 day corresponding to the late afternoon and 1300-1400 early evening. These hours are usually related to peak hours of motor vehicles, pedestrians and cyclists movement; and these may also be related to the fact that work to home trips are made over much more concentrated period than are the home-to-work trips. Therefore, motorized and non-motorized vehicle conflicts at these times would be significantly giving more potential for accident occurrence

TABLE 4.8 DISTRIBUTIONS OF ROAD TRAFFIC ACCIDENTS BETWEEN HOURS OF A DAY

S.No.	Time	2003	2004	2005	2006	2007	Total	%
1	0100-0200	4	4	4	11	4	27	2.85
2	0200-0300	7	8	8	7	9	39	4.11
3	0300-0400	4	4	4	14	4	30	3.16
4	0400-0500	3	3	3	8	4	21	2.21
5	0500-0600	8	8	8	5	8	37	3.9
6	0600-0700	8	11	9	14	13	55	5.8
7	0700-0800	9	8	8	7	9	41	4.32
8	0800-0900	6	13	8	8	12	47	0.5
9	0900-1000	2	7	3	6	5	23	2.42
10	1000-1100	9	12	14	12	13	60	6.32
11	1100-1200	11	11	15	9	12	58	6.11
12	1200-1300	8	11	12	10	12	53	5.58
13	1300-1400	15	14	14	15	14	72	7.59
14	1400-1500	11	7	7	8	9	42	4.43
15	1500-1600	12	14	16	14	17	73	7.69
16	1600-1700	15	13	13	11	13	65	6.85
17	1700-1800	6	5	5	4	7	27	2.85
18	1800-1900	10	9	9	8	9	45	4.74
19	1900-2000	4	4	4	4	6	22	2.32
20	2000-2100	9	5	11	10	10	45	4.74
21	2100-2200	5	4	4	6	7	26	2.74
22	2200-2300	3	3	3	7	5	21	2.21
23	2300-2400	2	2	2	3	2	11	1.16
24	2400-0100	2	2	2		3	9	0.95
Total		173	182	186	201	207	949	100

Source: -Jimma Zone, Saja special Woreda, Gurage Zone Police and South West Showa Zone police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

TABLE 4.9 ACCIDENT CAUSED BY LIGHT CONDITION ON THE HIGHWAY FROM ADDIS ABABA TO JIMMA IN THE YEARS 2010/11-2014/15

S.No.	Light Condition	Cause of Accident				Total	%
		Fatality	Heavy injury	Light injury	Property Damage		
1	Day Light	326	58	35	206	625	65.86
2	Night	10	14	4		28	2.95
3	Morning	4	10	1	24	39	4.11
4	Night with traffic light	10	10	1	3	24	2.53
5	Night with week traffic light	8		1	12	21	2.21
6	Night no traffic light	112	48	2	45	207	21.81
7	Unknown	4	1			5	0.53
Total		474	141	44	290	949	100

Source: -Jimma Zone, Saja special Woreda, Gurage Zone Police and South West Showa Zone police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

4.7. Variations of Accidents by Vehicle Type

Road traffic accidents vary by type of vehicles with their corresponding compositional structure in the vehicle fleet. On the highway, this factor is quite relevant. The mixture effects mean that different types of vehicles use the same roads. This leads to high potential risk, especially for non-motorized road users. As indicated in Table below accident Shows most accident is Caused by ISUZU car capacity 11-40 Quintal and followed by ISUZU car capacity 41-100 Quintal minibus 12 seat and bus 12-35 seat

TABLE 4.10 ACCIDENT CAUSED BY VEHICLE TYPE ON THE HIGHWAY FROM ADDIS ABABA TO JIMMA IN THE YEARS 2010/11-2014/15

S.No.		Accident Caused	Types of vehicle																			Total	%
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
			bicycle	Motor bicycle	Auto mobile	Station wagon	Pickup up to 10 Quintal	capacity 11–40 quintal	capacity 41-100 quintal	Truck trailer	Fuel truck	taxi	minibus 12 seat	bus 13-45 seat	bus >46 seat	Machineries	Machineries with	cart drown	Trainee	Another	unknowing	Total	%
1		**Fatality**		27	16	17	22	143	80			10	50	44	25	10				24	6	**474**	49.95
2		**Heavy injury**	2	1			23	20	23			4	29	29						10		**141**	14.86
3		**Light injury**		1		1	2	13	2				14	11								**44**	4.64
4		**Property Damage**		8	7	6	15	112	101	13	7	6	10	5								**290**	30.56
		Total	**2**	**37**	**23**	**24**	**62**	**288**	**206**	**13**	**7**	**20**	**103**	**89**	**25**	**10**				**34**	**6**	**949**	100.00

Source: -Jimma Zone, Saja Woreda, Gurage and South west Showa Zone Police Commission, Road Traffic Accident Statistics Office,
2010/11-2014/15

As can be seen from Table 4.11, the total damage on property accidents only estimated in birr in the years between 2010/11to 2014/15 was greater than 33,331,780 birr. Looking at the distribution of wasted property within a year for the last five years, one can understand that a picture of huge sum of money is lost each year

Table 4. 11 Reported Damaged Property Accidents and Estimated Costs in Birr on Addis Ababa to Jimma highway

Years	Estimated property Damage		%
	Birr	cent	
2003	4,008,800.00	0.00	12.0
2004	4,816,800.00	0.00	14.5
2005	6,158,936.00	0.00	18.5
2006	7,114,204.00	0.00	21.3
2007	11,233,040.00	0.00	33.7
Total	33,331,780.00		

Source: -Jimma Zone, Yem special District, Gurage and SWSZ Police Commission, Road Traffic Accident Statistics Office, 2010/11-2014/15

The main cause of the high road accident rates of highway from Addis Ababa to Jimma Problem related to driver. The Karl Pearson Coefficient of Correlation was utilized to compute the relationship between the Road traffic Accident accidents (dependent variable) and Various Demographic Characteristics of Drivers, vehicles, Pedestrian and Different Road Environment. (Independent variables). Correlation Describe about two variables

Correlation Coefficient   Interpretation

-1   Perfectly negatively correlated

 1   Perfectly positively correlated

[1, 0.3]   Positively Correlated

[-1,-0.3]   Negatively Correlated

 [-0.3, 0.3]   No Correlation

As observed above the relation between vehicle problem and Vehicle problem was 1 which shows perfectly positively correlated, the relation between Vehicle problem and Fatality, Vehicle problem and Heavy injury, Vehicle problem and Light injury and Vehicle problem and property damage were -0.075,-0.283,-0.495 and -0.125 respectively which shows negatively correlated for all and No Correlation between vehicle problem and property damage only

Table 4.12 The Association between Road Traffic Accidents and Independent Variable (Vehicles problem)

Correlations		Vehicle Problem	Fatality	Heavy Injury	Light Injury	Property Damage
Vehicle Problem	Pearson Correlation	1	-.075	-.283	-.495	-.125
	Sig. (2-tailed)		.873	.539	.258	.789
	N	7	7	7	7	7
Fatality	Pearson Correlation	-.075	1	.933**	.399	.952**
	Sig. (2-tailed)	.873		.002	.375	.001
	N	7	7	7	7	7
Heavy Injury	Pearson Correlation	-.283	.933**	1	.471	.959**
	Sig. (2-tailed)	.539	.002		.286	.001
	N	7	7	7	7	7
Light Injury	Pearson Correlation	-.495	.399	.471	1	.568
	Sig. (2-tailed)	.258	.375	.286		.183
	N	7	7	7	7	7
Property Damage	Pearson Correlation	-.125	.952**	.959**	.568	1
	Sig. (2-tailed)	.789	.001	.001	.183	
	N	7	7	7	7	7

**. Correlation is significant at the 0.01 level (2-tailed).

Systematic and regular inventories of traffic accident densities per street type are needed to determine the characteristics of the sections of a road network (which show the highest number of accidents) along the Highway

$$AD = \frac{TA}{RLK \times TAY}$$

> AD = Accident Density
>
> AT = Total Accident along a particular Highway Section
>
> RLK = Road length in kilometer
>
> TAY = Total Accident Years.

The average accident density for each Section of the highway from Addis Ababa to Jimma was calculated to know the accident density and the following average accidents per kilometer per annum have been obtained.

1. Sabata 27+000 to Bridge near Wolkite 147+000 length 120 km

Accident Density = $\frac{76}{120 \times 207}$ AD = 0.003 Average accidents per km per annum.

2. Gurage zone 147+000 to Gibe Bridge 186+000\ length 39k m

Accident Density = $\frac{81}{39 \times 207}$ AD = 0.009 Average accidents per km per annum.

3 Part of jimma Zone, Gibe Bridge 186+000 to 232+000 near Saja length 46 k

Accident Density = $\frac{6}{46 \times 20}$ AD = 0.0006 Average accidents per km per annum.

4 Yem Special Woreda, 232+000 to 238+000 near Saja length 8 km

Accident Density = $\frac{1}{8 \times 207}$ AD = 0.0006 Average accidents per km per annum.

