



Addis Ababa University
Department of Public
Administration and Development Management

Road Traffic Accident: Causes and Control Mechanisms:
In Addis Ababa City

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**ROAD TRAFFIC ACCIDENT: CAUSES AND CONTROL
MECHANISMS: THE CASE OF ADDIS ABABA CITY**

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Abbreviations

AATCB	Addis Ababa Transport and Communication Bureau
AATPTACIO	Addis Ababa Traffic Police Traffic Accident Control and Inspection Office
AATPR	Addis Ababa Traffic Police Report
CSA	Central Statistically Agency
DALYs	Disability Adjusted Life Years
ECA	Economic Commission for Africa
ERA	Ethiopian Roads Authority
ECE	Economic Commission for Europe
ERTA	Ethiopian Road Transport Authority
FDRE	Federal Democratic Republic of Ethiopia
FRTA	Federal Road Transport Authority
FASC	Federation of Africa Society of Chemistry
GNP	Gross National Product
HAPI	Horn of Africa Press Institution
IRTAD	International Road Traffic Accidents Data
OAU	Organization of Africa Union
RA	Road Accident
RTA	Road Traffic Accident
TRL	Transport Research Laboratory
UNDP	United Nation Development Program
UNECA	United Nation Economic Commission for Africa
WHO	World Health Organization

Abstract

In this study, the researcher tried to assess road traffic accident causes and control mechanisms undertaken by authorities, in Addis Ababa traffic police bureau and Addis Ababa Road Authority. Traffic accident overall linkage with human security in Addis Ababa has been examined using mixed methodological approach, i.e., qualitative and quantitative. As findings revealed, combination of factors has immensely contributed to the incidence of road traffic accident (RTAs) in Addis Ababa, such as human recklessness, vehicles defect, poor road design and poor traffic regulation enforcement. The study found the multifaceted effects of RTAs on the economy of households in particular and the country in general, on the social interaction of victims and family, as well as on the physical safety or the survival of individuals including permanent and temporal health problems. Counter-measures are being carried out by authorities starting from creating awareness through education campaigns, improving road designs and enforcement of the traffic regulation of the city. However the rate of RTAs is still rising and persistently occurring. The findings of the research reveal that RTAs have resulted great human life loss and huge property damages in Addis Ababa. Little attention is given to the problem despite the alarming increase of road accident from time to time. The recommendations made by the researcher to reduce the car accidents level in Addis Ababa city are as follows, provide education and training to all segment of citizens about Road safety, Computerize of the system, develop the skilled manpower, Improving road safety and licenses awarding system, Introduce pedestrians penalty system, use latest technology. The government should implement different control mechanism in the city.

CHAPTER ONE

INTRODUCTION

1.1 General Background of the Study

People for centuries and millennia have been moving from place to place to carry out their day-to-day activities. To facilitate their movement, people use different ways of transportation including road, air, water, train etc. It is an accepted fact that of all modes of transportation, road transport is easily accessible and closes to people. According to WHO (2011), and Wade *et al* (2011), road transportation provides benefits both to nations and to individuals by facilitating the movement of goods and people. It enables people to have increased access to jobs, markets, education, recreation and health care. ECA (1989) and Atnafseged (1996) noted that, road transportations have major advantages compared with others means of transport due to its flexibility, that allow people to run business from door-to-door over short distances at the most competitive prices. In Africa, over 80% of goods and people are transported by roads and in Ethiopia road transport accounts for over 90% of freight and passenger movements in the country every year.

Therefore, road transportation has a direct connection with the day-to-day activities of people, especially in large cities where the distance is too far to cover on foot or by bicycle within a reasonable time. According to WHO (2009), however, the increase in road transportation has placed a considerable burden on the people's lives. The fatality of road traffic deaths and injuries is the major one. According to Ethiopian Federal Police (2008/09-2010/11) report, each year more than two thousand people die and ten thousand people beinjured because of road traffic accidents. WHO (2009) asserted that road traffic crashes are the leading causes of death and disablement of people under 44 years next to HIV/AIDS. The continuing advance of motorization in many developing countries is likely to exacerbate the problem.

The theoretical explanations stating that road traffic accidents (RTAs) constitute major health, economic, and developmental challenges of developing countries, especially those in Africa (Chen, 2009; World Health Organization, [WHO] , 2009; United Nations Economic Commission for Africa, [UNECA] ,(2009), hold true as it is widely witnessed in many countries. In 1999, for instance, 750-880,000 people died prematurely of road traffic crashes of which some 85% of them occurred in developing countries (Downing, Jacobs, Aeron-Thomas & Sharples, 2000)). And in 2002, for example, of the estimated 1.2 million people killed in road traffic crashes (Peden, Scurfield, Sleet, Mohan, Jyder, Jarawan, & Mathers, 2004; WHO, 2009; UNECA, 2009), 90% occurred in low and middle income countries of which Africa had faced the highest fatality rate (28.3 per 100,000 population), which is substantially higher than developed world, such as those in North America (i.e. 12.1 to 16.2 per 100,000 population) (Peden et al., 2004). In economic terms, the cost of road crash injuries is also estimated at roughly 1% of gross national product in low-income countries, 1.5% in middle income countries and 2% in high-income countries (WHO, 2004). This shows that RTAs are not limited to developing nations but are also universal phenomena. In other words, the implication it has on sustainable transport development in a nation or a city is immense. As large cities of the world have been experiencing high level of motorization and threatened by the lack of sustainable transport development (Kennedy et al, 2005), serious attention must be given to the issues of urban transport.

The social, economic and political impacts of road accidents are widespread all over the world. The loss of lives, damage to property and the sorrow it leaves in human mind are profound though the degree varies from nation to nation, developing nations being the hardest hit (Peden et al, 2004). RTAs are found to be among the top leading causes of deaths and injuries of various levels (Tesema, Abraham & Grosan, 2005). An estimated 1.2 million people die in road traffic accidents each year while about 50 million are being injured and about 85% are in developing countries (WHO, 2004; WHO 2009, UNECA 2009). Odero, Garner and Zwi (1997)

also attempted to review the differences between sexes and ages in developing countries, showing 80% of road casualties occurred to men. On the other hand, urbanization accompanied by high population (Guyu, 2011) and number of vehicle growth is usually accompanied by high urban congestion and increases in the occurrence of road traffic crashes. Accordingly, nearly ½ a million people die and up to 15 million people are injured in urban road accidents in developing countries each year and this is estimated to have a direct economic cost of 1% to 2% of worldwide gross domestic product (Peden et al, 2004). Moreover, in 1999, for instance, of the total 750-880,000 people died prematurely in road traffic crashes, between 35% and 70 % of all crashes occur in urban areas and urban road networks contribute to a significant proportion of countries' national road traffic crash problem (Downing et al, 2000). These and other estimates have indicated that traffic accident as a whole will become the third major killer next to HIV/AIDS and TB (Peden et al, 2004).

The situation of RTAs is most severe in Sub-Saharan Africa where the lives of millions are lost and significant amount of property is damaged. For example, more than 85% of these casualties occur in low and middle in-come countries (UNECA, 2009). This has imposed a huge economic burden on developing economies that may amount to 1%-2% of GNP in most countries (ibid).

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 (UNECA, 2009). 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], 2000/01-2010/11) compared to over 8000 deaths annually in Turkey (Murat, 2009). In financial terms, Ethiopia, one of the poorest countries in the

world, loses 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 (Fanueal, 2006). 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 UNECA (2009), 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 that 15,086 accidents which caused loss of 2,161 lives and over 82 million Ethiopian birr, equivalent to US\$7.3 million estimated cost of property damage. And, up to 2005/06, traffic accidents and fatalities increased at 17 % and 10 % per year respectively although there is a decline in this respect. There were 2.84 road accident fatalities per 100,000 populations in the same year (UNECA, 2009).

Despite the growth of RTAs, researchers have not yet seriously examined the linkages among RTAs and human security. According to WHO (2010), road traffic injuries have become the leading cause of death for people aged 15-29 years. Over 90% of road traffic deaths and injuries occur in low-income and middle-income countries, which have only 48% of the world registered vehicles. Nearly half (46%) of those dying of the roads accident and vulnerable road users' are: pedestrians, cyclists and motorcyclists. In addition to the grief and suffering they cause, road traffic crashes result in considerable economic loss to victims, their families, and nations as a whole, costing most countries 1-3% of their gross national product; without action, road traffic crashes are predicted to result in the deaths of around 1.9 million people annually by 2020.

According to UNDP (1994), traffic accidents present great risks on personal security. In industrial countries, traffic accidents are the leading causes of death for people aged 15-30. And in developing countries, traffic accidents account for at least 50% of total accidental deaths. For example, the highway death toll in South Africa

in 1993 was 10,000, which was three times the number of deaths from political violence. WHO (2004) argues that, road traffic injuries are a major but neglected public health challenge that requires concerted efforts for effective and sustainable prevention. Of all the systems with which people have to deal every day, road traffic systems are the most complex and the most dangerous.

1.2 Statement of the Problem

Ethiopia is one of the developing countries with low level of income coupled with high rate of population growth. As part of the developing world, Ethiopia is predominantly an agrarian country with low level of urbanization. The economic performance of different sectors of the nation is very low. This low performance is due to a number of constraints in relation to investment in different sectors. The existing transport system could be mentioned as one. Transport is an important sector for facilitating different economic activities in the national economy.

Nevertheless, due to low level of urbanization and the poor economic performance, transport is said to be at its infant stage in Ethiopia. The modalities of transport mobility are limited. The greater percentage is covered by the natural mode of walking and animal transport system leaving only a very negligible share for the motorized aspect. According to the 2004 population and housing census result, its population is estimated to be 87 million. There are 926 urban centers in the country out of which only 302 urban centers are designated with municipal status (CSA). Of the urban localities, Addis Ababa is the largest urban centre, accounting for one third (around 28 percent) of the total population of all the urban areas, [Ministry of Federal Affairs: Addis Ababa Development and Improvement Project office Report, July 2002].

In Ethiopia, the rate of road traffic accidents (RTAs) is very high; because road transport is the major transportation mechanism along with poor road infrastructure, poor traffic laws enforcement and other factors. 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, Addis Ababa, takes the lion's share of the risk, with an average of more than 20 accidents being recorded a day and even more going unreported (WHO, 2009).

Many of the traffic congestions and road safety problems in Addis Ababa may be attributed to inefficient use of road networks, weak enforcement capability and poor design of roads. As such Road Traffic Safety Regulations have been issued in the 1998 by the Council of Addis Ababa Administration. Accordingly, who so ever, by commission, contravenes what is laid down, depending on the gravity of the offence committed is obliged to be punished.

Development refers to the change in the economic, social, cultural, political and all others aspects of human life for the better. When development takes its course in a country the living standard and quality of life the citizens begins to improve. Their anomalies significantly reduce. Hence road traffic accident being one of the nemeses for people it has to reduce remarkably in the process of development endeavor. Development through effecting change in the culture, education, social interactions, quality of infrastructure etc reduces the accident rate. One of the ways that development manifests itself is the boom in the number of vehicles that are used for commercial and private purposes. If the growth in all facades of the given country ignores the road traffic accident that definitely occurs due to the development itself. That would have the reverse effect on the development. In the developing countries, like Ethiopia road traffic accident is the major factor that brings about death next to those caused by natural factors. They do have a great impact on economic and social activities. Road accidents cause all kinds of losses. Other than the loss of life, there

is loss of means of transportation and fresh expenditure for purchasing new vehicles or repairing damaged ones. These scarce resources (including productive labor force) could be used more profitably elsewhere. Generally the losses involved in the developing countries from road accidents are believed, on average, to have reached over 1% of gross national product per year (Adler, 1987). Therefore development and reduction of road traffic accident go hand in hand.

The costs of fatalities and injuries due to RTAs have a tremendous impact on societal well-being and socio-economic development endeavors. However, public policy responses to this epidemic have been muted at national and international levels (Nantulya and Reich, 2002). Hence, the issue of RTAs in Addis Ababa is worth investigating. The causes of car accident, effects and assessing the control mechanisms taken by the institution in reducing or preventing vehicle collision in the Addis Ababa context need to be analyzed to point out what should be done in a manner that contributes to the reduction of RTAs. Similarly, different studies on road traffic accident were done in Addis Ababa show that the rate is increasing rapidly and it is becoming more serious in the primary, secondary and territory cities of Ethiopia like, Guyu Ferede(2013),Girma Brhanu (1996),and Yared Debebe (2014). However no one has shown the progress to assess the control or reduction mechanism taken by traffic bureau. Hence, this research is going to assess the status, cause and the control mechanisms of traffic accidents in the capital.

Generally, the central argument of the present study is to assess the status of Addis Ababa in road traffic accident, causes of accident and reviewing different control/prevention ways taken by Addis Ababa traffic bureau to reduce the accident rate. The researcher was motivated to carry out this academic research stemmed from the rise of RTAs on the highways of Addis Ababa and its effect on the lives and livelihood of individuals as road traffic accident has long claimed the lives of thousands of millions of fellow citizens.

1.3 Research Questions

In light of the above statement of the problem, the study tries to answer the following basic research questions

1. What is the current level of road traffic accident in Addis Ababa?
2. What are the possible causes that lead to road traffic accident?
3. What road traffic management measures/control mechanisms are taken by the city administration to reduce the accident rate?
4. Which approaches (control mechanisms) are effective in reducing the accident levels in the city?

1.4 Objective of the Research

A. General Objective

The General objective of this academic study is to examine the status of road traffic accidents in Addis Ababa, the root causes that expose the city to high car accidents as well as assess control mechanisms taken by Addis Ababa traffic bureau to reduce the accident rate.

B. Specific Objectives

- A. To identify the possible causes of road traffic accident,
- B. To find out the situation in which the capital is currently found with regard to road traffic accident,
- C. To know the effective approaches entertained with a view to reducing the accident levels in the city,
- D. To know road traffic management measures/control mechanisms which have been taken by city administration to reduce accident rate, and
- E. To make appropriate recommendations on the subject based on the findings.

1.5. Methodology of the Study

This study employs a mixed research approach (qualitative and quantitative). Nowadays, a number of researchers have applied mixed approach to reduce the weakness of qualitative and quantitative approaches. For instance, the weakness of qualitative design includes that the knowledge produced may not be generalized to other people or other settings (i.e., findings may be unique to the relatively few people upon whom the research focused); the results are more easily influenced by the researcher's personal biases and idiosyncrasies, etc. Quantitative design weakness also includes knowledge produced may be too abstract or general for direct application to specific local situations, contexts, and individuals (Kothari, 2004).

The evolution of mixed approach is associated with the field of social psychology. It intends to converge, i.e. to triangulate the different qualitative and quantitative data sources (Creswell, 2003). Among the mixed approach strategies, transformative strategy is employed in this inquiry. According to Creswell (2003), transformative strategy may or may not be sequential during data collection. Priority can be given to either of the designs (qualitative or quantitative). The strategy has a theoretical perspective to guide the study. Accordingly, the researcher has given weight to qualitative design for the sake of closely looking participant's social situation, the way they make sense of their lives or experiences, and perception and/or attitude.

With all its weaknesses, this strategy is chosen owing to the fact that it gives the researcher discretion to decide on the issue of priority and enables to use theoretical frameworks on researcher rely. Needless to say, the problem at hand could be solved using mixed approach. Hence, the approach is worthy of being adopted for this study. as, the research is grounded on qualitative data gathered through interview, questionnaire and other sources coupled with the quantitative statistical reports of Addis Ababa traffic Police Commission.

