



ADDIS ABABA UNIVERSITY

ADDIS ABABA INSTITUTE OF TECHNOLOGY

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

ANALYSIS OF ROAD TRAFFIC VIOLATIONS IN ADDIS ABABA CITY
(THE CASE OF ARADA SUB-CITY)

BY GADISA LAYO MOSISA

A thesis submitted to the School of Graduate Studies of Addis Ababa University in partial fulfillment of the requirements for Degree of Masters of Science in Civil Engineering (Road and Transportation Engineering)

Advisor: Getu Segni Tulu (PhD)

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Addis Ababa, Ethiopia

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DECLARATION

I declare that this thesis entitled “ANALYSIS OF ROAD TRAFFIC VIOLATIONS IN ADDIS ABABA CITY (THE CASE OF ARADA SUB-CITY)” is my original work. This thesis has not been presented elsewhere for assessment and award of any degree or diploma, and all sources of material used for the thesis have been duly acknowledged.

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GLOSSARY

AACRTMA-Addis Ababa City Road and Traffic Management Agency

AACPC-Addis Ababa City Police Commission

AAC-Addis Ababa City

ANOVA-Analysis of Variance

AU-African Union

BAC-Blood Alcohol Content

CD-Corps Diplomatique (Diplomatic Corps)

CSA-Central Statistical Agency

DOT-Department of Transportation

E.C-Ethiopian Calendar

GC-Gregorian Calendar

GNP-Growth National Product

GDP-Growth Domestic Product

HR-Harari Region

HIV/AIDS-Human Immunio-Deficiency Syndrome,

IRR-Incidence Rate Ratio

RLR-Red Light Running

OECD-Organization for Economic Co-Operation and Development

SPSS-Statistical Package for Social Science

SUV-Sport Utility Vehicles

USA-United States of America

WHO-World Health Organization

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ABSTRACT

Introduction- Road traffic injury death rates are highest in the African region. Violation of traffic rules, which is a human factor, is an important factor behind traffic crashes and many lives could be saved if all drivers complied with the rules and regulations of road. Other than piece of reports from traffic police, very few is known about magnitude, trends and characteristics of traffic offences in Addis Ababa City. In addition, almost no literatures exists on differences in traffic offences by driver and vehicle characteristics in Addis Ababa city. The objective of this research is to characterize and identify most common traffic offences, trends and magnitudes of traffic offences in Arada sub city over 3 years. Further, this study also investigates differences in traffic offences by drivers and vehicle characteristics. Finally, this study finds attitudes of traffic offenders towards unsafe driving behaviors.

Methodology- To achieve the objectives of this research two methods were followed. The first method was secondary traffic offence data collection from Arada sub city over (2007E.C-2010E.C) and analyzed. The second method was through questionnaires results from 385 traffic offenders at sub city traffic police department who come to take back their driving license and vehicle plate after paying traffic offence fines. Questions containing traffic offender and vehicle characteristics, history on traffic crashes and frequency of traffic offences for selected traffic offence types and attitudes towards unsafe driving behaviors were prepared. These collected data were analyzed by Excel and SPSS; Independent t-test, one-way ANOVA test, Chi-square, Descriptive and frequencies were used.

Results- Over all, 154436 traffic offences registered, 95.6% occurred by male. It showed an increase of 8.3% and 13.04% in 2008 E.C and 2009 E.C respectively. But, the rate is decreasing for female averagely by 2.4% and increasing for male averagely by 13.7%. The most common traffic offences were traffic flow obstruction (12.9%), disrespecting prohibiting signs (11.3%), parking of motor vehicles on prohibited areas (8.5%), overloading (8.2%) and using mobile phone while driving (7.8%). Youth groups (18-30 years) are the most traffic offenders than any other age category and drivers older than 50 were the second traffic offenders as compared to licensed driver population in the city.

Drivers with license level 4, 5 and license level 6 (with old licensing system) were more involved in traffic offences than others as compared to their corresponding license population in the city. Code 1, 5 and others (T, CD, UN, ET and police) vehicles showed higher

involvement in risk factors of road traffic crashes. Further, vehicles coded 1 showed higher involvement in total traffic offences.