5 Jimma Zone, 238+000 to 346+000 near jimma town at Check point length108 km

Accident Density = $\frac{43}{108 \times 207}$ AD = 0.0019 Average accidents per km per annum

To facilitate the comparison of results obtained from the analysis of accidents at a particular Location AD   with those of other locations, one or more accident rates could be used. These accident rates are determined on the basis of exposure data, such as traffic volume, and the length of road section being considered. Commonly used rates (based on the measurements and methods of Garber and Hoel) are rate per million of entering vehicles and rate per 100 million vehicle per kilometer as discussed below. The Rate Per Million of Entering Vehicles (RMEVs) is the number of accidents per million vehicles entering the study location during the study period. It is expressed as

RMEV = $\underline{A \times 1,000,000}$

$\qquad\qquad$ V

RMEV = Accident Rate per Million Entering Vehicles

A = Total Number of Accidents occurring in 5 years at the location

V = Average Daily Traffic (ADT) x 365

Based on the above formula accidents per million vehicles entering for each main street in the year 2015 has been calculated and the following results were obtained. The Computations were done at five selected locations starting from the end of study area near jimma check, point Saja, Wolkite and South west Showa ADT Count were collected from ERA

1. Sabata 27+000 to Bridge near Wolkite 147+000 length 120 k

$$RMEV = \underline{A \times 1,000,000}$$

$$V$$

$\underline{348 \times 100,000}$ $\qquad$ = 322 *accidents/million entering vehicle*

3050 x 365

This implies that, the number of all accidents recorded along this highway from Sabata to Wolkite st.147+000 between the last five years was 174, and the average 24 hours volume entering from all directions was 3050 vehicles; thus the accident rate per million entering vehicles in this road accounted for   322 accidents/million entering vehicle

1   Gurage zone 147+000 to Gibe Bridge 186+000 length 39k m

$$RMEV = \frac{A \times 1,000,000}{V}$$

$$\frac{372 \times 1,000,000}{2191 \times 365} \qquad = 465 \text{ accidents/million entering vehicle}$$

3   Part of jimma Zone, Gibe Bridge 186+000 to 232+000 near Saja length 46 k

$$RMEV = \frac{A \times 1,000,000}{V}$$

$$\frac{27 \times 1,000,000}{709 \times 365} \qquad = 104 \text{ accidents/million entering vehicle}$$

4   Yem Special Woreda, 232+000 to 238+000 near Saja length 8 km

$$RMEV = \frac{A \times 1,000,000}{V}$$

$$\frac{2 \times 100,000}{709 \times 365} \qquad = 8 \text{ accidents/million entering vehicle}$$

5   Jimma Zone, 238+000 to 346+000 near jimma town at Check point length108 km

$$RMEV = \frac{A \times 1,000,000}{V}$$

$$\frac{161 \times 100,000}{1526 \times 365} \qquad = 289 \text{ accidents/million entering vehicle}$$

Thus, it should be noted that, On the Highway from Addis Ababa to Jimma section from 147+000 to Gibe Bridge 186+000 which was in Gurage zone have more accident rate per/million entering vehicles and roads section from Sabata 27+000 to Bridge near Wolkite 147+000 length 120km was the second record of accident this is due to over speed, violation of traffic law and road has more traffic volume than other roads as observed during field surveying

Summary of AD and RMEV

Location	Station	AD	RMEV/M
Sabata	27+000-147+000	0.003	322
Gurage Z.	147+000-186+000	0.0009	465
Jimma	186+000-232+000	0.0006	104
Yem	232+000-238+000	0.0006	8
Jimma	238+000-346+000	0.0019	289

4.8 CAUSES CONTRIBUTING TO ROAD TRAFFICACCIDENTS

4.8.1 Primary Causes Reported by Police

Accidents commonly have multiple of causes, in that they stem from a number of adverse circumstances. The Ethiopian traffic police are responsible for completing the traffic accident forms. As indicated on report from federal police, more than 80 percent of the total traffic accidents were caused by human error (drivers and pedestrians) and appear to be serious problem as reported by the police. The contribution of vehicle defects to road traffic accidents as identified by the police is small percent, which is lower than as one could expect from vehicles accidents. Moreover, the contribution of road factors is not well identified by the police as the causes of traffic accidents. Analysis of the police statistics show that the main causes for all accidents that are related to drivers error include excessive speeding, failure to give way for vehicles and pedestrians, and improper overtaking.

4.8.2 Observed and Questionnaire Surveyed Based Factors that Contribute to Road Traffic   Accidents

Accident statistics from the traffic police provide objectives and priority targets for corrective actions. In order to design such action, it is also necessary to identify the main accident generating process, or associations of explanatory factors related to drivers and pedestrian behaviors to vehicles or to the road environment. But police reported accidents on the Highway from Addis Ababa to Jimma were often incomplete. That is why field observations were performed as a complement to the analysis of various accidents on the Highway. The risk of having accidents were the direct consequences of several factors and elements, such as traffic

behavior of drivers, traffic behavior of pedestrians, road environments, vehicle conditions and the availability of comprehensive and adequate legislation and law enforcement

4.8.3 Traffic Behavior of Drivers

The police traffic accident statistics on the highway indicated that drivers' errors are the main causes of the great majority of road accidents. Higher accident occurrences correlated to the drivers can be explained by many factors, including lack of experience, age, and ignorance and inadequate understanding of the value and use of traffic regulations. These are being believed to be the major causes of the higher accident rates by drivers on the Highway. To achieve the objectives of the study, a questionnaire survey was conducted. The questionnaires were designed to allow the writer to identify the level of adherence and understanding of traffic regulations of the drivers being interviewed, including a series of direct and indirect questions related to traffic regulations and their importance. In addition to this, questions related to age, level of license, number of years of driving educational level, etc. were also included.

Table 4.12 from this table the following characteristics can be observed.

S.No	Questionnaires	Total	%
	sex		
	Male	28	93.3
	Female	2	6.7
	Age	0	0.0
	1. <15	0	0.0
	2. 15 -24	7	23.3
	3. 25_44	18	60.0
	4. 45_64	4	13.3
	5. >64	0	0.0
	Educational level	0	0.0
	1. Illiterate	0	0.0
	2. Read and write/informal	0	0.0
	3. Primary education (1-8)	7	23.3
	4. Secondary education (9-12)	15	50.0
	5. Above secondary	8	26.7
	Level of License	0	0.0
	1. None	0	0.0
	2. First level	0	0.0

3. Second level	2	6.7
4. Third level	18	60.0
5. Fourth level	8	26.7
6. Fifth level	2	6.7
How long have you been driving in on the highway from Addis Ababa to Jimma?	0	0.0
1. Less than one year	1	3.3
2. 1-2 years	5	16.7
3. 2-5 years	11	36.7
4. 5-10 years	8	26.7
5. >10 years	5	16.7
Which type of vehicle do you normally drive?	0	0.0
1. Passenger car	7	23.3
2. Buses	8	26.7
3. Two -Four axle single unit	10	33.3
4. Four-Six axle Single Trailers	5	16.7
5. More than five axle Multi Trailer	0	0.0
How many years is the vehicle give service on this highway which you drive?	0	0.0
1. <2 years	6	20.0
2. 2-5 years	9	30.0
3. 5-10 years	11	36.7
4. >10 years	4	13.3
Where do you often park your motorcar?	0	0.0
1. on street	13	43.3
2. Park area	9	30.0
3. In front of commercial / office area	8	26.7
When you drive, what is your normal speed (approximate) in the town? school/animal cross, villages along the highway	0	0.0
1. < 30 km/ hr	0	0.0
2. 30-40 km/hr	4	13.3
3. 40-50 km/hr	5	16.7
4. 50-60 km/hr	7	23.3
5. >60 km/h	14	46.7

Source: Computed by the writer, 2015.

As it indicates in Table 5.1, the majority of the drivers are male which accounted for (93.3 percent) of all the observations in the study area. Thus, most of the drivers (83.3 percent) are less than 44 years of age. As far as educational status of the respondents is concerned (73.3

percent) of the drivers are less than 12 grades. It has also been found that most drivers have less than 10 years of driving experience, one of the dangerous actions of drivers on the highway Addis Ababa to Jimma is speeding, which caused the majority of accidents for the last Five years (2010/11-2014/15). The speed problem deserves particular attention, which plays a leading part in traffic accidents on the highway

The writer has therefore, attempted to describe speed behavior of the drivers by preparing questionnaires such as "what is your normal speed when you drive on the highway". A set of choices were given which include: <30km/hr, 30-40 km/hr, 40-50km/hr, 50-60km/hr and above 60 km/hr. For this questions majority of drivers responded as follows, (46.7 percent) declared that they currently drive more than 60km/h. From this, it is possible to conclude that current speeds are high on which generating high accident risks. This again tells, us that strict speed control system needs to be enforced in the town. But during the field observations by the writer, yet no adequate speed limit signs are installed and posted on the highway.