1.5.1 Research Design

The researcher collected the empirical data from Addis Ababa traffic bureau over the past three years through questionnaire and interview. Hence, the research design uses mixed approach and descriptive type of research. The descriptive type of research is found to be an appropriate method to assess the status, causes and control mechanisms of road traffic accident in Addis Ababa.

1.5.2. Sources of Data and Method of Collection

In order to achieve the objectives of this study, both primary and secondary data are used. The primary data obtained through interview and questionnaires of pedestrian's and traffic police officers who are concerned with the issue and comfortable to the researcher, especially with regard to availability, knowledge about the issue, and experience aspects. Primary sources for this study are different documentations (letters, memoranda, agendas, study reports and the like), archival records (maps, charts). Interview with the help of open-ended and structured questions was conducted with key-informants coupled with non-participant observation. The secondary sources of data were also taken from statistical report of Addis Ababa traffic bureau, reviews of relevant books, journals, articles, and reports (extracted from international organizations such as WHO, World Bank and others) and other published and un-published documents. Information was also gathered from officials in the Addis Ababa Transport and Communication Bureau (AATCB), the Addis Ababa Traffic Police Traffic Accident Control and Inspection Office (AATPTACIO), and the Traffic Police who were on duty. The secondary sources were then integrated with the primary sources so that the research became comprehensive enough to incorporate elements of the phenomenon under study.

1.5.3 Population of the Study

Population also known as universe refers to any collection of specified group of human beings or non-human entities. In this regard the populations of the study

are 100 residents of Addis Ababa city and some traffic police officers who are found in 10 sub-cities and higher inspectors which are located in sub-city traffic offices of Addis Ababa traffic bureau.

1.5.4 Sampling Method

In this research, both probability sampling (simple random sampling, stratified sampling) and non-probability sampling (purposive or judgmental sampling) techniques were applied. For the purpose of this research, the population is stratified into two groups i.e. the traffic police officers and the pedestrians. Stratifying the population helps increase the accuracy of the research by taking the same sample for homogenous group. Among these two groups of populations, heads of the officers (inspector) and some pedestrians were selected by judgmental sampling method and sample for traffic polices by simple random sampling (lottery method).

1.5.5 Sample Size

Given the lesser heterogeneity of the population, the researcher believes that it is possible to capture the representative data from a reasonable sample size. The actual sample size was determined based on statistical method and the researcher has taken 100 pedestrians from total population and 100 traffic police from 567 traffic police which is found in 10 sub-cities. In order to strength the responses given by pedestrians, the researcher offered interview questions to different inspectors and commanders'.

1.5.6. Data Analysis Technique

The data gathered from different sources is analyzed using mixed approach. The data gathered through interview, questionnaire, recorded data from traffic authorities and other institutions are translated into viable meanings and analyses. Tables, charts and figures are also used to clarify and substantiate explanations.

The data obtained from different sources are placed together or compared for the purpose of critical examination of the various claims.

1.6. Significance of the Study

Road traffic accident problem in Ethiopia, especially in Addis Ababa, is now a major concern of the government, its organs and other institutions working on road safety and the public at large. Hence, this research study is mainly concerned with the assessments of current status of road traffic, causes of accident in Addis Ababa city and control mechanisms taken by concerned body to minimize accidents which happen in the day to day of the society in the capital. Therefore the findings of this research will have the following significance. The research is believed to;

- A. Provide inputs for decision-making, policy change or new regulations,
- B. The study will also help to stimulate further investigation by Addis Ababa traffic bureau for further actions.
- C. Be an important resource /reference material for someone who is interested in undertaking similar research and it can be used for academic purpose as well, and
- D. Contribute to review the effectiveness of existing/current control mechanisms that were taken by the bureau.

1.7. Delimitations/ Scope of the Study

Among the factors that affect the precision of any study, the availability and reliability of the information it employs is very important. This study mainly uses the information collected from Addis Ababa Traffic Police Traffic Accident Control and Inspection Office that is available from 3 years accident records which is from the years 2011/3-2013/4). The study also tries to observe the road accident, causes and assesses the control mechanisms of road traffic accident in Addis Ababa within three years. Therefore, the study is restricted to assess the case of Addis Ababa along that line.

1.8. Limitation of the Study

One of the main objectives of this thesis is investigating the status, causes and assessing the control/prevention mechanisms taken by Addis Ababa traffic bureau in Addis Ababa city. To do such kind of research, one obviously faces many problems beyond time and financial constraints.

The organization/institution for confidentiality purpose is not willing to provide the whole documents which are susceptible to personal judgment. Accident reports from different sources lack significant level of consistency and accuracy and the figures obtained are not enough. In nutshell, gathering information especially through observation is not feasible; this could be taken as the limitation of this research too.

1.9. Organization of the Paper

This thesis has been organized in five chapters. The first chapter is devoted to bring about the background of road traffic accident in different parts of the world in general and Ethiopia in particular, objective of the study, statement of the problem, research questions, significance of the study, and the methodology adopted for this study. The second chapter reviews the theoretical framework of the study. The third chapter of this research is describing the study area. The fourth chapter of the study focuses on the results obtained by analyzing the data collection on the improvement /reduction of accident rates. Based on these results, suitable recommendations and suggestions are forwarded in the fifth chapter. Lastly, the bibliography is listed.

Chapter Two

Literature Review and Theoretical Framework

2.1 Introduction

Different scholars, international institutions and countries have attempted to come up with the definition of road traffic accident. However, the term continued to be ambiguous and difficult to define. This chapter explores conceptual frameworks and literature review on RTAs and control mechanisms. As a result, the definition causes and control mechanisms of RTAs will be discussed in detail.

2.1 Road Traffic Accidents (RTAs) Defined

The WHO (1977) defines a transport accident as; “any accident involving a device designed primarily for, or being used at the time primarily for, conveying persons or goods from one place to another”. On the other hand, ABS (1990) classified road accidents on the basis of the following conditions; the death of a person within 30 days of the accident; or personal injury to the extent that the injured person was admitted to hospital; the accident occurred on any road, street, or any place open to public, the accident involved one or more road vehicles which were in motion at the time of the accident.

IRTAD (1992) stated that according to the Vienna Convention, the standard international definition of road crash involves a collision of a moving vehicle on a public road in which a road user (human or animal), is injured. Besides, the widely accepted definition of RTAs is given by the Economic Commission for Europe (ECE); i.e., “road traffic accidents (RTAs) are those accidents that occur on a way or street open to public traffic; result in one or more persons being killed or injured, and at least one moving vehicle was involved.” Thus, RTA is collisions between vehicles; between vehicles and pedestrians; between vehicles and animals; or between vehicles and fixed obstacles. For the purpose of this thesis, the definition of the Economic Commission of Europe is adopted.

2.2 Operational Definition of Key Concepts /Words.

Road Traffic Accident; A collision involving at least one vehicle in motion on a public or private road that results in at least one person being injured or killed (WHO, 2004).

Road Traffic Management:It is planning, coordinating, controlling and organizing traffic to achieve efficiency and effectiveness of the existing road capacity (World Bank, 2004).

Traffic Accidents are defined as major problems in both developed and developing countries, albeit related to different historical reasons and circumstances. The single, clear, common feature is the impact caused by the use the automobile. Or traffic accident are major public health problems which are leading causes of death for males aged 15-44 and fifth greatest cause of death for women of the same age group.(Eduardo, 2001)

Road Traffic; A Movement of people, animals and vehicles from one place to another along roads and streets. (World Bank Encyclopedia)

Road Is defined as a good network for rapid growth of the city for its existence. As parks, gardens, open spaces are “lungs “so also roads are arteries of the city. (Solomon, 2000)

Road Traffic Management System a road traffic management system is defined as a system or plat forms which has innovative solution for the dynamic supervision, regulation and control of traffic on motor ways, highways, in tunnels and at junctions. [From website for traffic industry (<http://www.roadtraffic.technology> 2014)

Black-Spot: A location on the road network where a high number of casualties and crashes have occurred. 150m radius is commonly used. It requires at least one year traffic accident data. Addis Ababa Zone Police Traffic Report, (2011)

Traffic Composition: - Form and structure of different modes of transport which are motorized and non-motorized, that share the same road network, (World Bank, 2004).

Transport: it is a means of moving people and goods from place to place (World bank, 1999). It is understood that transport systems are rail, road, metros, air etc. But in this study, the term transport is used to denote the road transport. (World Bank, 1999)

Road Traffic Injuries: fatal or non-fatal injuries incurred as a result of road traffic crash (World Bank, 2004)

Road Traffic Fatality: A death occurring within 30 days of the road traffic crash (WHO, 2004).

Vulnerable Road Users: Road users most at risk in traffic, such as pedestrian, cyclists and public transport passengers. Children, old people, and disable people are also included in this category.

Traffic Mix: Form and structure of different modes of transport, motorized and non-motorized, that share the same road network World Bank, (1999).

Transportation System: it is defined as a system consisting of the fixed facilities, the flow of entities and the control system that permits people and goods to overcome the fraction of geographical space efficiently in order to participate in a timely manner in some desired activity (Zelalem, 2006).

2.3 Road Traffic in Urban Areas

As defined in Webster's Seventh New Collegiate Dictionary, "Traffic is pedestrians, animals (whether ridden, driven, herded or led), vehicles and other conveyances, either singly or together while using any road for the purpose of travel or locomotion". The Encyclopedia Britannica also puts it, "traffic means movement of vehicles, pedestrians and animals on the road or street" (Vol.18), where the main components of traffic are the road, vehicles, pedestrians and animals. Furthermore, "Traffic" is defined in broad sense as "the movement resulting from transport of people along roads, railways, sea lanes, navigable inland water ways and air routes" (Goodall, 1987). And road traffic is a continuous interaction between the three elements related to traffic itself, and the interaction within the three groups, namely: man or the human factor, the vehicle and the road or simply the

environmental factor (Cantilli, 1987). Growth in urban areas and in the number of vehicles in many developing countries has led to increased traffic congestion in urban areas and an increase in traffic accident on the road networks, which were never designed for the volumes and types of traffic which they are now required to carry. In addition, unplanned urban growth has led to incompatible land uses with high levels of pedestrian vehicle conflicts (TRL, 1991). Hence, providing transport in urban areas is more complex. The main reasons include a high population density, inefficient traffic and pedestrians on the one hand and a greater concern for personal safety on the other. According to Thompson (1998), the poor can rarely afford public transport and are more likely to walk or cycle on inadequate and insecure footpaths and tracks. This non-motorized traffic accounts for 80% of journeys in urban areas.

2.4 Road Traffic Accident Status

The 2004 world health report shows that of the 1.2 million people killed in road traffic accidents worldwide, 85% are in developing countries. Sub-Saharan Africa alone with only 4% of the global vehicle registered accounts for 10% of the total fatalities, and the economic, social and health consequences are grave. Conversely, the high-income nations, with 60% of the total global vehicle fleet contribute only 14% of the annual road deaths.

Table 1: The Global distribution of Road Deaths is depicted as follows.

Area	%
Central/ East Europe	12
Sub- Sahara Africa	10
Asia and Pacific	44
Middle East /North Africa	7
Latin/Central America	13
Highly Motorized countries	14
All areas	100

Sources; UN (2008) Department of Economic and Social Affairs

From this it can be seen that about 10% of global deaths occur in Africa, which is slightly less than those for the entire developed world or for all of Latin America,

Central America and the Caribbean. The traffic police reports that human errors, road environment and vehicle factors as the main causes of road traffic accidents. However, little documentation is available on the broader underlying factors such as deficiencies in the road transport network and passenger transport system, ineffective road safety legislation and enforcement, systems for data collection and management, inadequate medical infrastructure for post-injury management.

Each year, an estimated 1.2 million people are killed in road traffic accident and up to 50 million injured worldwide. Road traffic accidents are currently ranked 9th globally among the leading causes of diseases burden, in terms of disability adjusted life years (DALYS) lost (WHO, 1999). In the year 2020, road traffic accidents are projected to become the 3rd largest cause of disabilities in the world (WHO, 1999).

2.5 What causes car accidents?

The dictionary defines accident as "an unexpected and undesirable event, a mishap unforeseen and without apparent cause." Strictly speaking, most accidents are not accidents at all: they are collisions that could and should have been avoided. The association between the factors that contribute to accidents and accident occurrence is irreducibly statistical. By studying accidents without having any idea of how frequently various hazards occur in traffic, no conclusions what so ever can be drawn concerning the relative importance of factors contributing to accidents (Benedetto, 2008).

McMahon and Ward (2005) identified three major classes of causes of vehicle accidents; road user's errors/human factors, vehicle defects and road condition or environment. Among the most prominent factors is the human factor of which drivers' errors takes the lion's share of the blame. Drivers' carelessness that is pretty hazardous resulted from driving too fast, failing to give way, improper overtaking and following too close. All of which could result from aggressive or

irresponsible behavior, deficient actions, perceptual errors or impairments. Nonetheless, Van Elslande *et al* (2008) said that in the field of road safety research, most accident analysts tend to conclude by considering 'human error' as the main cause of accidents. The problem behind such a statement is that, it leads to oversimplification of the problem.

On the other hand, Salmon *et al* (2005) stated that there are two theoretical approaches to human error: the 'person approach' which focuses upon the last step of system operation and by so treats human error as the cause of most of the accidents; and the 'safe system approach' which looks further in the accident process considering the role of the various organizational levels that contribute to the production of system outputs (rules, design, management, etc.) and looking for the 'holes' or 'weaknesses' in the various defense layers which are supposed to constitute a safe system, well adapted to its users.

Elslande *et al* (2008) argued that most safety studies have been based upon a person approach and stress the role of human error in the production of 75-90% of accidents. But, it would be wrong to regard this 'error' as the primary cause of accidents. A safe system approach will rather consider it as a consequence of malfunctions further upstream, so that human error is only a link in the chain of events leading up to an accident. And it is a necessary link as far as the driving system which is unable to function without drivers is concerned.

The so called 'human error' may be explored in many different approaches on the basis of how it is perceived (Van Elslande *et al*, 2008). The common sense of using 'human error' in the framework of everyday life and in safety research gives the rise to an oversimplified conception of how events occur. Such an outlook neglects the complexity of accident phenomena which are the result of an amalgamation of factors. This affects the way to manage the root causes of accidents (Hollnagel and

Amalberti, 2001). RTAs are the results of a combination of factors and undesirable result of interaction between an operator and a task, arising from interaction between internal and external determinants (Van Elslande; *et al*, 2007).

The traditional view of road safety considers road crashes are usually the sole responsibility of individual road users. Despite the fact that many other factors beyond their control may have come into play, such as the poor design of roads or vehicles. But human error does not always lead to disastrous consequences. Human behavior is governed not only by the individual's knowledge and skills, but also by the environment in which the behavior takes place (Rumar, 1999). Indirect influences, such as the design and layout of the road, the nature of the vehicle, and traffic laws and their enforcement affect behavior in important ways (Nantulya and Reich, 2002). Moreover, traffic volume, traffic speed and traffic compositions have adverse effect on the frequency and severity of RTAs. As the volume of traffic grows, opposing vehicles increases, intervals for passing vehicles are less available, the accidents due to improper passing become frequent, and the frequency of accidents grows approximately in direct proportion to the average traffic volume (*ibid*). Hajar *et al* (2003) asserts that as the volume of traffic increases, the speed of vehicles drops and the main kind of accident becomes a nose-tail collision.