Results of Chi-square showed that there is an association of driver and vehicle characteristics and crash involvements. *Traffic offenders with degree and above education level, 11-15 years of driving experience, low income, code 3, new vehicles with (0-5 service year) and privately owned vehicles showed higher involvement in traffic crashes than others* . Results showed that male (p-value=0.002), in-friendship or cohabited (p-value=0.0022), 3-5 years of driving experience (p-value=0.036), taxis (p-value=0.036), medium income (p-value=0.001) traffic offenders showed higher significant score in *speeding* at 5%. In case of *red-light running*, traffic offenders of 24-29 years old, (p-value=0.012), private workers, (p-value=0.003), vehicle service year, 6-10 years (p-value=0.001) showed significant higher score. Finally, respondents have negative attitudes towards unsafe driving behaviors but they still don't completely translate into positive behaviors.

Conclusions- It can be concluded that male, 18-30 years, vehicles coded-1 (taxis), coded-3 (commercial vehicles) and coded-5, and drivers with license level-4, license level-5 and license level-6 were highly connected to traffic offences. In addition, young age (24-29years), new vehicles (0-5years), single and private workers, higher education levels (degree and above), experienced drivers, Buses and private cars also showed higher connection with number of traffic offences and crash involvements. More stringent effort and proper interventions should be done towards these groups and the most common traffic

Key words: *Addis Ababa, Arada, Traffic Offences, socio-demographics, Chi-square, Attitudes, Road safety, Un-safe driving behavior.*

CHAPTER ONE

1. INTRODUCTION

1.1 Background

For a long time people have been moving from place to place to carry out their day-to-day activities. In their movement, they use different ways of transportation including road, air, water, train and so on. From these all modes of transportation, road transport is the most common, easily accessible and closest to people. According to (WHO, 2011), road transportation provides benefits both to nations and to individuals by facilitating the movement of goods and people.

Even though the road transportation has used the society in these ways, the increase in road transportation has placed a considerable burden on the people's lives in the form of road traffic injuries, respiratory illness, and the health consequences that results a reduction in physical activity. According to Global Status Report on Road Safety 2015 (WHO, 2015) about 1.25 million people die each year as a result of road traffic crashes out of which 90% of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have approximately only 54% of the world's vehicles. Road traffic injuries are the leading cause of death among people aged between 15 and 29 years.

Road traffic injury death rates are highest in the African region. Even within high-income countries, people from lower socio-economic backgrounds are more likely to be involved in road traffic crashes. People aged between 15 and 44 years account for 48% of global road traffic deaths. From a young age, males are more likely to be involved in road traffic crashes than females. About three quarters (73%) of all road traffic deaths occur among young males under the age of 25 years who are almost 3 times as likely to be killed in a road traffic crash as young females. (WHO, 2015).

Table 1 Traffic crashes in Addis Ababa city from 2002E.C-2009E.C

Year	Fatal	Serious	Slight	Property	Total
2002	318	626	682	4689	6315
2003	332	904	831	7067	9134
2004	369	1190	820	9150	11529
2005	367	1336	1263	12849	15815
2006	391	1484	1128	14901	17904
2007	416	1669	1098	17249	20432
2008	439	1224	1165	19411	22239
2009	463	1996	973	23510	26942

Source: Addis Ababa City Police Commission

Addis Ababa, being the center of the country, it is the most populous in both the vehicles and the people in the country. Therefore, the number of road traffic crashes in the city is significant. Within the past eight years, (2002-2009 E.C) in Addis Ababa City, 3,095 fatalities, 10,429 serious injuries and 116,786 slight and property damage traffic crashes have occurred excluding the underreporting crashes (Federal Police Commission, 2017). This numbers of traffic crashes at low level of motorization is the issue making everybody to worry for.

Factors that are responsible for road traffic crashes are categorized into driver error, pedestrian, road environment and the vehicle factor (Heinon & Eck, 2007). Driver error and noncompliance of drivers with road traffic rules and regulations is the main factor for road traffic crashes which accounts for approximately 90% (Evans, 1991).