Among the drivers' errors indicated in the year 2010/11-2014/15 Road Traffic accident statistics on the highway indicates that, failure to give the right of way to other road users, are placed in the second places. The Ethiopian traffic regulation (Negarit Gazeta, 1963) clearly directs a driver of a vehicle where and how he/she should give priority to other road users. For example, a driver of a vehicle approaching a pedestrian zebra crossing is instructed by the law to slow down, and if pedestrians are crossing, to stop his/her vehicle and permit them to cross the road safely.

To compare the idea discussed above the writer has prepared other questions to study the behavior of drivers by taking sample pedestrians as presented below.

TABLE 4. 13 RESPONDENTS FOR QUESTIONNAIRES ON GIVING PRIORITY AND PEDESTRIAN RESPECTS

How often do you give priorities to pedestrians as required by law?		
1. Always	10	33.3
2. Sometimes	13	43.5
3. Never	7	23.1
How do you rate pedestrians respect ion for vehicles in giving priorities where necessary?		
1. Good	30.0	30.0
2. Moderate	26.7	26.7
3. Poor	43.3	43.3

Source: Computed by the writer, 2015.

In attempt to deduce the perceptions of drivers towards pedestrians safety two interrelated questions were introduced to the drivers as follows the majority of drivers interviewed, (33.3 percent) of the total responded that they always give priorities to pedestrians, (43.3 percent sometimes give priority to pedestrians, and the rest 23.3 percent never give priorities. For the second question the half of the surveyed drivers (43.3 percent) confirms with poor ranking. Thus, the drivers highly criticized pedestrian's behavior in applying the laws and rules of traffic on pedestrian.

In an attempt to assess the perception of Drivers towards traffic safety problems on this highway, a question was asked to the respondents "How do you perceive the level of road traffic accidents on the highway from Jimma to Addis Ababa". The majority of Drivers (60 percent) interviewed agree that the current Road Traffic accident was big problem. This shows that the level of perception of the problems experienced by drivers on the highway is very high. Similar question Have you ever encountered any traffic accident while driving on the high way? More than 26.7 percent were involved at least once.

How do you perceive the level of road accidents problems on this Highway?	0	0.0
1. A big problem	18	60.0
2. A moderate problem	7	23.3
3. Not a problem	4	13.3
Have you ever encountered any traffic accident while driving on the highway?	0	0.0
1. Yes	5	16.7
2. No	15	50.0

To compare the idea discussed above the writer has prepared other questions to study the behavior of drivers by taking sample pedestrians as presented below.

Do you give way/priorities to vehicles as required by law?	0	0.0
1. Always	7	23.3
2. Sometimes	16	53.3
3. Never	7	23.3

. Crossing the main roads on the highway is:	0	0.0
1. Difficult	18	60.0
2. Easy	6	20.0

For the first question, (23.3 percent) of them said "never" and (53.3 percent) responded as "some times. This shows that few drivers were prepared to stop or even slow down for pedestrians while crossing the highway in attempt to deduce the perception of pedestrians towards traffic safety on the highway, a question was asked as to whether crossing the highway is easy or difficult. For this question the majority of the surveyed pedestrians, (60 percent) indicated that they perceived crossing the highway from Addis Ababa to jimma were difficult. It is generally observed that driver's behavior towards pedestrians is rather poor; especially they do not respect pedestrians on road crossing i.e. drivers are less likely to stop for them. Therefore, it can be concluded that pedestrians who totally depend on their traffic rights at crossing points can be at great risk.

In addition, there is a lack of appropriate discipline among drivers in the traffic system when overtaking, changing lane, crossing or entering a road. It is common to see a driver almost widely turning the vehicle without giving priority and signs to other road users in the traffic system on this highway. Therefore, the respect for traffic regulations is very much dependent on the physical presence of traffic police.

Girma (2000) points out that much of the dangerous behavior by drivers could be attributed to lack of knowledge or their general attitude towards road safety. The basic issue of lack of knowledge lies on inadequate driver training and poor evaluation techniques. The existing system for training and examination of new drivers leaves much more to be desired. Drivers were asked questions on what they trust the current driving testing and training procedures.

Table 4.14 Respondents for Questionnaires on level of RTA

Do you favor road side check points? It provides law enforcement to monitor and check drivers' licenses, vehicle registration, vehicle equipment etc.		
1. Favor a lot	16	53.3
2. Favor some	10	33.3
3. Not favor at all	4	13.3

For the first question in the above box, (46.6 percent) of respondents replied that they do not have trusts on the current driving testing and training procedure or they favor some. Through the expression of the drivers interviewed thus appears a negative image of the existing system for training and examination of drivers. For the second question concerning the safety training by concerned parties, the majority of the surveyed drivers, (55 percent) of the sample drivers replied "not yet". This indicates that large numbers of drivers did not gain additional training and education by concerned bodies after getting their driving license.

4.8.4 Traffic Behaviors of Pedestrians

The accident statistics of police from different zones and districts showed that pedestrians are the most vulnerable category of road user in traffic. The high accident risk of pedestrians stems largely from lack of giving priorities to pedestrians by the drivers and the cyclists

As stated pedestrians accidents largely occur due to failure of drivers to give way to pedestrians at road crossing. But a number of accidents can be blamed on the ignorance and lack of attention of some pedestrians. Unlike drivers a considerable section of pedestrians in the town never learn the basic rules of the road safety except through observation. Thus, the following sub sections represent a discussion of the results with 30 pedestrian's traffic behavior study under taken on the highway. An attempt is made to produce some indicators of the traffic experience of the pedestrians on the highway. Traffic experience is considered to be a function of age as well as of traffic exposure. In this study most of the surveyed pedestrians (60 percent) fall with the age group of 25- 44 years, one can look at traffic exposure of pedestrians in terms of the trips they made. To understand the main type of journey purposes perform by the surveyed pedestrian the following questions have been presented.

TABLE 4. 15 RESPONDENTS FOR QUESTIONNAIRES ON PURPOSE OF THEIR TRIP

Which type of trip purpose constitutes most of your time?		
1. to farm field	**11**	36.7
2. Educational Trip	**7**	23.3
3. Shopping	**2**	6.7
4. Recreational	**4**	13.3
5. to office	**6**	20.0

As can be shown from the above box, trip to farm field would be perceived as constituting the main part of pedestrian journey, (36.7 Percent), Educational trip selected (23.3 percent) In an attempt to deduce the perception of pedestrians towards traffic safety problems on the highway, a question was asked to the respondents "How do you perceive the level of road traffic accidents problem on this highway". The majority of pedestrians (73.3 percent) interviewed agree that the current accident problems was a big problem. This shows that the level of perception of the problems experienced by pedestrians on the highway was very high. In the same, the majority of pedestrians interviewed (72.7 percent) replied that they faced or observed road traffic accidents more than one times in their trip on the highway.

TABLE 4.16 RESPONDENTS FOR QUESTIONNAIRES ON PURPOSE OF THEIR

	How do you perceive the level of road traffic accident problems on the Highway?		
	1. A big problem	22	73.3
	2. A moderate problem	8	26.7
	3. Not a problem	0	0.0
	Have you encountered traffic accidents in your journey?	0	0.0
	1. Yes	11	36.7
	2. No	19	63.3
	If your answer is ''yes '' on the above Question, how many times?		
	1. One time	3	27.3
	2. Two times	6	54.5
	3. Three times	1	9.1
	4. >Three times	1	9.1

Pedestrians were also asked a question," Which types of collision or road accidents were highly prevailing on the highway". Alternatives given were: The majority of the surveyed pedestrians interviewed replied bicycles motor vehicle Collision with a static object Ranks the first and Motor vehicle with pedestrians ranks second place.

TABLE 4.17 RESPONDENTS FOR QUESTIONNAIRES ON PREVAILING OF RTA

	Which types of collision or road accidents were highly prevailing on this Highway?		
	1. Motor vehicle with motor vehicle	7	23.3
	2. Motor vehicle with bicycle	1	3.3
	3. Motor vehicle with pedestrians	10	33.3
	4. Motor vehicle with static object	12	40.0
	5. Bicycle with bicycle		
	6. Bicycle with pedestrians	0	0.0
	7. Bicycle with horse drawn carts	0	0.0
	8. Horse drawn cart with pedestrians	0	0.0
	9. Motor vehicle with horse drawn carts	0	0.0
	10. Others	0	0.0

Further, pedestrians were asked the frequency of their side walk and whether they walk along the roads with their backs to the direction of traffic. Contrary to what has been expected, the majority of the surveyed pedestrians, (43.3 percent) indicated that they sometimes use side walk and (63.3 percent) with their face to the oncoming vehicles . On the other hand (36.6 percent) indicated that they walk with their back to traffic. However, still, a relatively high number seemed to indicate that they walk along the highway with back to traffic which further aggravates the potential risk of being exposed to an accident. The tendency of walking with their back to the traffic, however, is certainly related to a lack of knowledge.