McMahon and Ward (2005) and Hobbs (1979) claimed that vehicle defects lead significantly to accidents which are mainly those related to the lack of regular maintenance, of which defective tires and brakes failure most frequently. Vehicle defects contribute to less than 5% of crashes. The rise in the number of motor vehicles and the amount of motorized traffic along with economic development are key determinates of risk of road crashes. The quality of road network, vehicle compositions, increase in car ownership and the extent of public transport and facilities for more vulnerable road users such as pedestrians and cyclists, all contribute to the level of risk. In low income and middle income countries, rapid growth in motorization has not been accompanied by sufficient improvements in the

road design to allow for such growth to take place without an increase in the rate of road traffic crashes.

2.6 Top 10 causes of car accidents

Every year, car accidents result in hundreds of thousands of injuries and loss of human life around the world. In fact, traffic collisions are the leading cause that can be preventable. Thus, it is important to have an understanding as to the leading factors contributing to car accidents. A list of the leading causes of traffic accidents is provided below.

1. Speeding while driving and Reckless Driving: Failing to follow the speed limit is the most common cause of traffic accidents.

2. Use of Mobile Phone – Texting While Driving: The proliferation of mobile phone use has resulted in an increased level of danger on the roads. In response national and state legislatures have passed strict anti texting laws; while the judicial system has begun to charge individuals whose texting while driving resulted in deaths, with manslaughter.

3. Other forms of Distracted Driving - There are numerous types of distracted driving. Some of the most common types of distractions resulting in high incidences of traffic accidents include, eating, smoking, listening to loud music or changing the dial, reaching for objects in the vehicle, and looking or talking with other passengers in the vehicle.

4. Driver Fatigue – Falling Asleep on the Wheel – According to recently published data driver fatigue is the cause of 2.5-3.0 percent of all roadway related fatalities. Individuals who have a history of falling asleep at the wheel should be prosecuted for a criminal offense.

5. Drunk Driving – and Driving While under the influence of a Narcotic Substance: According to studies driving while under the influence of alcohol results in a 900% increase in the probability of an accident.

6. Rubber-necking – Rubbernecking is another type of distracted driving and takes place when drivers look at other things on the road not linked to their driving. Examples include watching other accidents, looking at sunsets, and nice views.

7. Defective Automobile and Automobile Parts – Common auto defects that can cause severe injuries to occupants include, tire defects, defective design of Sport Inutility Vehicles resulted in vehicles being more prone to rollovers, seatbelt defects and defective airbags.

8. Defects on Roadway Construction – The improper design of roadways result in hundreds of auto accident fatalities each year. Liable parties can include Caltrans and construction contractors for improper installment of traffic lights and roadway signals.

9. Poor Weather Conditions – Examples of weather condition posing the greatest dangers to motorists on the road includes icy roads, high winds, and rain after a prolonged drought resulting in oily surfaces.

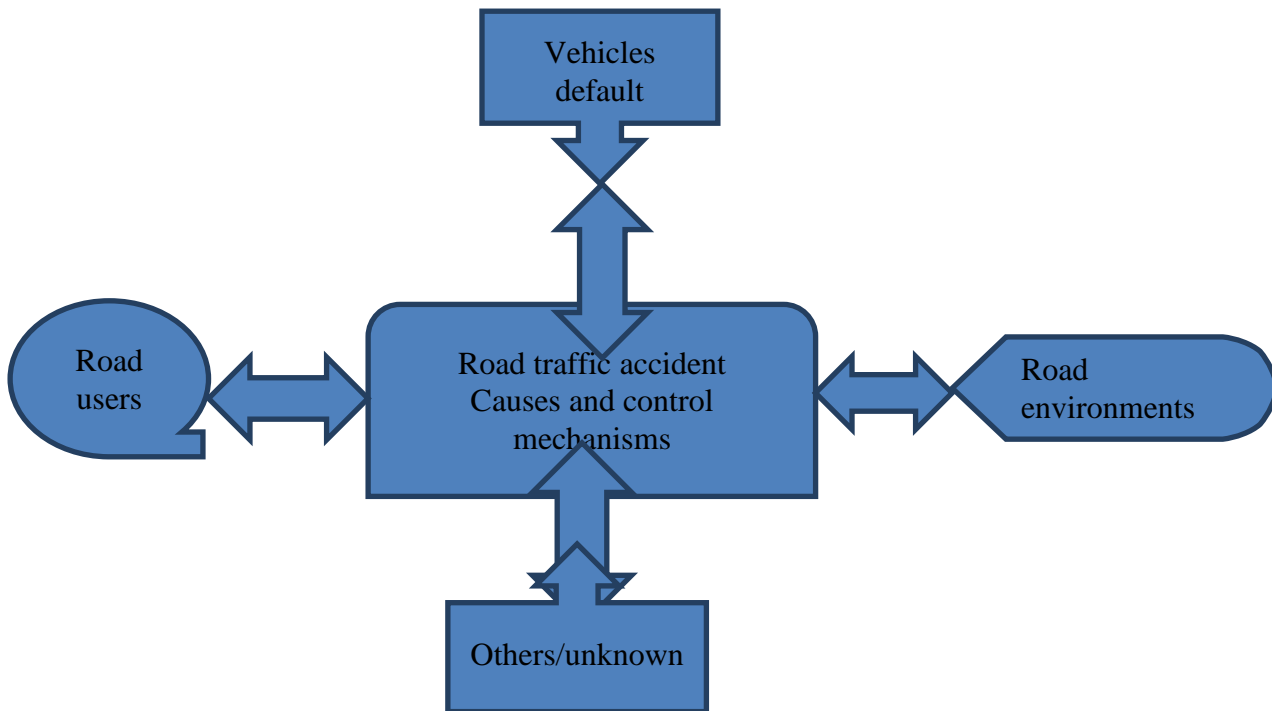
10. Improper Coning off of Construction Zones – Road work is needed to maintain and built the countries transportation infrastructure. However in many cases road construction crews fail to safely cordon off construction zones resulting in anincreased probability of auto accident. (<http://www.losangelespersonalinjurylawyers.co/top-10-causes-of-car-accidents/>accessed on 04, 2014 at 9.32pm

Generally, every accident is not usually attributable to a single cause but to a chain of unique multiple factors or failures associated with the road design deficiencies, vehicle defects, and road user errors. In most cases, the traffic police associate traffic accident with a single most important cause on the spot of accident and do not list the multiple factors.

The road traffic system has four main physical components; namely the road user (human factor), the vehicle, the road and the environment. The key contributory factors of road accident are driver, vehicle, road, pedestrians and animals (Hick ford and Hall, 2004 66). Then these factors are considered as prime actors of the roads

that need a proper management to mitigate a range of road traffic accidents.

Diagram 1 shows the conceptual model for causes of road traffic accident in Addis Ababa.



2.7 Road Traffic Management System

Road traffic may be considered as a system in which humans, vehicles and the road interact with each other. This implies that the efficiency and safety of road traffic depends on the performance and interaction of these components. A road traffic accident may thus be regarded as an event caused by a failure in one of the components or in the system of interaction between these components,(Girma, 2000)

According to (Ogaden, 1996), road traffic accident is a rare, random, multiple factor event, always preceded by a situation in which one or more road users have failed to cope with the road and its environment. It is a random event from time and location (space) aspects or it is impossible to predict actually where or when the next road accident will occur. By contrasting the above concepts, many leaders do not consider

road traffic management problems as accidents. Therefore everybody in the world should have to consider the road traffic management problem.

2.8 Road Traffic Factors

The prominent factors which affect the frequency and severity of road traffic accidents are mainly traffic volume, traffic speed and traffic composition. As the volume of traffic grows, the increase of opposing vehicles increases, intervals for passing vehicles are less available, the accidents due to improper passing become frequent, and the frequency of accidents grows approximately in direct proportion to the average volume of traffic volume according to Babkov (1975) cited in Girma (2000). Here, again as the volume of traffic increases, the speed of vehicles drops and the main kind of accident becomes a nose-tail collision.

According to Ross Silcock partnership (1991) and Ogden (1996) cited in Girma (2000), greater hazard occurs at higher speeds for the fact that vehicles become less stable and the driver and other road users have less time to react. Hence, as the speed of the vehicle increases the severity of accident increases. The survival rate also decreases as the collision speed of the vehicle increases. And the death risk of pedestrians is much higher than for a vehicle user according to Gunnarsson (1999). Gunnarsson cited results of studies that indicate that 90% of pedestrians survive at a collision speed of 30km/h, and 40% at 50km/h. Another study made in Norway as summarized by Sakshaug (1989) showed that when the speed limit was lowered from 60 to 50, 70 to 60, and 80 to 60 km/h, serious accidents were reduced by 40-50%. On the other hand, the number of serious accidents increased by about 50% where the speed limit was raised from 80 to 90 km/h. Another factor, which affects the frequency and severity of road traffic accidents, is composition of traffic. There are different types of vehicles in a traffic stream. And different types of vehicles have different physical, geometric, and performance characteristics. Speed and Acceleration can vary greatly from one vehicle type to another. High differential

speeds in traffic streams result in more overtaking maneuvers and more probable danger of accidents. In support of this view, Ogden (1996) showed that the speed differential between heavy and other vehicles is often the basic argument for higher involvement of trucks in accidents. Therefore, speed, volume and composition of traffic are most important factors in accident prevention (safety), which needs more attention.

2.9 The Four Major Road Transport System Physical Components and their Contribution to Improper Management of Road Traffic

The road transport system has four main physical components. These are the road user /human factors/, the vehicle factor, the road factor and environmental factors. The road user includes the driver, animals, passenger, pedestrian and bicyclist. The vehicle factor also can be further classified as motorized and non-motorized. (Hickford and Hall, 2004:87).

When we see the human factor specially the driver, it is considered as the major contributor of road crash. Some of unnecessary actions made by the drivers are giving misleading signals, driving without respecting pedestrian priority, behaving in undisciplined way, driving recklessly, ignoring traffic rules and regulations, relocating driving under the influence of alcohol and drugs, getting driving licenses by corruption, competition with other drivers, following too close etc.

As far as the other human factors are concerned, the following contributory factors are observed. Inattention (Failed to look and looked but did not see), crossing a road without watching left and right, playing on road, animal drawn carts found in main road, crossing from behind parked vehicle, ignoring lights at crossing, animals without control, walking without holding the left side of the road, ... etc.

With regards to factors which are related with road, the following can be mentioned.

- Poor visual guidance,
- Narrow road, poor road surface, steep hill,
- Lack of pedestrian facilities (E.g. pavement),
- Engineering efforts that did not consider safety,
- Poor maintenance of roads, slippery road,
- Steep ditches and hard objects near the road,
- Inadequate or absence of road signs,

The last factor which deals with the environment refer to:-

- Darkness and inclement weather condition,
- Weak traffic law enforcement,
- Over population ,and
- High winds, mist weather

Due to improper movements of the road users, more than 1700 people are died and 8000 people seriously or slightly injured in 1996-2000 a year in Ethiopia. For example when we see the percentage distribution of road accident by road user (from 1996-2000 E.C) 58% pedestrian, 31.6% passengers & 9.8% drivers died (Addis Ababa Traffic Bureau 2008 Report).

2.10. The Social and Economic Impact of Road Traffic Accident

The social and economic impact of road traffic accident is a very sensitive issue. The impact is not only on individual life or his family but also on the government and on the society at large. Road traffic accidents can be categorized in to three: Motor vehicles accident, Non-motor vehicles accident and non-traffic accident. Motor vehicles accidents are accidents which are made by motor vehicles, non-motor vehicles accidents are caused by vehicles which are not made with motor. E.g. bicycle, animal or man drowns carts. The non-traffic accidents are dealing with accidents occurred out of road like in agricultural area, with in one's own compound etc. (Alemgena, 2005:65)

When we see the specific social and economic impact of road traffic accident we can find the following:

- Disability of many people
- Create high dependency burden
- Jobless too many people
- Increase in number of widows and female headed households
- Unable many children to complete their education or acquire skill for life making
- Long period of hospitalization
- Ethiopia losses about 700 million birr a year (Federal .Police, 2003:26)
- Cost of Medical care and insurance
- Hampers economic growth
- Delays on the road way
- Loss of household productivity,and
- Backwardness of the country.

2.11.Types of Road Traffic Management Techniques

There are four principal types of road traffic management techniques.

These are: -

A. Physical Measures

This technique involves a physical alteration to the road system, physical alterations to the road system may be undertaken for a variety of purposes and these are as follows:

- ✓ Re-allocation of existing highway space by introducing changes of level, bollards and other physical barriers, differences in surface coloring or texture.
- ✓ Alteration to road layout at junctions often allied to changes in the type of control or range of permitted (E.g right or left turn bans).

- ✓ Closing or opening roads to particular classes of vehicular traffic in one or both directions.
- ✓ Changes to surface levels, texture and alignment to control speed of traffic.
- ✓ Coordinating the passing of traffic signals where they exist.
- ✓ The provision or alteration to traffic signs and road markings either to reinforce other physical measures or for regulatory or informative purposes.
- ✓ The provision of crossing facilities for pedestrians and cyclists.

Physical measures do not rely on any order or traffic sign. They are essentially self-enforcing. Road user compliance, in particular drivers, is assured without the presence of a law enforcement officer or resource to legal penalty. /Assefa, 1976:9/

B. Traffic Regulations Strategies

This technique involves some form of regulatory measure. Methods of regulating the use of the road include the following.

- ✓ Control by traffic signals
- ✓ Imposition of speed limits
- ✓ Introduction of one-way operation
- ✓ Restrictions on the directions of movement at junctions
- ✓ Restrictions on parts of the carriageway for use by specified classes of vehicles.
- ✓ Exclusion of vehicles by size or weight with or without exemption for access, and
- ✓ Limitation on parking and loading including special provision for parking by those with a mobility handicap and control of foot way parking.

Regulations can be applied for some or all of the times and are usually of the prohibitive rather than permissive nature. (Federal Road Transport, 2000)

C. Provision of Information for Road Users

The effectiveness of road traffic regulations relies on the acceptance by the general public. Clear traffic signs and road marking are very important to reduce uncertainty and encourage road users to follow routes. Comprehensive and clearly legible naming of streets can also assist drivers and reduce uncertainty. Direction signing for cyclists and pedestrians can encourage them to use safer routes and crossing places especially where there are many people. Systematic sign posting of car parks, perhaps, including information on the availability of spaces and service areas encourages their use and reduces parking and loading in places prohibited (F. Road Transport, 2000). Maps designed especially for car drivers, lorry drivers and coach drivers can also be helpful, particularly for visitors. In some places, multi-language information signs may also be beneficial. (Federal Road Transport, 2000)

D. Charging Systems

When road traffic regulations are violated by road users a certain amount of punishment (usually a fine) is given.

If the above techniques are properly implemented, the following benefits can be obtained

- ✓ Avoiding danger to persons or other traffic users
- ✓ Preventing damage to the road, building etc.
- ✓ Reduction in vehicle journey times, number of stops, fuel consumption and environmental pollution
- ✓ Creating prorates for certain road users such as buses, emergency vehicles, pedestrians etc.
- ✓ Improve utilization of car parks
- ✓ Saving life and minimizing physical injury
- ✓ Reducing property damage
- ✓ Creating safe area or sustainable mobility.

The road traffic management techniques should aim to enhance effectiveness, efficiency and affordability so as to improve the quality of life of the communities.

Furthermore, they should improve accessibility, enhance travel opportunities, improve quality of travel, sustain development, and minimize environmental impact and the cost of providing transport services and infrastructure. (Silvestre O.Kasuku, 2002:50)

2.12.Role of transport

The availability of efficient transportation system facilitates survival, economic growth and the betterment of the life style of a society. Without transportation survival would not be possible. Through and efficient transportation net work, the benefit of specialization result in production and economic growth and also it brings geographic specialization Transportation also encourages regional development and competition, the former in turn ensures utilization of the entire nation's resource, whereas competition fosters technological gain and efficient resources allocations. Collectively the benefit of an efficient transportation system accrues to increase standard of living and life style and form foundation for national defense. Transportation is a key factor in the production and consumption processes of an economy. This can be observed by the following factors(David, B.(2004).