Ignorance to the traffic regulation is among the human behavioral factor that may lead to traffic crashes (Petridou & Moustaki, 2006). Studies conducted all over the world support a strong relationship between traffic rule violations and traffic crashes (Williams, et al., 2006; Begg & Gulliver, 2008). Understanding the groups of people who more frequently violate traffic rules can help researchers, policy makers and traffic safety authorities focus their efforts on those groups.

For the year 2007-2009 E.C above all the regions of the country, Addis Ababa City shares the majority of traffic offences (more than 60%) of traffic offences in the country (Federal Transport Authority, 2017). This shows that the number of traffic offences is highly positively related to the vehicle population and importance of the area under consideration since Addis Ababa City is the center of the country, with about 77% vehicle population (Tesema, et al., 2005), capital city of the country, and center of market for the country.

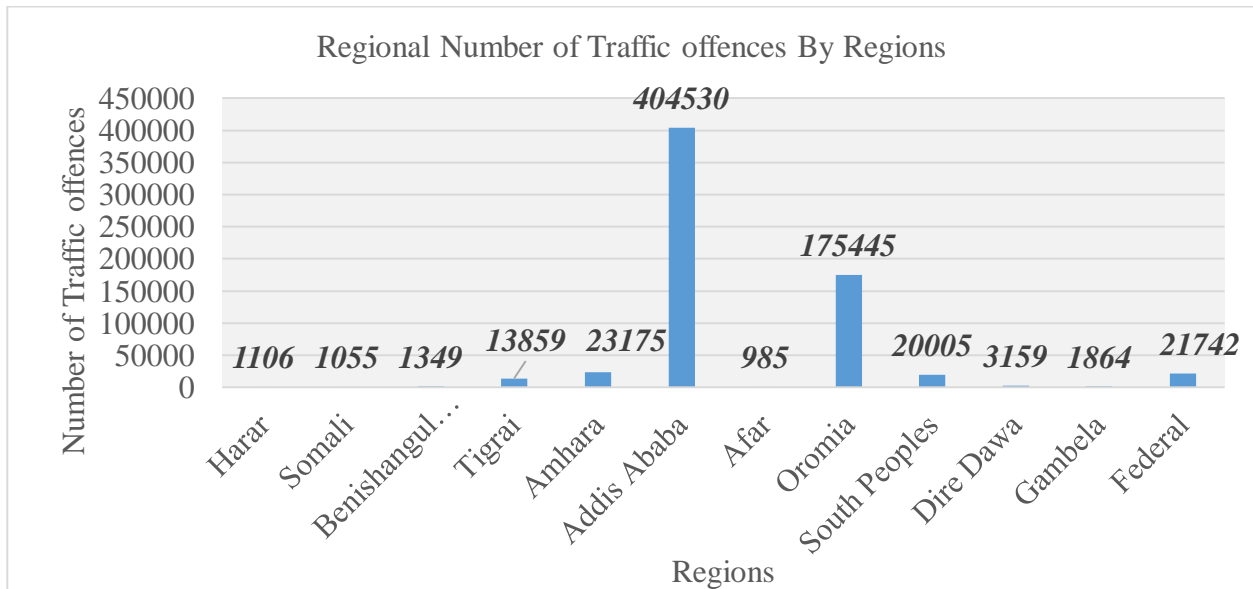


Figure 1 Regional Number of Traffic offences (2007-2009E.C)