TABLE 4.18 RESPONDENTS FOR QUESTIONNAIRES ON SIDE WALKING

How frequently do you use sidewalks and walking along roads?		
1. Always	11	36.7
2. Some times	13	43.3
3. Rarely	6	20.0
4. Never		
While walking along roads, do you walk with your		
1. Face to the oncoming vehicles	19	63.3
2. Back to the oncoming vehicles	11	36.7

Pedestrians were also asked how much they perceive traffic signs, signals, and road marks when they walk and cross the roads. For this question only (56.7 percent) of all pedestrians indicated, as they perfectly understood. But the nearly half of pedestrians, (43.3 percent) were not clearly aware of the traffic signs and road marks.

TABLE 4.19 RESPONDENTS FOR QUESTIONNAIRES ON UNDERSTAND TRAFFIC SIGNS & SIGNALS

Do you understand traffic signs, signals and road marks while you are moving along the highway?		
1. Yes	**17**	56.7
2. No	**13**	43.3

Pedestrians were asked questions as to where they would usually cross the highway. Alternatives given were: at traffic light, at junctions, at any point, at mid- block pedestrian and behind the standing Vehicle. For this question the majority of the surveyed pedestrians, (43.3 percent) have indicated that they would cross roads at any point, (43.3 percent) at mid-block pedestrian crossing away from junctions, (6.7 percent) at junctions and No at traffic light. This shows that about (86.6 percent) of the pedestrians would tend to cross the highway at unsafe points. This represents a dangerous crossing attitude that might lead to the occurrence of accidents.as indicated on the second question crossing the highway was difficult or Easy. As expected, the severity of accidents occurring when pedestrians were crossing was higher. This figure confirms with the result of the majority of the surveyed pedestrians, (60 percent) indicated that crossing this highway was difficult.

TABLE 4. 20 RESPONDENTS FOR QUESTIONNAIRES ON CROSSING THE MAIN ROAD

Where do you usually cross the main roads?		
1. At traffic light	0	0.0
2. At junction	2	6.7
3. At mid-block pedestrian crossing away from junction	13	43.3
4. At any point	13	43.3
5. Behind the standing vehicles	2	6.7
. Crossing the highway is:	0	0.0
1. Difficult	18	60.0
2. Easy	6	20.0

As it has been demonstrated earlier only few drivers are prepared to stop or even slow down for pedestrians while crossing roads. Thus, it could be true that pedestrians who totally depend on their traffic right at crossing points can be at great risk because of drivers being less likely to stop for them.

The pedestrians are also asked a question "which of the driver's error highly aggravated traffic accidents on this highway". The questionnaire result for this question revealed that pedestrians, of all respondents perceived the high speed of vehicles as the most profound problem that endangers their safety when attempting to cross roads. The results also indicate that of

pedestrians perceive non- abidance of drivers to pedestrian's traffic rules as the second serious safety problem encountered while crossing the roads. Limited number of properly designed pedestrian crossing, lack of enforcement and others are problems in their order of seriousness. The rules and regulations recognize the right of pedestrians on the road and restrict drivers to stop upon seeing a pedestrian on the pedestrian crossing. The regulation further provides for penalty against offending motorists. But the respect for traffic regulations and penalties are very much dependent on the physical presence of traffic police along the roads. To understand the perception of pedestrians towards traffic police efficiency on enforcement the writer interviewed the sample pedestrians as mentioned below

The response of the respondents for the first question, (60 percent) indicated that they were Penalties sometimes for their law offensive, while, (16.7 percent) of interviewed pedestrians indicated that they did not see any penalties for law offensive drivers. Concerning the second question in the below, large number of pedestrians interviewed criticize the current system of penalties taking by traffic police against offending drivers, (53.3 percent) of all respondents were replied that the traffic police commitment to their duties are poor.

Table 4.17 Respondents for Questionnaires on breaching and traffic police commitment

Are drivers breaching traffic rules and regulations in the presence of traffic police penalized for their law offensive?		
1. Always	**7**	23.3
2. Sometimes	**18**	60.0
3. Never	**5**	16.7
How do you rate the traffic police commitment to their duties?		
1. V. good	**4**	13.3
2. Good	**10**	33.3
3. Poor	**16**	53.3

Two interrelated questions were introduced to the pedestrians whether they gained education or not about road safety for the first question in the box below large proportion of pedestrians, (80percent) did not get any education about road traffic rules by concerned officials. For the

second question the majority of pedestrians, (40 percent) have indicated that they have learned how to deal with traffic from media (radio and television), and (26.7 percent) through school. Also (16.7 percent) have indicated that they get knowledge from book and (10 percent) of pedestrians have also indicated the involvements of religious leader; and the parent involvements accounted only 6.7 percent. The responses and result demonstrate the almost non-existence of any systematic official source for providing the necessary education, training and information related to traffic safety. Television and radio both have a wide coverage in study area. Thus, essential mixed safety message can promote for influencing human behaviors and attitudes. However, their broadcasting of road safety education is still limited and not gained great attention.

Table 4. 21 Respondents for Questionnaires on awareness of road safety

	Have you ever been give education about road safety rules by concerned officials?		
	1. Yes	6	20.0
	2. No	24	80.0
	Who is your source of knowledge and experience about road safety rules?		
	1. Books	5	16.7
	2. Parents	2	6.7
	3. Schools	8	26.7
	4. Traffic police	0	0.0
	5. Media	12	40.0
	6. Religion leaders	3	10.0

4.8.4 School Children Traffic Behavior as Pedestrians

Many factors could be raised to accidents of school children but the major one is inadequate education and training of children on how to use the road safely. An attempt has been made to establish measures for traffic exposure of school children by preparing a set of inter-related questionnaire.

The first traffic related question was whether the children afraid of or not on their way to schools. The result for this question shows that, out of the total 20 respondents, (70 percent) of children stated that they are afraid of traffic on their way to school. The second question stated that "crossing the road is easy or difficult". For this question, (70 percent) children have perceived that crossing the road was difficult and only 30 percent of them have indicated that crossing roads was easy. These responses of school children demonstrate the probable existence of potential problems in the locations of schools and the presence of traffic hazards nearby in front of the schools.

Table 4. 22 Respondents for Questionnaires on the difficulties

Are you afraid of traffic accidents in your way to school?	0	0.0
1. Yes	14	70.0
2. No	6	30.0
Crossing the road is	0	0.0
1. Difficult	14	70.0
2. Easy	6	30.0

Children were also asked a question as" what type of wheeled vehicle do you often afraid on your way to school" The alternative given were motor vehicles, bicycles, and horse drawn carts. The majority of the surveyed children, (90 percent) have indicated that they afraid of motor vehicles, (5 percent) bicycles, (5 percent) that horse drawn carts, from this one can deduce that motor vehicles traveling at high speeds were mostly the causes to create fear of school children on the highway from Addis Ababa to Jimma. It is not uncommon to see drivers driving at very high speeds, where there are signs of school children crossing the roads. Insufficient knowledge of safe ways of walking along the streets appears to be one of the contributory factors to road traffic accidents among children of school.

The last question forwarded to school children was the identification of different parties towards the teaching of school children on how to deal with traffic sources. The alternatives are: parents, schools, traffic police, radio and television and none of them were allowed to mark more than one choice.

Accordingly, (50 percent) stated television and radio was their source of traffic knowledge, (40percent) their schools, (10 percent) the involvement of with their parents,

From the discussion it can be concluded that Media, schools and parents together share the responsibility for educating the children on how to deal safely with traffic. However, schoolchildren face problems in terms of parents and school system not providing adequate knowledge on how to safely walk on and across the roads. From school are increasingly susceptible to road traffic accidents

4.8.5 Traffic Behavior of cyclists

Similar to pedestrians, drivers and School Children traffic safety, a questionnaire survey was conducted for cyclists and asked, as "which type of trip purpose is constitute most of your cycling time?" For this question (40 percent) of respond ants replied work trips, (35 percent) were for Trips to education, and (25 percent) for recreational purposes. Another question asked was whether they had had an accident on their journey on the highway or not. For this question, (30 percent) of interviewed cyclists were replied as " yes" answer which means large number of the cyclists interviewed were faced road traffic related accidents in their journey, of which (33.3 percent) of respondents were indicated that road accidents were not recorded by police. Cyclists were also asked to mark when and where bicycle accidents frequently happened in the on the highway another question prepared for Cyclist was in which time of a day bicycle accidents are highest? For this question (90 percent) of interviewed cyclists replied that large number of Accidents happened during the day time, while, (10 percent) indicated at night time

TABLE 4.23 RESPONDENTS FOR QUESTIONNAIRES ON THE REPORTING SYSTEM

Was the accidents you faced reported/ recorder by traffic		
1. Yes	4	66.7
2. No	2	33.3
In which time of a day bicycle accidents are highest?	0	0.0
1. Daytime	18	90.0
2. Nighttime	2	10.0

As it is shown below, out of 20 cyclists interviewed during the traffic survey period, (20.8 percent) of interviewee responded absence of segregated lane for cyclists and other road users, road conditions (16.8 percent), No priorities given by motor car drivers (13.9 percent), Poor road Condition (14.4 percent), Over speeding by Cyclist and Poor condition of bicycle on the roads (11.9 percent), lack of enforcement (8.9percent), and poor maintenance of cycles (6.6 percent).