A. Transportation and survival

To survive, a person must consume products. First, the available raw materials must be located and tools needed to extract raw material have to be moved. Second, the raw material requires processing tools for processing and also raw materials to be processed require moving. Finally, when the product is ready for consumption, it is necessary to move it for consumption. Given that a person must perform some or all these activities to survive. These activities could not be accomplished without transportation.

B. Specialization

People seek more than survival. They strive for a better life style and standard of living with less time devoted to obtaining needs and wants. One means of accomplishing development is specialization. Specialization can be defined as allowing human and physical resource to perform the task of which they are best suited. One of the

benefits of specialization is that resources are utilized on the best possible manner. The overall efficiency of society is improved because fewer resources are employed to produce the desired output. The result is that less effort is exerted to produce a particular product. Thus, specialization is a desired goal for society, because it causes to increase the efficiency and directly improves out standards of living and life style.

The benefits of specialization can be gained through other production economic or geographic specialization. Productions are realized when a large volume of the same type of commodity is produced at one time in one location. Mass production of automobile is one example. Geographic specialization involves using particular region to produce specific products. If productions are to specialize is a task such a task such as factories, then a movement of products among different location must take place. Thus, in order to be efficient, we must specialize and if we specialize, we must exchange. For this to happen, we must have transportation. Therefore, transportation increases ability to increase the overall efficiency of society.

C. Regional development

Nation is composed of heterogeneous regions with human resources. For a society to reach its full potential, regions must develop through resources they have natural advantage. Regional development is a desired goal from both regional and national perspective. People live in a particular area desire development that improves their standard of living and life style a regions developed so doe's society. When the inherent advantages of an area are utilized, efficiency form specialization is gained and a more efficient allocation of resources results. Of course, transportation plays an integral role in regional development. Efficient transport facilities must be for regional development.

D. Competition

In a free economy system, competition is desirable. Competition encourages technological innovation, lower price and increase efficiency of the system. If two producers are on the same location, transportation does not play a significant role. That is if producers are located in different place they can compete in the market only if efficient transportation is available.

One can logically extend this to include that the more efficient the transportation the greater the degree of competition. First, the more efficient the transportation the greater is the market for a given product. Second, as transportation becomes more efficient, the number of competitor which in turn increase the overall efficient, the number of competitor which in turn increase the overall efficiency of society. Thus the presence of efficient transportation facilities competitions that result in efficient utilization of resources.

E. National defense

A fundamental objective of all societies is defense from outside aggression. To guard against the possibility of physical invasion and to be repelling such attempts several conditions must be presented with regard to transportation. First human and materials resources must be able to reach the physical limits of the country, access to all border must be possible. Second, transportation facilities must exist to bring defense forces from several areas across the country to a particular location. Third, a transportation network must be available to supply the defense efforts during the conflict as it enables control of border and territory.

F. standard of living and life style

It is difficult to define the concepts of standard of living and life. Styles generally both reflect the manner in which individuals and societies are able to fulfill their needs and wants. One measure of standard of living and life style is the amount of

variety of goods and services people are able to acquire. Transport is the basic services, which people use to satisfy their needs and wants.

Role of Transportation has been significant, without transportation we would not have been able to take advantage of production, geographic specialization and competition to increase overall economic efficiency. Furthermore, as the efficiency of transportation system increases the ability to gain these advantages will also increase.

2.13.Spatial and Temporal Variations in Road Traffic Accidents

A fundamental pre-condition for safe traffic is that the road users have sufficient information about road conditions, traffic characteristics and traffic regulations. The road layout and design should be improved. If it is not the case, traffic accidents will tend to increase. And most road accidents occur in urban areas than in rural.

2.13.1. Spatial Distribution of Road Traffic Accidents

Severe road traffic accidents are associated with those areas, where there is lack of information, overload of information and when the information is difficult to perceive as well as at intersections where traffic is not regulated and with complex geometry (design). Moreover, roads with heavy traffic volumes, with mix of local and through traffic, road users traveling at different speed levels and/or in different directions as well as in busy shopping streets where the high complexity makes it difficult to select sufficient information about the road and the traffic. Most road traffic accidents take place at junctions, on curves, at gaps in dual carriageways, at pedestrian crossings, private driveways and bus stops. Also accidents more likely occur at junctions than elsewhere and in urban areas (Hobbs, 1979). According to Ogden (1996), for example, in the USA, over 50% of urban and over 33% of rural total reported accidents occur at intersections. The corresponding figures in Australia are 43% and 11%, respectively. Again in the United Kingdom, 60% of all reported accidents are intersection accidents (Jacobs et al., 1986). Therefore,

intersections and urban areas especially in the central places of cities are the areas of traffic accident and focus of road safety works. Intersections have different configurations such as the T, X and Y junctions which have different influence on the safety performance of intersections (Ogden, 1996).

2.13.2. Temporal Variation of Road Traffic Accidents

Occurrences of road traffic accidents obviously vary with time. This variation occurs between hours in a day, days in a week, and months in a year closely following the variation of traffic volume. Even though nighttime driving is normally low, the rate and severity of the accident is higher during the nighttime. According to Hobbs (1979), nighttime accident rates are about 50% greater than daytime accidents.

CHAPTER THREE

GENERAL BACKGROUND OF THE STUDY AREA

3.1 Historical overview

Addis Ababa, the spelling used by the official Ethiopian mapping Authority) is the capital city of Ethiopia. (In Ethiopian languages: Amharic, Addis Ababa means “new flower” in Oromofia, Finfinne it is the largest city in Ethiopia, with a population around of 3 million according to the 2007 population census.

As a chartered city (rasgezastedader), Addis Ababa has the status of both a city and a state. It is where the African Union and its predecessor, the OAU, are based. Addis Ababa is therefore referred to as “the political capital city of Africa,” due to its historical, diplomatic and political significance for the continent. The city is populated by people from different states of Ethiopia – the country has as many as 80 nationalities speaking 80 languages and belonging to a wide variety of religious communities. It is home to Addis Ababa University, the federations of African Societies of Chemistry (FASC) and Horn of Africa Press Institute (HAPI) are also head quartered in Addis Ababa.

The site of Addis Ababa was chosen by Empress TaytuBetul and it was founded in 1886 by her husband, Emperor Menelik II. The name of the city was taken from parts of the city called horafinfinnee (“hot springs”) in Oromofia .Another Oromofia name of the city is Sheger. Menelik, as initially a king of the Shewa province, had found mount Entoto a useful base for military operations in the south of his realm, and in 1879 visited the reputed ruins of a medieval town, and an unfinished rock church that showed proof of an Ethiopia presence in the area prior to the campaigns of Ahmed Gagn. His interest in the area grew when his wife Taytu began work on a church on Entoto, and Menelik endowed a second church in the area.

However, the immediate area did not encourage the founding of a town due to the lack of firewood and water, so settlement actually began in the valley south of the mountain in 1886. Initially, Taytu built a house for herself near the “filwoha” hot mineral springs, where she and members of the Showan Royal court liked to take mineral baths. Other nobility and their staffs and households settled the vicinity, and Menelik expanded his wife’s house to become the imperial palace which remains the seat of government in Addis Ababa today. The name changed to Addis Ababa and became Ethiopia’s capital when Menelikll became emperor of Ethiopia. The town grew by leaps and bounds. One of Emperor Menelik’s contributions that is still visible today is the planting of numerous eucalyptus trees along the city streets.

Geography

Addis Ababa lies at an altitude of 7,546 feet (2,300 meters) and is a grassland biome, located at 9 1, 48” n 3844’24”E/9.03;38.74 coordinates: 91’48”N 38 44’24”E/9.03N38.74 E/9.03;38.74. The city lies at the foot of Mount Entoto. Form its lowest point, around Bole international Airport, at 2,326 meters (7,631 ft) above sea level in the southern periphery; the city rises to over 3,000 meters (9,800ft) in the Entoto mountains to the north.

Climate

Addis Ababa has a subtropical highland climate .The city possesses a complex mix of highland climate zones, with temperature differences of up to 10 c, depending on elevation and prevailing wind patterns the high elevation moderates temperature year- round, and the city’s position near the equator means the temperatures are very constant form month to month.

Demographics

Based on the 2011 census conducted by the central statistical Agency of Ethiopia (CSA, 2011), Addis Ababa has a total population of 2, 980,001, of whom 1,420,001

are men and 1,560,000 women; all of the population are urban inhabitants. For the capital city 662,728 households were counted living in 628, 984 housing units, which results in an average of 4.1 persons to a household. Although all Ethiopian ethnic groups are represented in Addis Ababa due to its position as capital of the country, the largest groups include the Amahra (47.04%), Oromo (19.51%), Gurage (16.34%), tigray (6.18%), Silt'e (2.94%), and Gamo (1.68%). Languages spoken include Amharic (71.0%), Oromiffa(10.7%), Gurage (8.37%), Tigrinya (3.60%), Silt'e (1.82%) and Gamo (1.03%). The religion with the most believers in Addis Ababa is Ethiopoa orthodox with 74.7% embracing that belief, while 16.2% are Muslim, 7, 77% protestant, and 0.48% catholic.

Table 2: Population size by area, density and gender in sub -cities of Addis Ababa.

Sub-city	Male	Female	Total	Total area/km	Density
Akakikaliti	96,503	100,677	197,180	118.08	1,669.9
Nifas silk	162,065	181,978	344,043	68.30	5,037.20
Kolfekeraniyo	225,872	240,667	466,539	61.25	7,617
Gullele	140,757	150,356	291,113	30.18	9,645.90
Lideta	104,725	114,693	219,418	9.18	23,901.70
Kirkos	112,587	128,064	240,651	14.62	16,460.40
Arada	107,872	122,193	230,065	9.91	23,215.40
Addis ketema	135,864	141,922	277,786	7.41	37,488
Yeka	175,780	201,311	377,091	85.98	4,385.80
Bole	157,976	178,139	336,115	122.08	2,753.20
Total	1,420,001	1,560,000	2,980,001	526.90	5.654.80

Sources: (2011) Central Statically Report.

Economy

The economic activities in Addis Ababa are diverse. According to official statistics from the federal government, some 119,197 people in the city are engaged in trade and commerce; 113,977 in manufacturing and industry; 80,391 homemakers of

different variety; 71,186 in civil administration; 50, 538 in transport and communication; 42,514 in education, health and social services; 32,685 in hotel and catering services; and 16,602 in agriculture. In Addition to the residents of semi rural parts of Addis Ababa, the city dwellers also participate in animal husbandry and cultivation of gardens. 677 hectares (1,670 acres) of land is irrigated annually, on which 129,880 quintals of vegetables are cultivated.

3.2 General Conditions of Traffic and Transport Development

Addis Ababa is the seat of the Federal Democratic Republic of Ethiopia (FDRE) government. It is also home to the African Union, the Economic Commission for Africa and other international organizations. For administrative purposes, Addis Ababa is divided into 10 sub-cities. Hence, Addis Ababa has a significant contribution to the economic, social and political sector development of the country. Over the past years the city has witnessed an amazing expansion in terms of size. Located at the heart of the country with population around 3 million, Addis Ababa has a total land area of 54,000 hectares. The rapid increase in urban population with an annual growth rate of 3.8 percent per year has not been provided with an equal growth in urban transport provisions.

Urban transport in Addis Ababa is carried out by a mixture of ownership structures, of which public and private operators are predominantly contenders for business. The modes of urban transport system in the Addis Ababa are categorized in to motorized and non- motorized traffic. The modes of transport include public buses; minibus; taxis and the non-motorized transport, while walking and animal carts dominant the periphery. Currently, taxis, city buses and private cars altogether cover 30 percent of the urban mobility, that is, 26% bus, 72% taxis and 4 % private cars, While 70% of urban mobility is covered on foot. (AATCB ,2014)

Addis Ababa transport has its own special characteristics. The foundation of the city in 1886, the broad physiognomy of a radial road system had evolved from the centre. This radial system consists of 5 main arterial roads. Besides, their national and regional level functions also ensure connection and accessibility to new expansion areas. A combination of these radials with a set of ring roads has been envisaged to minimize travel distance, time and energy consumption to discourage long-distance traffic from passing within the city centre. Today, the total length of road in the city is 1,329.59 kms, out of which 29.7 percent or 395.27km is asphalt road, the remaining 70.03 percent or 934.34 km is non-asphalt. Road gross density is 1.45 percent including the asphalt and non-asphalt roads adequate to support the smooth running and development of the socio economic and physical integration of the city.

As modernization and consequently urbanization move forward, the use of motorized transport to maintain the socio economic and physical integration of the city increases. Currently city buses, taxis and private cars altogether cover only 30 percent of the total urban mobility, while 70 percent of the urban mobility is covered on foot. The rise in automobile ownership, although not significant, together with the road unstable condition, and poorly functioning traffic system has resulted in high level of congestion particularly at peak hours.

The vehicle fleet in Ethiopia is estimated to be 1.3, 000 vehicles in 2001 composed of 39,200 private cars, 21400 trucks (dry and liquid cargo) 13200 Government vehicles, 12600 buses, 10,000 taxis, 5200 international vehicles and 1600 motorcycles. The greater number of motor vehicles is found in Addis Ababa with a total share of 77 percent of the total motor vehicles. Thus Addis Ababa had 21, 31 motor vehicles per 1000 in the years 1996 to 2001 E.C respectively. Annual motorization rate of the city had been 5.8 percent on average (AATCB, 2014).

3.3 Main Problems of Traffic Development in Addis Ababa

The rate of traffic accidents and pollution in Addis Ababa goes up together with the increase of motor vehicles and population size. Despite it has low level of motorization, the share of the city in the total number of accidents has been 60 percent in 1995 and 55 percent from 1996-2001 E.C on average. During this period, annual average traffic accident growth had been 31.4 percent. Besides, the increase in car traffic has resulted in an increase in air and noise pollution of the city. More than 12, 000,000 Ethiopian Birr is lost every year because of traffic accidents. Thus, the aforesaid problem has potentially resulted in high level of traffic safety problems. In general the major transport problems in Addis Ababa include, among others,

- A. Shortage and low quality of transport services and facilities
- B. Poor quality of roads, pedestrian walkways
- C. Low affordability level by most urban citizens
- D. High rate of congestion at peak hours and hence high rate of traffic accidents
- E. Lack of lane animal transport, bicycle and pedestrian

Moreover, the high unemployment rate, the rising household size and the low income level negatively affect the demand for motorized transport. City bus transport is the second cheapest mode of transport next to walking on foot. The fact that the revenue it generates doesn't cover its costs and that even the subsidized fares are unaffordable by the majority of the citizens are the major challenges (AATCB, 2014).

3.4 Main targets of Traffic Police and Practice

The urban transport system could be viewed as a nervous system whose proper functioning is central to the overall well-being and functioning of the city. In view of this, the main targets of traffic police in Addis Ababa include:

Improvement of infrastructure facilities: There are good opportunities in the existing land tenure, liberalization and decentralization policies that could be utilized to improve the situation of mobility in Addis Ababa. Upgrading of slum areas with main focus on the infrastructure (road access provision) should be promoted in order to improve accessibility and the safety of the living conditions for the poor. In this regard, a city ring road and city to city train is the major ongoing projects Phase I and II of this ring road are under construction while the 3rd is under study. This road is expected to facilitate the flow and accommodation of more traffic and hence lessening the effect of congestion on mobility.

Involvement of the Private sector and seeking international partners:-

With the ongoing privatization process and the government's strong orientation towards enabling the private sector, possible and effective areas of action could be identified and built upon. The private sector should be mobilized to provide the general public with services at a competitive aspect. The public sector might be limited to ensuring the process to meet social and environmental objectives for example by controlling fares. The city government is showing interest in this direction. To improve the situation, donors could also take part in promoting these varieties of initiatives Donors can take part in the actual physical provision of services and facilities such as equipments in the development of traffic regulations and management systems through different institutions and arrangements as deemed appropriate.

Appropriate policy and programmes:- Traffic management is crucial and thus should be given importance to improve the movements of people and goods; to ensure efficient and safe access and distribution; alleviate traffic congestion and adverse traffic impacts arising from major land use developments. Constructing new roads in areas where development expansion focuses, enhancing the capacity of the existing roads and improving the drainage system, as well as road and transport facilities, getting the involvement of the private

sector increased are among the major directions the Addis Ababa Transport Authority has been entertaining to improve the capital traffic flow.

These strong initiatives could be fostered towards practical actions if appropriate tools and implementation are put in place. Increasing the number of buses for mass transportation, providing the society with appropriate walkways, fostering road maintenance and redesign and reconstructing roads at critical junctions and squares could help ease the problem of traffic congestion, the application of road changes and taxes can help correct subsidizing private motor vehicles. Creation of an enabling policy environment and provision of facilities such as parking spaces, terminals etc. and limiting the non-motorized ones to specific route could also be recommended as a viable strategy (2011 transport policy of Addis Ababa).

Planning Strategy to reach these goals

Addis Ababa is a metropolitan city where rapid growth of population is witnessed year by year, increasing number of vehicles move in it and a center of many business activities. Besides, it is a seat of many national and international organizations like organization African Unity and the Economic Commission for Africa. Hence, the promotion of modern urban transport and traffic management is indispensable for the purpose of ensuring sustainable urban transport development (2011 transport policy of Addis Ababa).

In its Five –Year Development Programme (2001-5) the Addis Ababa City Government has developed a strategy to deal with transport issues: The main concerns of the strategy are to:

- A. Increases the number of buses;
- B. Encourage more involvement of private sector in the provision of the city bus and taxi services, management of park meters , park lots , drivers training,

- C. Improve road utilization culture through mass media campaign to remove traffic flow obstructions
- D. Improve transport utilities by expanding terminal construction as well as park meters installation with a view to charging street side parking.

CHAPTER FOUR

4. Data Presentation, Analysis and Findings

4.1 Data presentation

This chapter presents data in the form of tables, percentages, graphs and deals with interpretation and discussion of data collected through questionnaires and interviews.

4.2. Results from the Questionnaire and Interviews

As it was described in chapter one, the main objective of this study is to assess the status of road traffic accidents in Addis Ababa, find out the root causes of high rate of car accidents and pin point potential control mechanisms taken by Addis Ababa traffic bureau to reduce the rate of traffic accident. Both primary and secondary data collection methods were applied. This chapter begins with presentation of data. The information about the respondents who participated (involved) in this study are presented in the tables 4.2.1 which follows:

4.2.1 General Characteristics of Respondents

Table 3: respondents who participated (involved) in this study.

	ITEM	TRAFFIC POLICE	PEDESTRIANS
		#	#
Sex	Male	98	68
	Female	2	32
	Total	100	100
Age	18- 22 years	-	9
	23-27	28	24
	28-32	38	24
	33-37	12	22
	Above 38	22	21
	Total	100	100
Education level	12 grade not complete	29	11
	12 grade complete	31	12
	TVET	20	13
	Diploma	19	18
	Degree	1	38
	Above Degree	-	8
	Total	100	100
Experience of service	< 3 years	19	-
	3-10 years	44	-
	11-15 years	13	-
	16- 20 years	12	-
	Above 20 years	12	-
	Total	100	-
Occupation	Private worker	-	12
	Unemployed	-	8
	Student	-	4
	Government officers	100	72
	Other	-	4
	Total	100	100
Duration in Addis Ababa	< 1 year	-	-
	1-2 years	-	2
	3-5 years	-	14
	Above 6 years	100	84
	Total	100	100

Source; Organized by researcher

4.3. Current Situation of Addis Ababa

Existing Addis Ababa City transport services

The Public transport system of Addis Ababa comprises of

- 550 Anbessa city bus services with 100 seat capacity but rendering service with a congested scenario,
- 462 midi Bus (Higer) with 27 seat capacity,
- 4000 Saloon Taxi with 5 seat capacity ,
- Non – motorized transport (walking) 60%, and
- 9,200 privately owned mini Bus Taxis with 11 seat capacity

Questionnaire Distributed to Pedestrians and Traffic Police

In addition to the secondary data source, the researcher distributed questionnaire to 100 Addis Ababa dwellers/pedestrians and 100 traffic police to know the status of traffic accidents in the capital. The responses obtain through questionnaire were presented together with the data obtained from Addis Ababa traffic bureau.

Table 4: Responses of pedestrians and traffic police about their respective experience with regard to traffic accidents in Addis Ababa

Options 1	Traffic police		Pedestrians			
	#	%	M	F	#	%
Yes	84	84	62	32	94	94
No	6	6	4	-	4	4
No answer	4	4	-	-	-	-
Indifferent	6	6	2	-	2	2
Total	100	100	100		100	100
Option 2	Traffic police		Pedestrians			
	#	%	M	F	#	%
Yes	33	33	26	10	36	36
No	53	53	34	18	52	52
No answer	6	6	6	4	10	10
Indifferent	8	8	2	-	2	2
Total	100	100	100		100	100

As shown on the above table 4, the majority of traffic police, 84(84 percent) of the total population told that there is high level of traffic accidents in Addis Ababa, 6(6 percent) of them responded that they do not accept the high level of traffic accidents in Addis Ababa, and the rest 4 percent of traffic police are neutral. For the second category of respondents the majority of the pedestrians 94(94 percent) shared the idea of Traffic police and 4 percent of pedestrians do not accept the high level of traffic accidents in Addis Ababa. Concerning the second question (the relationship of accident and number of vehicles) in the above table 4 indicates the percentage share of responses of traffic police and pedestrians for the given questions. Both say that road traffic accidents do not occur due to the high number of vehicles moving on roads. Some 53percent's of traffic police and 52 percent of pedestrians responded that accident is not predominantly caused by cars on street, but because of pedestrian's improper usage of roads and unlawful crossing of main roads, technical capacity of vehicles, low standard of road as well as other unknown factors.

4.4 Questionnaire Distributed to Pedestrians

The researcher collected information through questionnaire distribution to 100 Addis Ababa dwellers/pedestrians to know the status of capitals traffic accidents. The responses obtained through questionnaire are presented together with the data obtained from Addis Ababa traffic bureau.

Question: 3, the survey depicts the following figure to the question

“Have you given priorities to vehicles as required by law whenever you cross the road?”

Table 5: Pedestrian’s responses on priority issue

Items	Pedestrians			
	M	F	#	%
Always	24	16	40	40
Sometimes	26	8	34	34
Never	10	2	12	12
Indifferent	8	6	14	14
Total	100		100	100

As shown on the above table 5, the majority of pedestrians 40(40 percent) of the total respondents explained that they always give priorities to drivers, 34 (34 percent) sometimes give priorities to drivers and the rest 12 percent never give priorities. The researcher also tried to collect information about the above questions from different inspectors and most of them said they have highly criticized pedestrian’s behavior in due course of putting traffic rules and laws in to effect at the time of using roads. According to inspectors, some peoples start crossing roads even when green light comes out, haphazardly cross road, play on highways, etc. These and other weak behaviors of pedestrians have all the time caused fatal traffic accidents. To address this challenge, the Ethiopian government has launched new laws and rules regarding road usage. The new laws which will be implemented in the coming years incorporate conditions that allow law enforcement bodies to throw pedestrians in to jail and fine them accordingly.

Question; 4,the survey I have conducted depicts the following figure to the question “Where do you usually cross the main roads?”

Table 6: Crossing point of pedestrians in the main roads.

Items	M	F	Total	%
At traffic light	-	-	-	-
At junction	-	-	-	-
At any point	28	2	30	30
Mid-block pedestrian crossing away from junction	4	4	8	8
At zebra crossing	34	26	60	60
Indifferent	2	-	2	2
Total	68	32	100	100

Accordingly, about 30% of the pedestrians lack knowledge about the signs, signals and symbols around the pedestrian crossings, the pedestrians did not know about their responsibilities as they crossed the roads at any point. About 8% of them had doubts about what is a Zebra crossing and they crossed the road at mid-block pedestrian crossing away from junction and 60% of Addis Ababa city dwellers use Zebra crossings when they cross main roads.

Question: 5

“How do you rate the traffic police commitment to their duties?”

Table 7: Commitment of traffic police towards their duties

Items	M	F	Total	%
Strongly agree	4	-	4	4
Agree	16	4	20	20
Indifferent	22	6	28	28
Disagree	18	20	38	38
Strongly disagree	5	2	7	7
Indifferent	3	-	3	3
Total	100		100	100

The response of the pedestrians with respect to the above question, 38 (38 percent) indicated that large number of traffic polices are not committed to effectively discharge their responsibilities. The respondents replied that the commitments of the traffic police to their duties are poor. The combination of poor road traffic management, low level of infrastructures and low level commitments of traffic police to their duty aggravate the current road traffic accident in Addis Ababa.

Questions: 6, Reflect the survey conducted to the question of “Crossing the main roads in the city is?”

Table 8: Peoples view on the road crossing

Options	M	F	Total	%
Difficult	57	28	85	85
Easy	6	4	10	10
Indifferent	5	-	5	5
Total	100		100	100

Attempting to know the perception of pedestrians towards traffic safety in Addis Ababa, the researcher asked questions as to whether crossing the road in the capital is easy or difficult. For this question the majority of the surveyed pedestrians, 85(85 percent) indicated that they perceive crossing roads in Addis Ababa is so difficult. It is generally observed that driver’s behavior towards pedestrians is rather rude; especially they do not respect pedestrians on road crossing i.e. drivers are less likely to be willing to stop for pedestrians. Even the current ring road and city train transportation system has not taken pedestrians issue in to account. This will aggravate the problem of crossing main roads in the city. Therefore, it can be concluded that pedestrians who totally depend on traffic lights at crossing points can be at a greater risks.

Questions: 7, How frequent do you leave sidewalks/walk along roads and walk on the vehicles road?

Table 9: Pedestrians walking habits

Questions	Option				
		M	F	Total	
How frequent do you leave sidewalks/walk along roads and walk on the vehicles road?	Always	4	2	6	6
	Sometimes	48	11	59	59
	Never do this	14	14	28	30
	Indifferent	2	5	7	7
	Total	100		100	100
While walking along roads, do you walk with your face/back	Face to the oncoming vehicles	48	30	78	78
	Back to the oncoming vehicles	12	2	14	14
	Indifferent	8	-	8	8
	Total	100		100	100

As learnt from the above Table 10, in Addis Ababa there are notable tendencies of pedestrians towards walking along vehicle roads. When asked to indicate how frequent do pedestrians have to leave the sidewalks and walk along roads, 6(6 percent) indicated that they always use vehicles road calculatingly or unknowingly, 59(59 percent) indicated that they sometimes do this, while 30(30 percent) indicated that they never do this and they use the right pedestrians road except exceptional phenomena (road status, order from police or traffic police and etc.) This habit of pedestrians to leave the sidewalks and walk along the roads increases the risk of a pedestrian being exposed to traffic accidents. Concerning the second question in the above box, about 78% of the pedestrians use/walk the road correctly as the

traffic rules and regulations ordered and 14% of pedestrians are not obey by traffic rules.

Question: 8, the survey I have conducted depicts the following figure to the question “In your opinion, do drivers in Addis Ababa city give priorities to pedestrians as required by law?”

Table 10: Drivers’ priorities to pedestrians

Items	M	F	Total	%
Strongly agree	10	2	12	12
Agree	16	2	18	18
Indifferent	6	2	8	8
Disagree	19	22	41	41
Strongly disagree	14	4	18	18
Indifferent	3	-	3	3
Total	100		100	100

As shown on the above box, the majority of pedestrians believe that only 12(12 percent) drivers always give first priorities to pedestrians, 18(18 percent) sometimes give priority to pedestrians. However, the largest share which account for 41(41 percent) shows they do not give priority to pedestrians. In fact, this is a big problem in Addis Ababa especially when pedestrians cross the main road. To solve this problem, the government has constructed tall bridges that are used by pedestrians and animals to cross, traffic light, traffic police (student traffic police especially in school area) and zebra crossing.

4.5 Questionnaire Distributed to Traffic Police

The researcher distributed questionnaire to traffic police to know the status of Addis Ababa traffic accidents. The answers obtained through questionnaire are presented together with the data obtained from Addis Ababa traffic bureau.

Questions: 10

“Which type of vehicles is causing high number of road accidents in the city of Addis Ababa?”

Table 11: Potential vehicles causing accidents

Types of vehicles	M	F	Total	%
heavy vehicles(trucks, buses	38	-	38	38
light vehicles(cycles, Bajaj	6	-	6	6
Medium vehicles(tax, automobiles)	44	2	46	46
Others	-	-	-	-
Indifferent	10	-	10	10
Total	100		100	100

The above table indicates that 46% of the respondents argue that most of the accidents recorded in Addis Ababa are mainly caused by medium vehicles such as tax, medium automobiles and others and 38% of the respondents argue that accidents recorded in Addis Ababa are caused by heavy vehicles (trucks, buses and the rest 6 percent are caused by light vehicles (two wheels, three wheels).

Question: 11

“Which types of collision or road accidents were highly prevailing in the city?”

Table 12: Nature of collision

Types of collision	M	F	Total	%
Motor vehicle with motor vehicle	6	1	7	7
Motor vehicle with bicycle	3	-	3	3
Motor vehicle with pedestrians	83	1	84	84
Motor vehicle with static object	2		2	2
Indifferent	4	-	4	4
Total	100		100	100

According to traffic police response, about 84% of the traffic collision or road accidents are between motor vehicles with pedestrians which consist of high figure in Addis Ababa. Motor vehicles with motor vehicles have accounted for 7% and the rest 3% and 2% collision is between Motor vehicle with bicycles and static object.

Questions:12

Table 13; Attitudes of traffic police towards annual Bolo inspection and enough traffic symbols, sign and traffic lights in relation to traffic accidents.

Questions	Options	M	F	Total	%
Do you think that the current Bolo inspection system is enough to control the city road accidents?	Yes	14	-	14	14
	No	68	1	69	69
	No answer	2	1	3	3
	Indifferent	14	-	14	14
	Total	100		100	100
Do you think that the city has enough road traffic signs, signals, symbols and lights in all important areas?	Yes	4	-	4	4
	No	82	-	82	82
	No answer	6	1	7	7
	Indifferent	6	1	7	7
	Total	100		100	100

Table 13 shows the response of traffic police regarding annual Bolo inspection of vehicles taken by Addis Ababa road authority. Some 69% of traffic police responded “no”. According to them, the annual bolo inspection system is not done in attractive and enough way plus it is being taken annually. There is also unfair treatment and lack of modern technology used to inspect technical parts of the vehicles. Concerning the second question in the above box, the response of traffic police regarding the availability of traffic signs, signals, symbols and lights throughout the city which are important for traffic flows, 82% of the traffic police answered “No”. This is also the researcher’s observation as well as commander’s responses (heads of Addis Ababa traffic bureau) during interview. According to commander’s

response the offices have launched a program to build different types of traffic signs, signals, symbols and lights throughout the city.