TABLE 4.24 RESPONDENTS FOR QUESTIONNAIRES ON RANKING THE MAJOR CAUSES OF S BICYCLE ACCIDENTS

	Questionnaires	Total	%
	Descriptions		
1	Negligence of pedestrians for cyclists	**11**	10.9
2	No priorities given by motor car drivers	**17**	16.8
3	Absence of segregated lane for bicycles	**21**	20.8
4	Speed riding	**13**	12.9
5	Poor road conditions	**14**	13.9
6	Poor condition of bicycle on the roads	**13**	12.9
7	Lack of en for enforcement	**12**	11.9

Detailed observation of cyclists by the writer during the study period identified that most bicyclists with pedestrian's accidents happened on off street paths and are caused by the error of bicyclists, because the bicyclists ride too fast and not giving priorities for pedestrians. In addition to this, bicyclists also ride on sidewalks in a business districts or heavily trafficked pedestrian areas, which highly aggravate the pedestrian / bicyclists accidents with bicycles.

Cyclists were asked to mark where they thought riding of bicycles is most dangerous. For this question the majority of respondents, (30 percent) indicted that large number of accidents frequently happened on crossroads, (30 percent) were on Traffic light and again, (30 percent) were at junction roads, the remaining accidents (5 percent) occurred on the stretched drive way areas. From this, one can conclude that large number of bicycle accidents occur at junctions than straight sections.

TABLE 4. 25 RESPONDENTS FOR QUESTIONNAIRES ON DANGEROUS HIGHWAY SECTION

Where you thought riding bicycle is more dangerous on the highway?		
1. On cross roads	7	35.0
2. At traffic light	6	30.0
3. At junction roads	6	30.0
4. On the stretched drive way	1	5.0

Cyclists were asked how much they perceived traffic signs, signals and road marking when they ride along this highway. For this question, (65 percent) cyclists indicated that they perfectly understood the components of road safety, while (35 percent) were not clearly aware of the stated road safety elements. The result obtained implies that knowledge of traffic safety elements generally does not have importance for the reduction of accidents among cyclist, because cyclists are notorious for breaking traffic rules in the town streets. In general, (45 percent) of the cyclists were not yet gained education about road traffic rules by responsible agencies and majority of the respondents learned how to deal with traffic rules by themselves.

TABLE 4.26 RESPONDENTS FOR QUESTIONNAIRES ON TRAFFIC SIGN AND SAFETY EDUCATION

Do you correctly perceive traffic sign, signals and road marks when you riding bicycle along the highway?		
1. Yes	13	65.0
2. No	7	35.0
Have you gained education about road safety by concerned officials?		
1. Yes	11	55.0
2. Not yet	9	45.0

4.9 Condition of Road Environments

Efficient and economic road transport is largely dependent on road layout and condition. Efficiency cannot be achieved if the road user is frequently involved in road accidents, but fortunately those design provisions and frequent maintenance needs to improve traffic flow to reduce accidents on the highway from Addis Ababa to Jimma, due to lack of training and traffic

engineering skills of the traffic police underestimated the contribution of road environments to traffic accidents. A number of factors can be attributed to these accidents relating to road environments as discussed below.

4.9.1 Condition of road

The existing roads conditions on this highway are in poor conditions. The basic problem lies in roads that are not planned to fulfill a certain function by following an appropriate standard procedure. Like many other roads and highway of Ethiopia this highway has an A rural transportation infrastructure that was initially designed for largely motorized vehicles

FIGURE 4.7 PHOTO SHOWING ROAD CONDITION AND TAKEN BY THE RESEARCHER DURING FIELD SURVEYING

4.9.2 Traffic Segregation

A traffic engineering principle of overriding importance is the segregation of traffic categories by function and in space and time, for example the segregation of vehicle and pedestrian, of different classes of vehicles and different types and purposes of vehicles movement. But in the study area the traffic flow is too mixed and no distinctions of flow for different modalities are observed. Vehicles are usually parked on pedestrian lanes and pedestrians (including animals) walk in the center of motorways. Heavy trucks also use almost all routes without any restrictions or regulations, which lead into traffic conflicts between fast moving through traffic, slow moving local traffic and vulnerable Pedestrians. The conflicts arising from these inadequacies of traffic segregation give rise to all Sorts of traffic accidents.

FIGURE 4.8 PHOTO SHOWING NO TRAFFIC SEGREGATION AND TAKEN BY THE RESEARCHER DURING FIELD SURVEYING AT STATION

4.9.3 Facility on the road

Despite the heavy mix of traffic flow on the highway from Addis Ababa to Jimma, there are no safe pedestrian and vehicular facilities on the road networks. Engineering measures to segregate vehicles and pedestrians or to facilitate safety on shared surfaces such as paved sidewalks, pedestrian crossings, fences, speed calming facilities, road signs and good street lighting are inadequate or totally absent on the road. The road environment lacks important road safety facilities, which have proper guidance to road users. Moreover, major inter-urban road, for example roads from Jimma to Addis Ababa passes through many towns with out by pass for fast moving vehicles (absence of ring roads and speed calming facilities). This apparently adds to the increase in the road traffic accidents. The ability to see ahead and observe potentially conflicting traffic is critical to safe high way operations.

On this highway sight obstructions on the road observed due to the presence of tall vegetation and sharp curves along the main roadsides and intersections. Footways are obstructed by long trees, sign of advertising, illegal parking in towns along the highway, under these conditions, footways are unusable and pedestrians are forced to walk in roadway with both safety and traffic congestion problems.

4.9.4 On road -parking

On the highway from Addis Abba to Jimma, drives and cyclists normally are forced to park on the road due to the absence of adequate parking lots. On road parking is very much reacted to the frontage land use. Traffic generation characteristics of adjacent land use and absence of access control on street parking is another important factor, which affects traffic safety and

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Discussion

This paper represents a unique and comprehensive assessment and interpretation of Road Traffic Accident Analysis from Addis Ababa to Jimma Highway. The following major trends and observations are revealed by the comprehensive data analyzed, Questionnaires and Interviews:

1. The variation in road traffic crashes by time of day reflects variations in traffic volumes, and most crashes occur during daylight. However, the level of severity may not follow the same pattern and needs further in-depth investigation.

2. Driver involvement in crashes disproportionately high for the 18-30 age group, followed by the 31-50 age group. This trend also applies for all road users killed and injured. As a developing country, the population age distribution indicates that about half the population are aged under 18, however people of working age are more likely to be involved in crashes. It is likely that, on average, individuals in the workforce make more trips per day by various modes of transportation, especially as pedestrians. As a result, they spend more time in contact with motorized traffic in a variety of road environments and are therefore more exposed to the risk of crashes. Thus, unlike other age strata, these age groups suffer more injuries and deaths from road traffic crashes.

3. Tangent alignment of road sections, and midblock areas were the most common locations of crashes. There is a need for good exposure data (such as traffic volumes) to determine whether these factors are over-represented among crashes. However, factors like speeding may be mitigated by provision of low cost engineering measures. In the case of midblock crossings, advance warning signs and markings for vehicles and pedestrians, and road safety education may be viable solutions.

4. Demographic analysis showed that driver age group of 18-30 accounted for 62.18 per cent of the accidents. Accidents by vehicle type indicated that trucks with the capacity of 11-40 (ISUZU 3.5 tons) quintals and trucks with the capacity of 41-100 quintals (truck without trailer) had the major share in causing accidents. In terms of fatalities and injuries, these trucks

contributed the highest number of casualties. In terms of collision types, pedestrian crashes are the dominant types of collision, as motorized traffic and pedestrians share the same facilities. Failing to observe pedestrian priority and speeding are the likely root causes for the high level of crashes on this highway

5. The observed trends in Ethiopian road crashes provide guidance on their current road safety problems and challenges, and point to possible areas of countermeasure development and implementation. In many cases countermeasures, policies, and programs will need to represent low-cost solutions, given economic constraints within the country. In order to conduct a more refined analysis of crashes exposure data will be needed; thus, the collection of exposure data in Ethiopia should become a priority moving forward.

6. The frequencies of RTAs as well as the socio-economic impacts of RTAs have shown an increasing trend in the study period. Among the various reasons causing numerous RTAs on this highway, failure to give way for vehicles, speed driving, failure to give way for pedestrians, improper turning and failure to respect the right-hand rule contributed much to the misery of road crashes.

7. Road Traffic Accidents are affecting the dwellers of the peoples in various aspects. The RTA casualties of the study area mainly belong to the productive age groups. Some casualties have lost their lives, others have got serious or slightly injuries due to RTAs. Road Traffic Accidents are also deteriorating the economic wealth of the city. Thus, we believe that this study contributes much to those who need to understand the general characteristics of RTAs on the highway from Addis Ababa to Jimma in terms of time and space and inspire other stake holders to conduct further studies in the field.