Questions: 13

Table 14: Operation hours of traffic management systems.

	Options	M	F	Total	%
Do you believe those traffic management infrastructure provide 24x7 services?	Yes	32	1	33	33
	No	52	1	53	53
	No answer	12	-	12	12
	Indifferent	2	-	2	2
	Total	100		100	100
Do you believe that there is enough traffic police distribution throughout the city?	Yes	34	-	34	34
	No	58	1	59	59
	No answer	2	1	3	3
	Indifferent	4	-	4	4
	Total	100		100	100

Different studies which are done on road traffic accidents show the severity of car accident in Addis Ababa. This may be due to lack of modern technology that help at least reduce the accident levels, such as CCTV camera, alcoholic test instrument, speed measurement, radar and etc. The traffic police response (53%) is not far from this idea. To tell the truth in Addis Ababa 90% of traffic management infrastructures do not provide the 24x7 services unless exceptional cases happen (according to heads of Addis Ababa traffic bureau). This is because of power dependency, lack of frequent maintenance by concerned body, working habit of the city and etc. Concerning the second question in the above box, about 59% of the traffic police do not accept the availability of enough traffic police distribution throughout the city. Currently, in Addis Ababa there are 567 infantry and 64 motorist traffic police throughout the city. When we distribute these traffic police in

10 sub-cities, there is 56 traffic police or less average per day. This number is not enough to control the smooth flow of traffic.

Question:14 In which roads/ locations of the city car accidents are the highest?

Table 15; show accident prone city locations.

Accident area	M	F	Total	%
On the main roads of the city	74	2	76	76
On the residential roads	2	-	2	2
On the peripheral area of the city	10	-	10	10
Indifferent	12	-	12	12
Total	100		10	100

Table 15 shows the major locations of traffic accidents in the capital. Accordingly, the majority of traffic police, 76% of the accidents occur in the main roads of the city. This is because of high number of vehicles involved in the transportation at a time (crowdedness), poor pedestrian’s habit of road usage, etc. 10% of car accidents occur at the peripheral areas of the city and the rest 2% occur at the residential roads.

Question: 15

How do you rate pedestrian’s respectation for vehicles in giving priorities where they use roads?

Table 16: Rate of pedestrian vehicle respect

Options	M	F	Total	%
Good	2	-	2	2
Moderate	14	-	14	14
Poor	72	2	74	74
Indifferent	10	-	10	10
Total	100		100	100

From table 18, the majority of the traffic police 74 (74 percent) confirmed that pedestrians vehicles respect is minimal or poor. Thus, the traffic police have highly criticized pedestrian’s behavior and habits of using roads in applying the laws and rules of traffic.

Table 17: Car accident records by education levels

Education level	2003		2004		2005	
	2003	%	2004	%	2005	%
Illiterate	45	0.5	29	0.2	12	0.6
Somehow literate	56	0.6	142	1.2	131	0.8
Primary school level	1076	11.8	3493	30.3	1730	10.9
Secondary school level	2722	29.8	3490	30.2	3837	24.2
Higher school level	2814	30.8	3273	28.4	5720	36.1
Above of Higher school	1937	21.2	748	6.5	3739	23.3
Unknown	484	5.3	354	3.1	646	4.9
Total	9134	100	11529	100	15815	100

Source: Source: 2003, 2004 and 2005, AATBR Various Unpublished annual Reports

The above Table 17 the education level of people who are susceptible to car accidents. From this, more than 30 percent’s of car accident is recorded by those people found between primary and secondary school level. Most of the time, those people who are between these educations levels are youths. Hence, road accident is identified to be the major cause of death for pedestrians and kill both economically productive segments of the population in Addis Ababa.

4.6 Causes and Collision Types of Car Accidents

4.6.1 Primary Causes Reported by Police

Accidents commonly have multiple of causes as they stem from a myriads adverse circumstances. The Addis Ababa traffic police are responsible for completing the traffic accident forms. An accident code contains 30 possible causes for accidents categorized under drivers, pedestrians, vehicles and road defects. From analyzing the accidents records of 2003/11- 2005/13, it was found that of all accidents, 74 percent were caused by drivers error, 6 percent happened as a result of pedestrians' error, 8 percent occurred as a result of vehicle defects, 3 percent occurred as a result of road condition and the rest 9 percent have been caused by other and unknown factors.

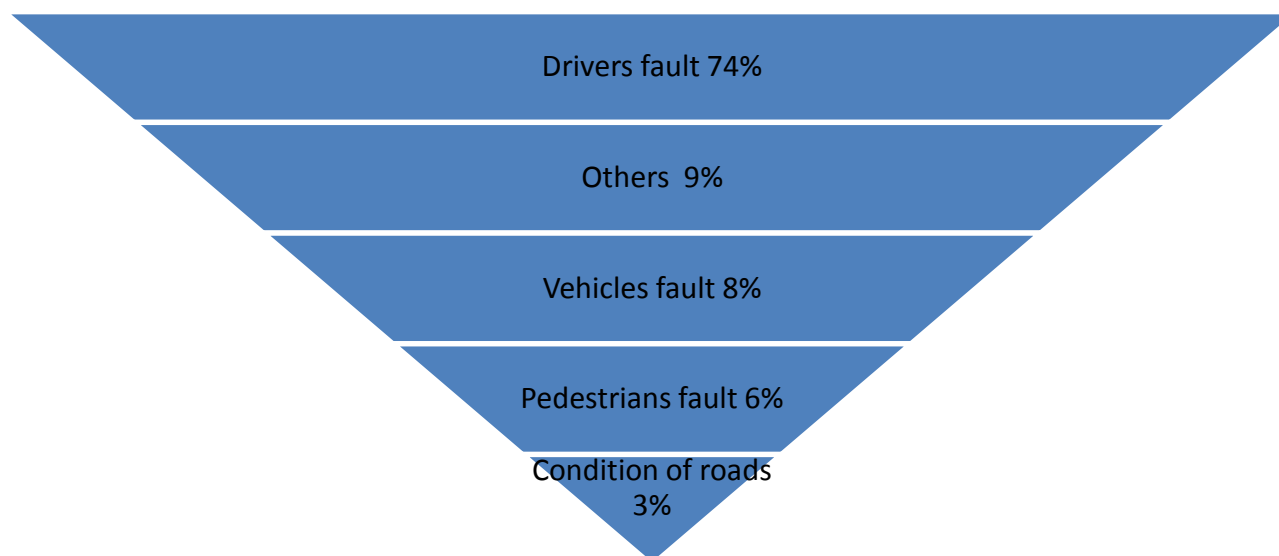
4.6.3 Major Causes of Road Traffic Accidents Reported by Police

There are a lot of causes that increase the road traffic accidents. Among the main causes of road traffic accidents, the most important ones as indicated by AATPR (2011), are

1. Driving beyond speed limit.
2. Negligent pedestrians crossing or walking on the wrong side of the road and rushing in to the road way.
3. Mechanical defects of vehicles such as brakes, lights, etc
4. Violating traffic rules and regulation.
5. Driving recklessly, dangerously or without due regard for other road users and lack of experience.
6. Driving under the influence of alcohol or / and drug.
7. Condition of road, (roads unsuitable for vehicles, such as narrow, low quality dangerous curves).
8. Lack of keeping distance among other vehicles.

The national road security office has been listed the four measure causes of Road Traffic Accidents as shown in the following reverse pyramid.

Figure 1: Major traffic accident causes



Source: AATPR 2011.

Table 18; Distribution of Traffic Accidents in Addis Ababa (2005/2013 and 2003/11) in terms of hours (Ethiopian counting time)

Day times	No	%	Night times	NO	%	Day times	No	%	Night times	No	%
0100 – 0200	225	1.2	1300 – 1400	848	44.5	0100-0200	120	11.3	1300-1400	5541	55.9
0200 – 0300	206	1.1	1400 – 1500	979	55.2	0200– 0300	174	11.9	1400–1500	5533	55.8
0300 – 0400	167	1	1500 – 1600	949	55.0	0300– 0400	161	11.8	1500–1600	5522	55.7
0400 – 0500	204	1.1	1600 – 1700	976	55.2	0400– 0500	159	11.7	1600–1700	5529	55.7
0500 – 0600	294	1.6	1700 – 1800	918	44.9	0500– 0600	167	11.8	1700–1800	4464	55.0
0600 – 0700	501	2.7	1800 – 1900	775	44.1	0600– 0700	268	22.9	1800–1900	4465	55.0
0700 – 0800	880	4.7	1900 - 2000	702	33.7	0700 – 0800	489	55.3	1900- 2000	3390	44.2
0800 – 0900	977	5.2	2000 – 2100	588	33.1	0800– 0900	528	55.8	2000–2100	3337	33.7
0900 – 1000	949	5.0	2100 – 2200	515	2.7	0900– 1000	534	5.8	2100–2200	532	5.8
1000 – 1100	1081	5.7	2200 -2300	460	2.4	1000– 1100	608	6.6	2200 -2300	216	2.3
1100 – 1200	1067	5.6	2300 – 2400	345	1.8	1100– 1200	336	3.6	2300–2400	167	1.8
1200 – 1300	947	5.1	2400 – 0100	262	1.4	1200– 1300	430	4.7	2400–0100	112	1.2
			Total	15,815	100				Total	99134	100

Source: 2003 and 2005, AATBR Various Unpublished annual Reports.

According to Addis Ababa traffic police report (2003 and 2005), about 75% of the traffic accidents occur during the night time (08:00 to 19:00 hours interval) where the morning and till afternoon (08:00) the accidents rate is not too much. The researcher asked and tried to know the reasons for this question from Addis Ababa traffic bureau and inspectors. The reasons that are mentioned by these participants are listed below;

- Drivers drive with taking alcohols
- High number of traffic flow
- Drivers have felt tired
- High number of pedestrians' movement.
- Pedestrians do not take too much care (drunkards, addictives)

Table 19: Types of collisions occurred in Addis Ababa in the year of 2003.

	Types of collision	Injury because of collision				Total
		Death	Heavy physical injury	Light physical injury	Property damage	
1	In front collision → ←	71	10	14	926	1021
2	Front and side → ↑ ↑ ←	5	5	45	1655	1710
3	Front and side → ↑ ↑ ←	8	5	18	1722	1753
4	Side to side ↑ ↑	1	2	20	1234	1257
5	Flipping	7	61	69	169	306
6	Collision with pedestrian	181	731	600	2	1514
7	Collision with animal		1	-	24	25
8	Falling	5	10	6	23	44
9	Collision with parked car		3	2	251	256
10	Collision with object	13	3	3	726	745
11	Collision with train	-	1	-	1	2
12	Others	-	1	1	15	17
13	Unknown	41	71	53	319	484
Total		332	904	831	7067	9134

Source; 2003 Addis Ababa traffic annual report

From table 19 we perceive Front and side $\rightarrow\uparrow$ $\uparrow\leftarrow$ collision are more frequent in Addis Ababa. This may occur due to horizontal distance of the road (size), lack of traffic light at junction etc. Collisions from pedestrians are ranked first from other collisions which killed so many people in the year 2003.

Table 20: Types of collisions occurred in Addis Ababa in the year 2004.

No	Type of collisions	Injury because of collision				Total
		Death	heavy physical injury	Light physical injury	Property damage	
1	In front collision $\rightarrow\leftarrow$	101		4	910	1015
2	Front and back collision $\rightarrow\rightarrow$	2	10	10	2236	2258
3	Front and side $\rightarrow\uparrow$ $\uparrow\leftarrow$	9	13	22	1990	2034
4	Side to side collision $\uparrow\uparrow$		7	12	1816	1835
5	Flipping	2	113	10	551	676
6	Collision with pedestrians	219	949	700		1868
7	Collision with animal				1	1
8	Falling	10	15	8	41	74
9	Collision with parked car	1			206	207
10	Collision with object	1	10	7	1088	1106
11	Collision with train			1	59	60
12	Others	2	15	3	21	41
13	Unknown	22	58	43	231	354
Total		369	1190	820	9150	11529

Source: 2004 Addis Ababa traffic police annual report.

From table 20 we can conclude that front and back collision $\rightarrow\rightarrow$ collision are more frequent in Addis Ababa. This may occur due to horizontal distance of the road (size), lack of traffic light at junction, violation of the rule of moving at right

distance etc. Collisions from pedestrians are also ranked first from other collisions, which killed so many people in the year 2004.

Table 21: Types of collisions occurred in Addis Ababa in the year 2005.

NO	Type of collisions	Injury because of collision				Total
		Death	heavy physical injury	Light physical injury	Property damage	
1	In front collision → ←	5	12	8	625	650
2	Front and back collision → →	5	27	18	3918	3968
3	Front and side → ↑ ↑ ←		19	44	3059	3122
4	Side to side collision ↑ ↑	1	12	28	2840	2881
5	Flipping	5	51	22	223	301
6	Collision with pedestrians	308	1144	1043		2495
7	Collision with animal		15	12		27
8	Failing	6	13	25	15	59
9	Collision with parked cars	4		2	424	430
10	Collision with objects	8	5	13	1385	1411
11	Collision with trains					0
12	Others	16	5	5	96	122
13	Unknown	9	33	43	264	349
Total		367	1336	1263	12849	15815

Source: 2004 Addis Ababa traffic police annual report.

From Table 21 we can conclude that front and back collision → → collision are more frequent in Addis Ababa. This may occur due to horizontal distance of the road (size), lack of traffic light at junction, because of violating the rule of moving at right distance etc. Collisions from pedestrians are also ranked first from other collisions, which killed so many people in the year 2005.

4.7 Causes of Car Accidents Reported by Addis Ababa Traffic Police

Whether car or other type of accidents have multiple of causes, effects and responsible body, as they stem from a number of adverse circumstances. Regarding this issue, the Addis Ababa traffic police is responsible for completing, identifying/investigating the traffic accident causes and are expected to prepare different types of forms based on accident types. An accident code contains 30

possible causes for accidents categorization. Categorization code can be put as follows,

Table 22: Cause of car accidents2003

No	Causes of accidents	Injury because of accident				Total
		Death	Heavy physical injury	light physical injury	Property damage	
1	Drunk driving		8	6	682	696
2	Driving under influence of drug		2	3	68	73
3	Wrong way driving	23	9	22	732	786
4	Not ceding priority to vehicles	3	23	34	1455	1515
5	Not ceding priority to pedestrians	204	660	586	242	1692
6	Not keeping right distance	15	6	8	1551	1580
7	Overtaking on a mound			2	197	199
8	Overtaking on a curve		13	15	72	100
9	Set off improperly	1	9	8	171	189
10	Over speed	5	34	19	259	317
11	Inappropriate overtaking	3	4	4	260	271
12	Inappropriate turning	12	6	10	374	402
13	Violation of traffic police order				91	91
14	Violation of red lights			1	64	65
15	Violation of stop sign				15	15
16	Violation of first sign & symbol		8	5	74	87
17	Incidental starting	13	3	6	116	138
18	Inappropriate parking on roads	3	4	2	14	23
19	Tiredness/sleepiness				49	49
20	Absent mindless		4			4
21	Improper lighting		3	1	3	7
22	Overloading	3		1	34	38
23	Faulty breaks	1			1	2
24	Wheel blow away		1	1	4	6
25	Fire blast				1	1
26	Faulty steering	1	1	2	6	10
27	Faulty roads					0
28	Faulty pedestrians		9	12		21
29	Others	4	26	30	213	273
30	Unknown	41	71	53	319	484
Total		332	904	831	7067	9134

Source: 2003 Addis Ababa traffic police annual report

The police figure shows that the causes for all traffic accidents are related to car accidents, 18.5 percent is resulted not ceding priority to pedestrians, 17.2

percent occurred by not keeping right distance between vehicles, and 16.5 percent were caused as a result of not ceding priority to vehicles.