In general, the result indicates that the main causes of the accidents at the study areas were unavailability of proper pedestrian facilities, pedestrian traffic volume, drivers' fatigue, lack of awareness of traffic rules and regulation and violation of speed limit in accordance to the pilot study by the National Road Safety Coordination Office. Besides, densities of accidents per kilometer were found to be a function of access points on the highway. Narrow bridge, inadequate sight distance, insufficient illumination, road curvature, and faded road markings are usually the major causes of accidents.

The main reason why traffic accidents have become a very serious problem on this highway was due to the inappropriate road user's behavior, lack of law enforcement, insufficient structural improvement and poor traffic

Management, in combination with the deteriorating road conditions and weak public awareness. Road accidents were found closely associated with the behavior of road users. Nonetheless, drivers, particularly the young (above all taxi and other commercial vehicle drivers), did not bring an important behavioral change yet. They see things easily Controlled and drive recklessly creating risk to others. Many pedestrians also lack awareness and do not take care while walking & crossing roads. Some of them even create an environment that encourages more accidents. And some were participate in illegal street trading.

5.2 Recommendation

Road traffic accidents are easier to ensure through early prevention than later intervention. It is less costly to meet these threats upstream than downstream. Road traffic injuries are major causes of, morbidity and mortality challenge that requires concerted efforts for effective and sustainable prevention (WHO, 2004). The cost of RTAs on the Highway from Addis Ababa to Jimma is extremely high compared to the number of vehicles. To reduce the complication of RTAs on human security various governmental institutions are trying to make contribution through teaching the awful effects of RTAs. Based on deep understanding of the main causes of accidents, low cost engineering measures were proposed. On the existing situation or identified causes, improvement was suggested. In general, the following recommendation should be implemented.

5.2.1 Education (Creating Awareness)

Education campaigns and programmers should be given through mass-media that accentuates the risk of road traffic injury when unable to see the regulations and increase the likelihood of being detected and penalized. Underlining the consequences of RTAs; broadcasting the daily road accidents through radio (FM 98.1&97.1 daily in the morning following 8:00 news) awakes the people how much the vehicle accident is getting worse.

In addition to the endeavors to create awareness about RTAs through mass-media and magazine (Police enaEbreteseb Gazetha), printing and distributing pamphlets on the subject of RTAs is another measure, and people gather for session/meeting and religious institutions regarding what kind of measures these people should undertake to avoid themselves from RTAs. To reduce the death and injury rates of

5.2.2 Developing reliable accident database

The absence of reliable data on the magnitude and nature of the road traffic accidents is a serious Handicap that needs to be overcome as a priority. Under- reporting is significant on the highway from Addis Ababa to Jimma Official police statistics, the common data sources used, greatly underestimate the true extents of road traffic accidents on the highway. Errors in data collecting and coding are also very common. Therefore, to solve these problems traffic safety personnel should be made aware of the importance of accident data recording and reporting systems. Good data systems should be developed to identify successful and cost effective interventions in road safety works.

5.2.3 Establishing rural transport management bodies

As in the other areas of public work, the rural transport management section is not well-organized on this highway. Transport-related works are done in a fragmented way. Establishing a road safety unit to implement all programs pertaining to road safety is still not the concern of the Administration government. Only the traffic police department is involved in all activities. Therefore to implement all programs relating to rural transport in general and road safety in particular a rural transport management department should be organized at the Zonal level.

In addition to this the zonal road safety council should be put in place to support and ensure continuity of road traffic safety activities at the town and zonal level. Members could be drawn from different sectors such as municipal authorities, transport, education, schools, justice, public health, traffic police, mass media, private companies, road user groups and nongovernmental organizations. This council should have support at the highest level in government and should have a legal entity to work with the community. Cooperation between agencies and institutions is vital for future road safety work in the town

5.2.4 Efficient driver training and testing Method

Enhanced training is essential for new drivers' examinations and practical test have to be effective and free from unnecessary prejudices. Instructors both government and private schools have to have driving experience, clean from criminal and driving offence records. Therefore, these schools and their instructors must be regularly evaluated and monitored by the government. Apart from regular tests and courses it is also necessary to provide drivers accident free driving courses

5.2.5 Apply Proper Law Enforcement

Traffic police have to practice consistent and well-oriented enforcement with respect of all road users. Above all, traffic policemen have to apply violator directed patrol against few higher risky drivers. Visible enforcement against few risky drivers would mean educating others who see what is happening, from breaking the same laws. In order to stop high risky drivers it is better for the police to use unmarked dress and unmarked vehicles when necessary. Transport Bureau was also blamed that penalty did not go more than finance, even if any driver registers many offences and criminal faults. Therefore, the authority is expected to practice tougher penalty interventions on the basis of the recorded offences.

5.2.6 Strengthening road side check points- applying sobriety check points and saturation patrols

Strengthening of road side checking of drivers' license and vehicle inspection, which is decisive and needs less expense in preventing dangerous driving and unsafe streets, should be regular enough rather than being limited at the time of rain.

5.2.7 Road signs and marking measures

Information for drivers, pedestrians, cyclists and school children is essential for good traffic management. However, it was observed that the number and size of regulatory signs are often inadequate and poorly sited. Road marks are poorly visible at night and unclear even in day time. There are also institutional problems. For example, responsibility for putting marks and signs is not clearly designated to a legal entity. There is no responsible institute or department for designing and supervising signs and marks. It is indisputable that good town-wide signing and road marking can assist development and maintenance of road user behavior and can support enforcement. Therefore, immediate actions should be taken by the zones government in arranging effective traffic management agency and in supervising signing and marking measures. Near schools, warning signs for children are needed, and strict speed control systems are need to apply on the highway.

5.2.8 Vehicle Inspection program

As stated earlier, this may require annual inspections by the government, roadside inspections by the police, or government certified organization like insurance and motor vehicle importing companies. There are many challenges linked with such program. It will be a matter of the responsible body to check and regulate them through day to day evaluation and monitoring schemes and if not to suspend institutions who fail to practice according to the undersigned agreement with the government. With the Vehicle inspection time, it would be advisable to make it many times a year than once a year

5.2.9 Developing Emergency Medical Service (EMS)

refers to the improvement of the pre and post incident preparedness such as first aid training course and equipping vehicles with first aid kits; developing emergency response, i.e., arranging sufficient ambulances with a common and well publicized free emergency number; and developing of emergency assistance and surveillance institutions which helps in order to prevent secondary injury/trauma/ among road victims.

5.2.10 Bringing a cultural change

Research has thought us, like other social problems, road safety problems can also be eliminated. The simple thing expected from each of us is to bring a fundamental and cultural change in attitude. That is a new driving culture, new walking culture, new enforcement culture

and in general applying new culture in each door of our daily life complying with the rules. This will help us to bring new thinking with respect of the sector. Accordingly, each of us have to start saying it is my problem and I have to be part of the solution. The success or failure of a road safety program is decided by the level of community participation. We are in a new era, so every individual has to be ready for a broad cultural

Change (develop an error-free behavior) and then a traffic safety culture will be more likely to be flourished and truly adopted in practice.

5.2.11 Bicycle related measures

Bicycles are the predominant non-motorized transport mode and offer low cost personal mobility assisting lower income groups. However, increasing motorization has increased safety problems for bicycles particularly in mixed traffic heavily used streets and intersections. In the town providing convenient and good quality facilities for cyclists is a low priority. There is a view in some government officials during the discussion that bicycles are considered to impede motor vehicles, and are categorized as the least transport hierarchy. The tendency is, therefore, towards elimination of cyclists rather than provision of good facilities for their use. But bicycles are an efficient mode, suitable for various urban and rural journeys and available to at least most of the social groups of the community. Therefore, bicycles should be treated as an integral part of the traffic management system and strategies should be designed to improve safety by protecting cyclists from conflict with motor vehicles and pedestrians.

In general, the following recommendation should be implemented.

_road user information and campaign

_strict traffic police enforcement and speed control

_limiting driving time for professional drivers and

_prohibition of on road side parking

_ furnish appropriate sign and marking

_rumble stripes should be placed on changing traffic and road environment

_traffic channelization

_ providing pedestrian side walk

_access density and access permit regulation should be given a focus by the Road Authority.

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Appendix

Appendix 1.Questionnair Prepared for Sample Population

Jimma University

Jimma institute of technology

Introduction:

The questionnaire is prepared for an academic purpose for the fulfillment of Msc. Degree in Highway Engineering. The objective of the study is to assess the patterns, causes and countermeasures for road traffic accidents on the highway from Addis Ababa to Jimma Therefore your response is very important for the success of the study. Hence you are requested to provide your response by selecting or circling your answer among the alternative choice or by describing your opinion. I would like to thank you for your cooperation in advance.