Environmental conditions such as weather have important attributable causes for the occurrence of accidents.

Table 23: Causes of car accident in 2004

NO	Causes of accidents	Injury because of accident				Total
		Death	Heavy physical injury	light physical injury	Property damage	
1	Drunk driving		6	4	120	130
2	Driving under influence of drug				331	331
3	Wrong way driving	2	15	20	673	710
4	Not ceding priority to vehicles		17	12	2809	2838
5	Not ceding priority to pedestrians	319	842	618	380	2159
6	Not keeping right distance	6	96	17	1724	1843
7	Overtaking on a mound		9		152	161
8	Overtaking on a curve		26	8	57	91
9	Set off improperly		16	6	116	138
10	Over speed	4	13	3	495	515
11	Inappropriate overtaking	4	15	21	841	881
12	Inappropriate turning	4	31	18	511	564
13	Violation of traffic police order				28	28
14	Violation of red lights		3		46	49
15	Violation of stop sign		1	2	92	95
16	Violation of first sign & symbol		14	21	68	103
17	Incidental starting		3	6	113	122
18	Inappropriate parking on roads	2	1		6	9
19	Tiredness/sleepiness		1			1
20	Absent mindless				1	1
21	Improper lighting					0
22	Overloading			2	65	67
23	Faulty breaks			1	5	6
24	Wheel blow away				5	5
25	Fire blast				1	1
26	Faulty steering	1			1	2
27	Faulty roads				33	33
28	Faulty pedestrians		4	12		16
29	Others	5	19	6	246	276
30	Unknown	22	58	43	231	354
	Total	369	1190	820	9150	11529

Source: 2004 Addis Ababa traffic police annual report.

The 2004 police report shows that the causes for all traffic accidents are related to car accidents, 24.6 percent is resulted from not ceding priority to vehicles, 18.7 percent is occurred by not ceding priority to pedestrians, and

16 percent were caused as a result of not keeping right distance between vehicles. Environmental conditions such as weather have important attributable causes for the occurrence of accidents.

Table 24: Causes of car accident in the year of 2005

No	Causes of accidents	Injury because of accident				Total
		Death	Heavy physical injury	Light physical injury	Property damage	
1	Drunk driving		13	7	25	45
2	Driving under influence of drug					0
3	Wrong way driving	7	38	20	1209	1274
4	Not ceding priority to vehicles	3	24	45	4059	4131
5	Not ceding priority to pedestrians	323	1117	1051	864	3355
6	Not keeping right distance	5	60	39	3327	3431
7	Overtaking on a mound				124	124
8	Overtaking on a curve		92			92
9	Set off improperly		1		219	220
10	Over speed	4	1	9	485	499
11	Inappropriate overtaking	1	16	4	680	701
12	Inappropriate turning	1	16	30	1102	1149
13	Violation of traffic police order	1			10	11
14	Violation of red lights		1	2	18	21
15	Violation of stop sign	1	1	5	37	44
16	Violation of first sign & symbol	1	3	8	170	182
17	Incidental starting	7	1	6	166	180
18	Inappropriate parking on roads		2	3	92	97
19	Tiredness/sleepiness		1		14	15
20	Absent mindless				7	7
21	Improper lighting				15	15
22	Overloading		3	4	60	67
23	Faulty breaks			1	10	11
24	Wheel blow away			3	2	5
25	Fire blast		1	2		3
26	Faulty steering	12	4	3	62	81
27	Faulty roads					0
28	Faulty pedestrians	1	33	21		55
29	Others					0
30	Unknown					0
Total		367	1336	1263	12849	15815

Source: 2005 Addis Ababa traffic police annual report.

Table 24 shows various Causes of car accident in the year 2005 reported by Addis Ababa traffic police bureau. Some 26.1 percent is resulted from of not ceding priority

to vehicles, 21.7 percent is occurred by not keeping right distance between vehicles, and 21.2 percent were caused as a result of not ceding priority to pedestrians. Environmental conditions such as weather have important attributable causes for the occurrence of accidents.

Generally, according to Addis Ababa traffic police annual reports the three most causes of car accidents are and they show increasing trend.

Table 25: frequent causes of car accident

Causes	2003	2004	2005
Not ceding priority to vehicles	1515	2838	4131
Not ceding priority to vehicles	1692	2159	3355
Not keeping right distance	1580	1843	3431
Total accidents(with other causes)	9134	11529	15815

Source: 2003, 2004 and 2005 Addis Ababa traffic police annual reports

4.8 Questionnaire Analyzed Based on Factors that Contribute to Road Traffic Accidents. Respondents Answer to Different Questions are Presented in table 27-34

Question: 16

“Do you think the size of the road and lack of parking area in the city is the cause for car accidents?”

Table 26: Road size and lack of parking accident intensity.

Option	Traffic policies			%
	M	F	Total	
Yes	82	2	84	84
No	10	-	10	10
No answer	2	-	2	2
Indifferent	4	-	4	4
Total	100		100	100

As shown in the above table 26, the majority of traffic police, 84(84 percent) of the respondents agree that the size of the road and lack of parking area in the city has caused car accidents. In Addis Ababa, size of the road is not too vast plus parking on the road is a common phenomenon. This in turn creates crowdedness of traffic flow and causes collision between vehicle with vehicles and vehicles with pedestrians.

Questions: 17

Table 27: Accident causes responded by Pedestrians

Questions	Option				%
		M	F	Total	
Do you correctly perceive traffic sign, signals and road marks when you move on the street and cross the road?	Yes	22	14	36	36
	No	30	16	46	46
	No answer	10	-	10	10
	Indifferent	6	2	8	8
	Total	100		100	100
Do you think that the road traffic management and licensing system causes road accident?	Yes	57	28	85	85
	No	4	-	4	4
	No answer	2	-	2	2
	Indifferent	5	4	9	9
	Total	100		100	100

As presented in the table above, 36% of the Addis Ababa dwellers (respondents) do correctly perceive traffic sign, signals and road marks when they move on the street and cross the road. However, half of the respondents accounting for 46 percent are not correctly perceive traffic sign, signals and road marks when they move on the street and cross the road and the rest 10 percent of pedestrians kept silent. Concerning the second question, 85 percent of respondents argue that the road traffic management and licensing system is the cause for road accident. Only 4 percent of respondents did not accept the above causes of accidents and the remaining pedestrians kept silent.

Questions: 18

Table 28: Accident causes responded by Pedestrians

Questions	Option				%
		M	F	Total	
Do you think that the infrastructure (road condition) of the city causes Road accidents?	Yes	56	30	86	86
	No	6	2	8	8
	No answer	2	-	-	2
	Indifferent	4	-	4	4
	Total	100		100	100
Do you think that the lack of traffic sign and behavior of pedestrians can be potential cause for road accident?	Yes	54	30	84	84
	No	10	2	12	12
	No answer	1	-	1	1
	Indifferent	3	-	3	3
	Total	100		100	100

As shown on the above table 28, the majority of the pedestrians, 86(86 percent) of the total respondents believe that the infrastructure (road condition) of the city is the cause for road accidents, only 8percents of respondents do not accept the above conclusion. For the second question, themajority of the surveyed pedestrians 84(84 percent) confirmed that the lack of traffic sign and behavior of pedestrians can be potential cause of road accident, 12 percent of pedestrians said lack of traffic sign and behavior of pedestrians alone cannot be a potential cause of road accident and the rest of 1 percent of pedestrians kept silent in this regard.

Question: 19

Of the following traffic accident causes, please choose and rank them 1st, 2nd, 3rd.

Table 29: Depicts potential accident cause ranking

Items	M	F	Total	%
Drunk driving	10	8	18	18
Not giving priority to pedestrians	10	8	18	18
Not keeping right distance	6	-	6	6
Incompetency of the driver	16	12	28	28
Road status	4	-	4	4
Over speed	20	4	24	24
Indifferent	2	-	2	2
Total	100		100	100

As stated in the above box, some 28(28 percent) of respondents replied that they agree incompetency of the driver is the major cause of car accident in Addis Ababa, and 24(24 percent) of respondents agreed over speed is the second causes of car accident next to incompetency of the driver and last but not least 18 percent of pedestrians replied drunk driving and not giving priority to pedestrians is the third causes of car accidents. But the year 2003, 4 and 5 reports of Addis Ababa traffic bureau show that ceding priority to pedestrians, ceding priority to vehicles and not keeping the right distance are the causes of car accident in that order.

4.9 Control Mechanisms Taken by Addis Ababa Traffic Police

Accidents commonly have a multitude of causes, for they stem from a number of diverse factors. In order to minimize or to reduce their frequency, the concerned bodies have adopted and implemented different control mechanisms. In our context, Addis Ababa traffic police have been discharging their responsibility. Addis Ababa traffic police bureau has implemented three ways of accident control mechanisms in order to control traffic flow.

1. Control through motor
2. Control through patrol (sudden check)
3. Control through infantry traffic police.

4.10 Control Mechanisms of Road Traffic.

Addis Ababa traffic police bureau is not a technologically advanced institution. As a result the control mechanisms of traffic flow are manual. However, according to different inspector's responses the institution has exerted maximum effort to use the most advanced technology that is important reducing accident rate, easily catching the faulty drivers, improving the minimal intervention of traffic police on street and excluding incapable vehicles from street etc.

Addis Ababa traffic bureau uses and will continue to uses the following control mechanisms to closely follow up the traffic flow.

- A. Traffic police control
- B. Traffic light control
- C. Sudden-checking control through patrol and motor
- D. Record status control
- E. Radar control
- F. Speed measurement
- G. CCTV camera
- H. Alcoholic test control.

Question:20

Do you believe that Addis Ababa traffic bureau has trained and distributed sufficient traffic police throughout Addis Ababa?

Table 30: Shows qualifications and distribution of traffic police

Options	M	F	Total	%
Yes	32	-	32	32
No	60	1	61	61
No answer	2	1	3	3
Indifferent	4	-	4	4
Total	100		100	100

These days, Addis Ababa traffic bureau has 567 infantry, 64 motorist traffic police and 20 federal government vehicles support (patrol) throughout the city. With regard to training and skill development, the office offers training twice a year to all traffic police. However, this training and skills development is not sufficient to update the traffic police with current traffic management technology scheme. Besides, the training has only focused on ethical consideration, according to the response of some traffic police. Some, 61 percent of traffic police respondents said that Addis Ababa traffic bureau has no trained and sufficient traffic police distribution throughout the city. Only 32 percent of traffic police have accepted the availability of trained and sufficient traffic police distribution throughout the city. The rest 3 percents of traffic police kept silent.

Question: 21

Among the list of road traffic control mechanisms, which one is more effective to reduce the accident rate?

Table 31: Shows rating traffic control mechanisms

Types of Control	M	F	Total	%
Traffic light and signs	14	1	15	15
Traffic police control	52	-	52	52
Student traffic police	4	-	-	4
Incidental control through patrol and motor	20	1	21	21
Others(specify	-	-	-	-
Indifferent	8	-	8	8
Total	100		100	100

At present, Addis Ababa traffic bureau uses different kinds of traffic flow control mechanisms to reduce the accident level which have so far been recorded in Addis Ababa city. When we assess the responses of the traffic police for the above question, 52 (52 percents) of them indicated that the presence of traffic police is more advantageous than others, while, 21(21 percent) of the traffic police responded that incidental control through patrol and motor is effective and the rest 15 percent showed that Traffic light and signs traffic light and signs are more effective.

4.11 Ways of Awareness-raising Activities

Addis Ababa traffic police bureau has offered proactive awareness concept to the people. The institution uses different methods to raise public awareness about traffic accidents.

Among various methods the following are the major ones;

1. **Media.** Addis Ababa traffic bureau conveys information every day and week through radio, television, newspaper etc.

2. **Different meetings.** The bureau has been conducting various meetings and conferences to raise public awareness about the severity of traffic accidents. It also organizes (religious ceremony, meetings and trainings for student traffic police) through its officers with a view on traffic accident prevention.
3. **Preparing traffic weeks.** In addition to the above mechanisms, the Addis Ababa traffic bureau has organized traffic weeks and exhibitions in order to raise public awareness about traffic regulations.

Question:22

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

Table 32: Depicts sources of knowledge about safety rules

Items	M	F	Total	%
My self	-	-	-	-
Parents	-	-	-	-
Schools	-	-	-	-
Traffic police	2	-	2	2
Media	58	30	88	88
Other source	4	-	4	4
Indifferent	4	2	6	6
Total	100		100	100

As learnt from the above box, large proportion of pedestrians, and 88 (88 percent) did not get education about road traffic rules by concerned officials. The majority of pedestrians, 88 (88 percent) in turn indicated that they have learned how to deal with traffic from media, 4 (4 percent) from other sources and the rest of 2 pedestrians irregularities from traffic police. The above responses and results demonstrate that there is little or no systematic official source for providing the general public with the necessary education, training and information related to

traffic safety. Both television and radio have a wide coverage in Addis Ababa city particularly recently. Thus, essential mixed safety message can influence human behaviors and attitudes. Currently, the government gives great attention to road safety education be it through broadcast or printing media.

Questions:23

Table 33: Frequency of awareness- concept.

Have you got a chance of road accident awareness-lessons from Addis Ababa traffic bureau?	Options	M	F	Total	%
	Yes	22	8	30	30
	No	44	24	68	68
	No answer	-	-	-	-
	Indifferent	2	-	2	2
	Total	100		100	100
Do you think that the Addis Ababa traffic bureau did enough to create a good awareness about road traffic accidents for city dwellers?	Options	M	F	Total	%
	Yes	16	7	23	23
	No	48	21	69	69
	No answer	2	2	4	4
	Indifferent	2	2	4	4
	Total	100		100	100

The records in Table 33 show the awareness-lessons from Addis Ababa traffic bureau. According to pedestrian's response, 68 percent, Addis Ababa traffic bureau has not yet given awareness concept to all people throughout the city. Only 30percents of pedestrians got the chance to take awareness concept about road safety from office. Regarding the above questions, the researcher collected information from inspectors through interview and he said currently the office tries to provide all peoples of Addis Ababa/Ethiopia with awareness raising concepts

through different methods. Concerning the second question in the above box, large numbers of traffic police do not agree about the above suggestions. Until recently, the Addis Ababa traffic bureau did not provide awareness about road traffic accidents to the city dwellers. 69 percent of traffic police underlined this statement. Some 23 percent of traffic police said the Addis Ababa traffic bureau has provided city dwellers with awareness – concept about road traffic accidents. And 4 percent of traffic police remained neutral.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Addis Ababa, as capital city of Ethiopia and a host for many National and International Organizations, is experiencing a rapid growth of population. In addition, modern vehicles together with the existing old vehicles are estimated to be about 170-190 thousand. And more than 6,000 freight trucks and 10,070 public and private passengers' busses enter the city every day after originating from the regional capitals and other important cities and towns. This condition creates an alarming traffic situation especially during the peak hours of the day. With the increase in the horizontal expansion of the city and lack of parallel alternative roads, lack of appropriate short cuts and/or absence of linkages between radiating or parallel roads; poor surfacing and narrow carriage ways; inadequate sidewalks and traffic control facilities; together with the existing narrow streets and junctions create serious traffic congestions in the city. However, it is expected that the ring road and city in city train, whose construction is underway, will not only divert traffic but also save time and resource. It will be a shortcut to move from any corner of the city relative to the prevailing condition.