 A. Questionnaire to be responded by selected pedestrians using the Highway from Addis Ababa to Jimma

1. Address

      Region   1. Oromia---------------- ☐

                  2. SPNN------------------ ☐

      Zone   1. SW Shawa------------ ☐

                  2. Gurage ---------------- ☐

                  3. Yem S District-------- ☐

                  4. Jimma ---------------- ☐

      Kebele: _____

2. Sex

      1.   Male----------------------- ☐

      2.   Female------------------- ☐

3. Age

      1.   <15------------------------- ☐

      2.   15 -24---------------------- ☐

      3.   25_44---------------------- ☐

      4.   45_64---------------------- ☐

      5.   >64----------------------- ☐

4. Educational level

      1. Illiterate---------------------------- ☐

      2. Read and write/informal--------- ☐

      3. Primary education (1-8) -------- ☐

      4. Secondary education (9-12)---- ☐

    5. > 12 --------------------------------- ☐

5. Occupation

    1. Private Worker --------------------- ☐

    2. Unemployed------------------------- ☐

    3. Student----------------------------- ☐

    4. Office worker----------------------- ☐

    5. Other (specify) ---

6. How long have you been on the Highway?

    1. < 1 year------------------------------ ☐

    2. 1-2 years --------------------------- ☐

    3. 3-5 years --------------------------- ☐

    4. 6-and above ------------------------ ☐

7. Which type of trip purpose constitutes most of your time?

    1. to farm field --------------------------☐

    2. Educational Trip ------------------- ☐

    3. Shopping -------------------------- ☐

    4. Recreational ----------------------- ☐

    5. to office --------------------------- ☐

8. How do you perceive the level of road traffic accident problems on the Highway?

    1. A big problem ---------------------- ☐

    2. A moderate problem -------------- ☐

    3. Not a problem --------------------- ☐

9. Have you encountered traffic accidents in your journey?

    1. Yes --------------------------------- ☐

    2. No---------------------------------- ☐

10. If your answer is ''yes '' in Question No 9, how many times?

    1. One time -------------------------- ☐

    2. Two times ------------------------- ☐

    3. Three times ----------------------- ☐

    4. >Three times------------------------ ☐

11. If your answer is "yes" in Question no 9 did the accidents been reported to or registered with traffic police?

    1. Yes-------------------------------- ☐

    2. No--------------------------------- ☐

12. Which types of collision or road accidents were highly prevailing on this Highway?

    1. Motor vehicle with motor vehicle -------☐

    2. Motor vehicle with bicycle ------------- ☐

    3. Motor vehicle with pedestrians ----------☐

    4. Motor vehicle with static object ----------☐

    5. Bicycle with bicycle ------------------------------------- ☐

    6. Bicycle with pedestrians ------------------------------- ☐

    7. Bicycle with horse drawn carts ---------------------- ☐

    8. Horse drawn cart with pedestrians ------------------- ☐

    9. Motor vehicle with horse drawn carts---------------- ☐

    10. Others ---

13. How frequently do you use sidewalks and walking along roads?

    1. Always--- ☐

    2. Sometimes--- ☐

    3. Rarely-- ☐

    4. Never -- ☐

14. While walking along roads, do you walk with your

    1. Face to the oncoming vehicles---------------------------- ☐

    2. Back to the oncoming vehicles ---------------------------- ☐

15. Do you understand traffic signs, signals and road marks while you are moving along Streets?

    1. Yes--- ☐

    2. No-- ☐

16. Do you give way/priorities to vehicles as required by law?

    1. Always-- ☐

    2. Sometimes-- ☐

    3. Never--- ☐

17. Where do you usually cross the main roads?

    1. At traffic light--- ☐

    2. At junction-- ☐

    3. At mid-block pedestrian crossing away from junction---- ☐

    4. At any point-- ☐

    5. Behind the standing vehicles-------------------------------☐

18. Crossing the main roads in the town is:

    1. Difficult-- ☐

    2. Easy--- ☐

19. How do you rate drivers giving priorities to pedestrians as required by law.

    1. V. good-- ☐

    2. Good--- ☐

    3. Poor-- ☐

    4. V. Poor--- ☐

    5. I don't think---☐

20. Rank the following problems in their order of priority in terms of endangering your safety, which creates by driver's error.

S/No	Descriptions	(1) Most Important	(2) Medium Important	(3) least Important	(4) No any role Important
1	High speed of vehicles				
2	Not give priorities, to pedestrians				
3	Lack of enforcements				
4	Limited number of properly designed pedestrian				
5	Others				

21. Are drivers breaching traffic rules and regulations in the presence of traffic police penalized for their law offensive?

    1. Always--- ☐

    2. Sometimes-- ☐

   3. Never--- ☐

22. How do you rate the traffic police commitment to their duties?

   1. V. good--- ☐

   2. Good-- ☐

   3. Poor--- ☐

23. Have you ever been give education about road safety rules by concerned officials?

   1. Yes-- ☐

   2. No--- ☐

24. Who is your source of knowledge and experience about road safety rules?

   1. Books --- ☐

   2. Parents-- ☐

   3. Schools-- ☐

   4. Traffic police-- ☐

   5. Media-- ☐

   6. Religion leaders--- --------------☐

25. Suggest some possible solutions to prevent and reduce road traffic accidents on this Highway?

B. Questionnaire for School Children Traffic Safety

The questionnaire is prepared for an academic purpose for the fulfillment of Msc. Degree in Highway Engineering. The objective of the study is to assess the patterns, causes and countermeasures for road traffic accidents on the highway from Addis Ababa to Jimma Therefore your response is very important for the success of the study. Hence you are requested to provide your response by selecting or circling your answer among the alternative choice or by describing your opinion. I would like to thank you for your cooperation in advance.

Please choose an answer and mark it for the following questions.

1. Address

       Region   1. Oromia ------------- ☐
                      2. SPNN--------------- ☐

       Zone   1. SW Shawa----------- ☐
                      2. Gurage ------------- ☐
                      3. Yem S District------ ☐
                      4. Jimma -------------- ☐

       Kebele: _____

2. Sex.

    1.   Male-- ☐

    2.   Female-------------------------------------- ☐

3. Age

    1.   <15--- ☐

    2.   15 -24-------------------------------------- ☐

    3.   25_44-------------------------------------- ☐

4. Are you afraid of traffic accidents in your way to school?

    1. *Yes*-- ☐

    2. *No*--- ☐

5. Crossing the road is

    1. *Difficult*-- ☐

    2. *Easy*--- ☐

6. What type of wheeled vehicle do you often afraid on your way to school?

    1. Motor vehicles -- ☐

    2. Bicycles-- ☐

    3. Horse drawn carts -- ☐

7. Do you recognize the safer way of walking along the streets relative to on coming vehicles?

    1. Yes --- ☐

    2. No--- ☐

8. Have you got any road safety education by concerned bodies?

    1. Yes--- ☐

    2. No--- ☐

9. Who is the source of your knowledge about road traffic safety rules?

    1. Schools--- ☐

    2. Traffic police --- ☐

    3. Television-- ☐

C. Questionnaire (to be filled by drivers)

The questionnaire is prepared for an academic purpose for the fulfillment of Msc. Degree in Highway Engineering. The objective of the study is to assess the patterns, causes and countermeasures for road traffic accidents on the highway from Addis Ababa to Jimma Therefore your response is very important for the success of the study. Hence you are requested to provide your response by selecting or circling your answer among the alternative choice or by describing your opinion. I would like to thank you for your cooperation in advance.

1. Address

       Region   1. Oromia --------------------------- ☐

                      2. SPNN---------------------------- ☐

       Zone   1. SW Shawa--------------------- ☐

                      2. Gurage ------------------------ ☐

                      3. Yem S District------------------- ☐

                      4. Jimma -------------------------- ☐

       Kebele: _____

2. Sex

       1.   Male------------------------------------- ☐

       2.   Female----------------------------------- ☐

3. Age

       1.   <15------------------------------------- ☐

       2.   15 -24---------------------------------- ☐

       3.   25_44---------------------------------- ☐

       4.   45_64---------------------------------- ☐

       5.   >64------------------------------------- ☐

4. Educational level

     1. Illiterate-- ☐

     2. Read and write / informal ----------------------------- ☐

     3. Primary education (1-8) ------------------------------- ☐

     4. Secondary education (9-12) --------------------------- ☐

     5. Above secondary--- ☐

5. Level of License

     1. None -- ☐

2. First level--- ☐

3. Second level--- ☐

4. Third level--- ☐

5. Fourth level-- ☐

6. Fifth level-- ☐

6. How long have you been driving in on the highway from Addis Ababa to Jimma?

1. Less than one year ------------------------------------- ☐

2. 1-2 years --- ☐

3. 2-5 years --- ☐

4. 5-10 years --- ☐

5. >10 years--- ☐

7. Which type of vehicle do you normally drive?

1. Passenger car--- ☐

2. Buses-- ☐

3. Two -Four axle single unit-------------------------- ☐

4. Four-Six axle Single Trailers------------------------ ☐

5. More than five axle Multi Trailer-------------------- ☐

8. How many years is the vehicle give service on this highway which you drive?

1. <2 years-- ☐

2. 2-5 years-- ☐

3. 5-10 years-- ☐

4. >10 years -- ☐

9. Where do you often park your motorcar?

1. on street-- ☐

2. Park area --- ☐

3. In front of commercial / office area----------------- ☐

10. When you drive, what is your normal speed (approximate) in the town? school/animal cross, villages along the highway

1. < 30 km/ hr-- ☐

2. 30-40 km/hr-- ☐

3. 40-50 km/hr-- ☐

4. 50-60 km/hr- --

5. >60 km/h--

11. How often do you give priorities to pedestrians as required by law?

1. Always---

2. Sometimes---

3. Never---

12. How do you rate pedestrians respect ion for vehicles in giving priorities where necessary?

1. Good--

2. Moderate--

3. Poor--

13. How do you perceive the level of road accidents problems on this Highway?

1. A big problem --

2. A moderate problem-----------------------------------

3. Not a problem---

14. Have you ever encountered any traffic accident while driving in the town roads?

1. Yes---

2. No--

15. If you are involved in accidents how many times?

1. One---

2. Two---

3. Three---

4. >three--

16. If you faced an accidents did it reported or registered with traffic police?

1. Yes--

2. No---

17. How many times you convicted by traffic police for your traffic law-offensives?

1. One--

2. Two--

3. Three--

4. Four---

5. > Four---

18. How do you rate the traffic police commitment to their duties?

    1. V. Good-- ☐

    2. Good --- ☐

    3. Poor--- ☐

    4. V. Poor--- ☐

19. Have you got additional education or training about road safety by concerned

bodies?

    1. Yes-- ☐

    2. Not yet-- ☐

20. Suggest some possible role most important role, medium role, least important role, not any

role Played on the causes of accidents of the Highway? (Tick as many as applies).

No		(1) Most Important	(2) Medium Important	(3) least Important	(4) No any role Important
1	Increasing number of motor vehicles.				
2	High population increase				
3	Lack of proper and sufficient parking				
4	Poor road condition				
5	Absence of enough number and efficient traffic police				
6	Absence of sufficient road lights and signs.				
7	Absence of sufficient public transport				
8	Driver behavior				
9	Weak testing and training practice of drivers'				
10	Weak traffic management and enforcement				
11	Pedestrian behavior.				
12	Uncontrolled street trade				
13	Unexpected aerial expansion of the city.				
14	Unexpected growth of the number of institutions				

Others (please state below)--

----

21. How many of the pedestrians do you observe practicing the following errors, while walking or cycling?

No		(1) All of them	(2) Most of them	(3) Some of them	(4) None of them
1	Impaired by alcohol/drug				
2	Failed to look properly				
3	Wearing dark clothing at night				
4	Wrong use of crossing				
5	Failure in keeping left side of the road while walking				
6	Sending animal or object into the street				
7	Chatting or playing on the street				

22. How many of the drivers on this Highway do you observe practicing the following? errors, while driving?

No		(1) All of them	(2) Most of them	(3) Some of them	(4) None of them
1	Impaired by alcohol/drug				
2	Fatigue				
3	Using mobile phone				
4	Driver riding a child (<9years old) with no car seat or seat belt				
5	Exceeding speed limit Driver failed to look properly				
6	Running stop signs +red lights				
7	Driving along pavement				
8	Wrong parking				
9	Motor cyclist wearing dark cloth at night				

Section II: Traffic Regulation

23. How would you describe the traffic laws and regulations of this highway? It is:

    1. Excellent………………….........................☐

    2. Very Good……………………………….☐

    3. Good……………………………...............☐

    4. Fair……………………........................ ☐

    5. Unsatisfactory ……………….………….....☐

24. Do you favor the present testing and training of drivers? Do you:

    1. Most favorable……................................. ☐

    2. Favorable…………………..................... ☐

    3. Less favorable………………………….... ☐

    4. Not favorable………………………..…. ☐

25. If do not positively favor the existing testing and training method of drivers, can you

Specify the improvements you expect? (State them below)

----

26. Have you done this year's vehicle annual inspection?

    1. Yes……………………………………….…☐

    2. No... ☐

    3. When?   (State   the   date)

       _____

27. How do you feel about laws that require stopping using cell phone while driving? Do you:

    1. Favor a lot.. ☐

    2. Favor some... ☐

    3. Not favor at all... ☐

28. Do you favor road side check points? It provides law enforcement to   monitor and check

drivers' licenses, vehicle registration, vehicle equipment etc.

    1. Favor a lot.. ☐

    2. Favor some... ☐

    3. Not favor at all... ☐

29. Do you favor sobriety check points? These are points where law enforcement officials

Evaluate drivers for signs of alcohol or drug impairment at certain points on the roadway.

    1. Favor a lot.. ☐

    2. Favor some... ☐

    3. Not favor at all...................................... ☐

Section III. Accident Conditions

30. Have you ever been injured in a motor vehicle accident while driving? Only count injuries

that required medical attention.

    1. Yes.. ☐

    2. No... ☐

31. How many times has this happened to you? _____ times_____ not at all

32. What were you in that accident?

    1. Passenger... ☐

    2. Pedestrian.. ☐

    3. Bicyclist…... ☐

    4. Other...

Section IV. Treatment conditions after accidents

33. At which of the following were you treated for your injuries? Were you treated at

1. A hospital emergency room......................... ☐

2. A doctor's office... ☐

3. A clinic.. ☐

4. The accident scene..................................... ☐

5. Somewhere else...

34. Were you transported from the accident scene by

    1. Ambulance or(rescue vehicle)--------------- ☐

    2. Helicopter? ----------------------------------- ☐

    3. By Other Vehicles..................................... ☐

    4. By Man power…………………………… ☐

    5.   No, neither……………………………….. ☐

D. Questionnaire (to be filled by cyclists)

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1. Address

      Region   1. Oromia ------------------------ ☐
                         2. SPNN-------------------------- ☐
      Zone   1. SW Shawa---------------------- ☐
                         2. Gurage ------------------------ ☐
                         3. Yem S District------------------ ☐
                         4. Jimma -------------------------- ☐

        Kebele: _____

2. Sex

      1.   Male-- ☐
      2.   Female-------------------------------------- ☐

3. Age

      1.   <15--- ☐
      2.   15 -24-------------------------------------- ☐
      3.   25_44-------------------------------------- ☐
      4.   45_64-------------------------------------- ☐
      5.   >64--- ☐

4. Educational level

    1. Illiterate--- ☐
    2. Read and write / informal ----------------------------- ☐
    3. Primary education (1-8) ------------------------------- ☐
    4. Secondary education (9-12) --------------------------- ☐
    5. Above secondary-------------------------------------- ☐

5. Occupation

    1. Private Worker ------------------------ ☐
    2. Unemployed-------------------------- ☐

3. Student------------------------------- ☐

4. Office worker------------------------ ☐

6. How much experience do you have, in total, of riding a bicycle or motor cycle?

1. Less than 1 year------------------------------------- ☐

2. 1- 2years --- ☐

3. 2- 5 years -- ☐

4. 5- 10 years--- ☐

5. More than 10 years--------------------------------- ☐

7. Which type of trip purpose constitutes most of your cycling time?

1. Work trip --- ☐

2. Recreational-- ☐

3. Educational -- ☐

4. Shopping--- ☐

5. All purpose-- ☐

8. Had you faced accidents on your journey by riding bicycle?

1. Yes--- ☐

2. No-- ☐

9. If you had faced road accidents how many times?

1. One-- ☐

2. Two-- ☐

3. Three-- ☐

4. More than three----------------------------------- ☐

10. Was the accidents you faced reported/ recorder by traffic

1. Yes--- ☐

2. No-- ☐

11. In which time of a day bicycle accidents are highest?

1. Daytime--- ☐

2. Nighttime--- ☐

12. In which roads/ locations of the town roads bicycle accidents are the highest?

1. On the main roads-------------------------------- ☐

2. On the residential roads-------------------------- ☐

13. Rank the following bicycle accidents in their order of priority, which prevail in the town roads?

		(1) Most Important	(2) Medium Important	(3) least Important	(4) No any role Important
1	Collision with motor vehicles				
2	Collision with bicycles				
3	Collision with pedestrians				
4	Collision with a static object				
5	Collision with horse drawn carts				
6	Falling while driving				

14. Rank the following major causes of s bicycle accidents in their order of priorities.

S/no	Descriptions	(1) Most Important	(2) Medium Important	(3) least Important	(4) No any role Important
1	Negligence of pedestrians for cyclists				
2	No priorities given by motor car drivers				
3	Absence of segregated lane for bicycles				
4	Poor road conditions				
5	Poor road conditions				
6	Poor condition of bicycle on the roads				
7	Lack of en for cement				

15. Where you thought riding bicycle is more dangerous on the highway?

    1. On cross roads--[ ]
    2. At traffic light --[ ]
    3. At junction roads--[ ]
    4. On the stretched drive way----------------------------------[ ]

16. Do you correctly perceive traffic sign, signals and road marks when you riding bicycle along the highway?

    1. Yes-- ☐

    2. No--- ☐

17. Have you gained education about road safety by concerned officials?

    1. Yes-- ☐

    2. Not yet--- ☐

18. Suggest some possible solutions to prevent and reduce road traffic accidents in on this Highway?

    1. --

    2. --