Addis Ababa is characterized by poor traffic control systems and regulations, overcrowded residential patterns, lack of good engineering systems which can help reduce the high traffic congestion. Besides absence of road safety organization concerned with coordinating the different offices in relation with roads and road traffic, and absence of modern road transport regulations and other factors have resulted in a high number of traffic accidents in the city.

According to Addis Ababa police reports and interview results, 75 percent of the total accidents in Addis Ababa have been caused by human errors. Of these accidents caused by human errors, drivers were also indicated as responsible for about 74 percent of the cases. Failure to give way for pedestrians, over speed and

not moving at right distance were also the main reported and observed errors of drivers. The behavior of pedestrians is also causing loss of life and huge material damage. People in the city give little attention to traffic because of little experience and knowledge of a comprehensive traffic regulation and lack of awareness about how to safety act in the motor traffic system.

In conclusion, the mixed traffic flow in narrow and heavily pedestrians movements, mismanagement urban of public transport provision, poor standard of vehicle(most of vehicles are old), poor maintenance and development of roads, the negligence of drivers due to lack of adequately training and driver testing, negligence of pedestrians due to lack of stringent laws, poor traffic control and enforcement which combine increase risk of accidents on roads of Addis Ababa. Low institutional and public awareness of the extent of an immense destruction of traffic accidents aggravates the situation.

To summarize the main road traffic accident problems in Addis Ababa, the following points are generally put.

- Poor skill and undisciplined behavior of drivers and pedestrians
- Over speeding
- Pedestrians not taking proper precautions
- Drivers not respecting pedestrian priority
- Over loaded or improperly loaded vehicles
- Poor bolo inspection system of vehicles
- Weak traffic law enforcement
- Poor vehicle conditions
- Poor infrastructure condition
- Lack of modern technology used to control the traffic flow

Institutional and process related problems like the following are included in the list:

- ❖ Weak Institutions & Poor Coordination
- ❖ Poor Emergency and Rescue Services
- ❖ Poor recording system of data
- ❖ Unskilled staff
- ❖ Insufficient staff(traffic police, investigators)
- ❖ Poor coordination with researcher, academician, NGOs etc.

5.2 Recommendations

5.2.1 Education and Training

Discussions with pedestrians, drivers, traffic police and children about their level of knowledge of the rules and laws of road safety revealed that the majority of these road users did not have education and training. Therefore, road safety education should be given to all sections of the community. All dwellers should be trained to be good road users at all stages of their lives. The training and education system should also start at home among family members. A strong commitment is needed towards road safety education in schools. According to traffic police reports almost all accidents have driver's error as one of the contributory factors. And there should be viable means in due course of improving the standards of driving. The driving training program of motor vehicles should also be introduced coupled with revised test and safety emphasis. Updated training and education is needed for beginners as well as licensed drivers. Media campaigns should concentrate on disseminating knowledge to the public regarding the safe use of the roads, as well as ways to change unsafe traffic attitudes.

5.2.2 Road safety Education

There is solution to the road safety problem .A wide ranges of effective interventions exist. Experience in countries with long histories of motorized travel has shown that applying scientific systems to road safety is essential to tackling the problem.

In relation to road safety education, Asrat Alemayehu says the following. Road safety occupies an important place in the prevention of accidents. School children, who are particularly liable to accidents, can be easily coached with the necessary training in the school about the rules of road safety and others related aspects. Since the attitudes and personality of the children in their formative stage, a lasting impression can be left in their minds about the precautions. The society can reap the benefits when the children grow up and expect them to be law-abiding citizens in observing the traffic laws. Pedestrian traffic education that has been offered through radio, television, newspaper and magazines should also encourage (Asrat Alemayehu 1994, 14.) This approach addresses the traffic system as a whole and looks up the interactions between vehicles, road users and the road infrastructure to identify solutions. Since the pedestrians are the main victims of the accidents, intervention should be given by the responsive body. Hence, from this it is suggested that:

- ❖ Speed limits need to be stipulated in policy especially at locations where there are many pedestrians at risk. I.e. at shopping and school.
- ❖ Sidewalks for pedestrians should be clearly identified and fenced.
- ❖ Avoid roadside vendors and shops.
- ❖ Zebra crossing for pedestrians.
- ❖ Educate pedestrians using grass root communication system about rules and regulation of traffic.

5.2.3 Computerization of the System

Currently, the Addis Ababa City Transport Authority and Addis Ababa traffic bureau maintain a large volume on drivers, vehicles and other data on manual files. In order to improve data management, there is a need to computerize the system.

5.2.4 Development of Skilled Manpower

In order to enhance urban transport sector efficiency, the requirements of skilled manpower is an indispensable one. Particularly we need to develop our staff in transport planning, controlling and engineering; Traffic management system, information science and transport management could be potential approaches, to mitigate current car accident witnessed in the capital.

5.2.5 Improving Road Safety and licenses awarding system

Road accident is identified to be the major cause of death for economically productive portion of the population in Addis Ababa. Traffic accident rate in the city is high which covers 60 percent of the total accident occurred in Addis Ababa.

Mainly due to:

- A. Inadequate drivers' training and public awareness on traffic safety
- B. Inadequate traffic facilities such as traffic lights, signs, signs of crossing marks
- C. Ineffective and inefficient traffic regulations and traffic police distribution. As the issue of road safety is vital by its virtue it needs a special treatment in order to save the lives of citizens. To this effect the government must pay due attention.

5.2.6 Introducing Penalty System

Now a day, the dwellers of Addis Ababa use roads as they wish, they cross at any point of junction. When accidents occurred, the Addis Ababa traffic bureau officers are always blamed by drivers. However, as a researcher and dweller of city, this researcher feels discomfort because half of the pedestrians develop bad habits of road using, for instance, they play football on highways, they are begging and selling goods and services on roads especially at night time etc. So introducing penalty system is crucial to make those who violate the rules come to the right track as per the traffic management system.

5.2.7 Using Latest Technology

Today traffic management operates with the help of computer in developed countries. They can control the traffic flow without any movement of traffic police and other staffs. In Ethiopia the traffic flow is controlled by will of Gods not by our traffic police and other police staffs. Hence the government must buy and implement this latest technology.

5.2.8 The Government is Duty Bound to:

- ✓ Implement drink/drive measures(alcoholic test measurement),
- ✓ Construct and implement CCTV camera, radar measurement and alcoholic test throughout the city,
- ✓ Take incidental inspection system by the institution.
- ✓ Give ethical education to driver, pedestrians and traffic polices
- ✓ Traffic sign, symbols and signals and others related concept of traffic rules should be givento society in different formats, education curriculum, exercise books etc.
- ✓ Maintenance of traffic light, sign and symbols urgently,
- ✓ Prohibit to load, land passengers as well as park on the main road.
- ✓ Construct over bridges that help pedestrians cross the roads safely,
- ✓ Improve driver training and testing,
- ✓ Implement defensive driving for professional drivers,
- ✓ Strengthen targeted traffic law enforcement,
- ✓ Implement stringent vehicle testing procedure,
- ✓ Implement traffic safety education for children,
- ✓ Promote road safety publicity on speed limits and pedestrian priority,
- ✓ Improve accident data collection and processing system,
- ✓ Develop hazardous location maps for safety measures,
- ✓ Implement road safety audit and engineering measures , and
- ✓ Implement research on road safety publicity and accident costing

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Addis Ababa University

College of Business and Economics

Department of Public Administration and Development Management

Master's Program in Public Management and Policy

Dear Respondent

First and foremost, I would like to express my heartfelt appreciation in advance for your cooperation completing the questionnaire, sparing some of your precious time.

General Instruction

Please feel free to write your answers in Amharic, if necessary. Tick (✓ or circle) in the appropriate space provided. Should the spaces be too inadequate to accommodate your answers; you may use extra paper indicating the serial number of the question.

Confidentiality:

Please be informed that data you furnish will be safeguarded with strict confidentiality and be used for this research purpose only. You need not mention your name.

Yours sincerely

Fikadu Mekasha

Annexure – I

Questionnaire respond by selected pedestrians in Addis Ababa

1. Address (sub-city) -----
2. Sex
 - A. Male
 - B. Female
3. Age -----
4. Educational level
 - A.12 grade not complete
 - B.12 grade not complete
 - C. TVET
 - D. Diploma
 - E. Degree
 - E. Above degree
5. Occupation
 - A. Private Worker
 - B. Unemployed
 - C. Student
 - D. Office worker
 - E. Other (specify).....
6. How long have you been in Addis Ababa?
 - A. < 1 year
 - B.1-2 years
 - C. 3-5 years
 - D. 6-and above

7. Do you think that Addis Ababa is a city which experiences high level traffic accidents?

- A. Yes
- B. No
- C. No answer

8. Do you believe that road traffic accident is due to the number of cars moving on the road?

- A. Yes
- B. No
- C. No answer

9. Have you given priorities to vehicles as required by law?

- A. Always
- B. Some times
- C. Never

10. Where do you usually cross the main roads?

- A. At traffic light
- B. At junction
- C. At mid-block pedestrian crossing away from junction
- D. At any point

11. Crossing the main roads in the city is:

- A. Difficult
- B. Easy

12. Do you think that the infrastructure (road condition) of the city is the cause of road accidents?

- A. Yes
- B. No
- C. No answer

13. Do you think that the road traffic management and licensing system is the cause of road accident?

- A. Yes
- B. No
- C. No answer

14. Out of the following road traffic accident causes, please choose three and rank them 1st, 2nd, 3rd

- A. Over speed
- B. Driving while drinking
- C. Not giving priority to pedestrian
- D. Not moving at right distance
- E. incompetency of the driver

15. Do you think that the lack of traffic sign and behavior of pedestrians can be potential cause of road accident?

- A. Yes
- B. No
- C. No answer

16. Have you get a chance of road accident awareness-lessons from Addis Ababa traffic bureau?

- A. Yes
- B. No
- C. No answer

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

- A. strongly agree
- B. Agree
- C. indifferent
- D disagree
- E. stronglydisagree

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

- A. My self
- B. Parents
- C. Schools
- D. Traffic police
- E. Media
- F. Other sources

19. How frequent do you leave sidewalks/walk along roads and walk on the vehicles road?

- A. Always
- B. Some times
- C. Never do this

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

- A. Face to the oncoming vehicles
- B. Back to the oncoming vehicles

21. Do you correctly perceive traffic sign, signals and road marks when you moving on the street and crossing the road?

- A. Yes
- B. No
- C. No answer

22. In your opinion, drivers in Addis Ababa city give priorities to pedestrians as required by law.

- A. Strongly agree
- B. Agree
- C. Indifferent
- D. Disagree
- E. Strongly disagree

23. Please suggest some possible solutions to prevent and reduce road traffic accidents in Addis Ababa?

Annexure - II

Questionnaire respond by Addis Ababa traffic police officers in Addis Ababa

1. Address (sub-city) -----

2. Age category

A.18 – 22 years old

B.23 – 27 years old

C.28 – 32 years old

D.33– 37 years old

E. above 38 years old

3. Sex:

A. Male

B. Female

4. Educational level:

A. 12th grade not completed

B. 12th grade completed

C. TVET

D. Diploma

E. Degree

5. Experience of service

A. Less than 3 years

B. 3- 10 years

C. 11-15 years

D. 16- 20 years

E. above 20 years

6. Do you think that the frequency of the accident is more in Addis Ababa?

A. Yes

B. No

C. No answer

8. Which time of the day is more vulnerable to road traffic accidents (RTA?)

Please tick only one.

- A. 5:00AM to 8:00 AM
- B. 8:00 AM to 12:00 Noon
- C. 12:00Noon to 4:00PM
- D. 4:00PM to 8:00 PM
- E. 8:00PM to 12:00Night
- F. 12:00Night to 5:00AM

And what in your opinion is the reason? -----

9. Which type of vehicles is causing high number of road accidents in the city of Addis Ababa? Please rank them, 1st, 2nd, 3rd,

- A. heavy vehicles(trucks, buses
- B. light vehicles(two wheels, three wheels
- C. medium vehicles(tax, automobiles,

D Others (specify) -----

11. Do you believe that road traffic accident is due to the number of cars moving on the road?

- A. Yes
- B. No
- C. No answer

12. Which types of collision or road accidents were highly prevailing in the city?

- A. Motor vehicle with motor vehicle
- B. Motor vehicle with bicycle
- C. Motor vehicle with pedestrians
- D. Motor vehicle with static object

13. Do you think that the current bolo inspection system is enough to control the city road accidents?

- A. Yes
- B. No
- C. No answer

14. Do you think that the city has enough road traffic signs, signals, symbols and lights in all important areas?

A. Yes

B. No

C. No answer

16. Do you believe those traffic management infrastructure provide 24x7 services?

A. Yes

B. No

C. No answer

17. Do you believe that there is enough traffic police distribution throughout the city?

A. Yes

B. No

C. No answer

18. Do you think that the Addis Ababa traffic bureau did enough to create a good awareness about road traffic accidents for the city dwellers?

A. Yes

B. No

C. No answer

19. Do you think that the current driving license award-ship by the bureau is given after intensive tests?

A. Yes

B. No

C. No answer

20. Do you believe that Addis Ababa traffic bureau has trained and sufficient traffic police and distribution throughout Addis Ababa?

A. Yes

B. No

C. No answer

21. Among the list of road traffic control mechanisms, which one is more effective to reduce the accident rate? Please rank the best.

- A. traffic light, signs and signals
- B. traffic police control
- C. student traffic police
- D. incidental control through patrol and motor

E. others (specify)

22. In which roads/ locations of the city roads car accidents are the highest?

- A. On the main roads of the city
- B. On the residential roads
- C. On the peripheral area of the city

23. How do you rate pedestrians respectation for vehicles in giving priorities where they using roads?

- A. Good
- B. Moderate
- C. Poor

24. Do you think the size of the road and lack of parking area in the city is the cause for car accidents?

A. Yes

B. No

C. No answer

25. Please suggest some possible solutions to prevent and reduce road traffic accidents in Addis Ababa?

Annexure - III

Interview guide for Addis Ababa traffic police higher officers

The purpose of this interview is to collect data for a research project titled “causes and control mechanisms of road traffic accidents in Addis Ababa”.

This is an independent research being conducted for Master’s Degree in Public Management and Policy by a prospective graduate student from Addis Ababa University. This research will find out the level of road traffic accidents in Addis Ababa and recommend how road traffic accidents can be reduced.

1. What are the major causes and contributing factors for road traffic accidents occurring in Addis Ababa city?
2. Which approaches are more effective in reducing the accidents level?
3. Do you think that the office is trying to adopt the new road traffic management techniques to solve the accident problems?
4. Does the AA traffic bureau offer frequent training for traffic policeman?
5. What (how many) are the road traffic management techniques used to reduce the Accident rates?
6. Does your office give continuous awareness-lesson to the people, drivers and traffic police?
7. What is the level of road traffic accident in Addis Ababa? Has it increased or decreased during last three years?
8. What does your bureau do to address this most killer problem in our country especially in Addis Ababa?
9. Does your bureau coordinate with all stakeholders (NGOs, the private sectors, and academicians) to decrease the accident rate?
10. Do you believe that the institution has trained and sufficient traffic police distribution throughout Addis Ababa?
11. What type of accident minimization mechanisms does the office use/employ?

Thank you!

-----END-----

Declaration Letter

I, Fikadu Mekasha, confirm by my signature and that this thesis is my original work and has not been presented for a degree in other University, and that all sources of material used for the thesis have fittingly acknowledged.

Signature

Name of student: Fikadu Mekasha

Signature _____ Date _____

Name of advisor: Proff C.D. Dash

Signature _____ Date _____