Source: Federal Transport Authority

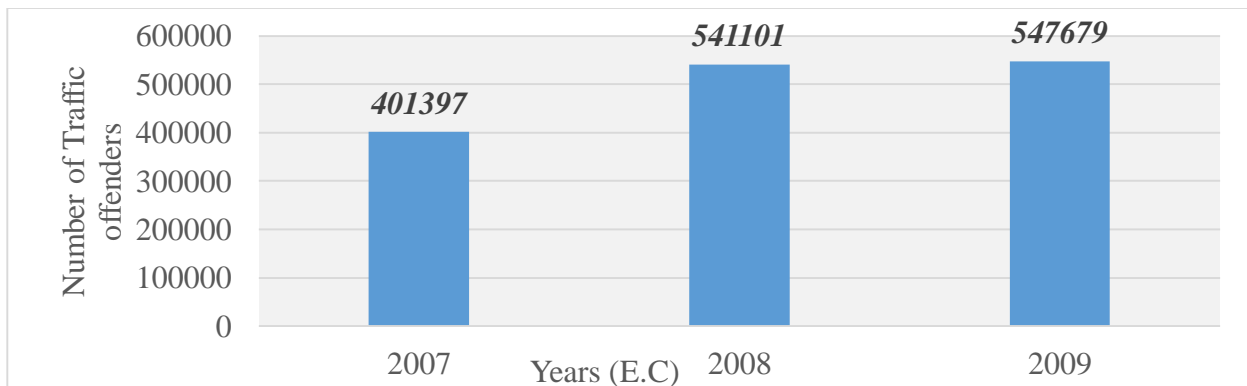


Figure 2 Total number of Traffic offenders in Addis Ababa City over 3 years

Source: Addis Ababa Police Commission

1.2 Problem Statement

Traffic crashes are a major problem all over the world. This problem has taken millions of lives and caused huge economic losses worldwide. According to (WHO, 2015), 1.25 million road traffic fatalities occur annually worldwide. In 2013, the road traffic death rate per 100,000 population was 24.1, 18.4, and 9.2 in low, middle, and high-income countries, respectively (WHO, 2015) and affecting 1-3% of GNP of each country (WHO, 2013).

According to federal police report in Ethiopia, in the past ten years, from 2000 E.C to 2009 E.C about 3852 fatal traffic crashes were occurred in Addis Ababa city which is the third in total number of traffic deaths in the country next to Oromia regional state with 9212 deaths and Amara regional state with 5658 traffic deaths (Federal Police Commission, 2017). Road traffic crashes are the leading causes of death of people under 44 years next to HIV/AIDS (WHO, 2009). The continuing advance of motorization in many developing countries is likely to exacerbate the problem.

According to traffic police report, over 81% of road crashes were result of driver error, such as failure to give priority for pedestrians. Speeding, lack of necessary pedestrian facilities and drink driving were the main contributing factors of fatal road traffic crashes in Addis Ababa city (Hirpa, 2016). Therefore, violation of traffic rules, which is a human factor, is an important factor behind traffic accidents and many lives could be saved if all drivers complied with the rules. (Jafarpour & Movaghar V, 2014; Uzongu & Ikeogu, 2013).

Even though there are many factors behind the cause of these road traffic crashes in addition to violation of traffic rules and regulations, human errors both of the driver and pedestrian accounts major part (Uzongu & Ikeogu, 2013). Every country has its own road traffic rules and regulations which should be respected by everybody for the safety of their own and there exists the government organ keeping these rules and regulation whether respected by drivers, pedestrians and other concerned or not including the society too. Disrespecting of road traffic rules and regulation increases the chance of occurrences of road traffic crashes.

But, majority of the city's drivers are not performing according to the rules and regulations of the city in every day of their driving activities for different purposes. Hence, this noncompliance of

drivers with traffic rules and regulations increases the chance of occurrence of traffic crashes (Fransisco, et al., 2017; Parker , et al., 1995; Forward, 2006).

Even though, the city's police commission is working on drivers as they have to perform as the traffic rules and regulation allows, the number of traffic offences in the city is increasing from time to time which in turn increases the chance of occurrence of road traffic crashes. Apart from traffic police piece of reports on traffic offences in the city, no more is known about the trend, magnitudes and characteristics of these traffic offences. Literatures on differences in traffic offences by vehicle and driver characteristics, associations of driver's and vehicle's characteristics and traffic crash involvements and attitudes of traffic offenders towards unsafe driving behaviors were very few in the city.

Therefore, these initiated the researcher to study the characteristics, trends and magnitudes of traffic offences in Addis Ababa City and differences in traffic offence types by vehicle characteristics, associations of driver's and vehicle's characteristics and crash involvements and attitudes towards unsafe driving behaviors among traffic offenders.

1.3 Research Questions

Many researchers in Ethiopia, specifically in Addis Ababa city have studied the causes and characteristics of road traffic crashes (Tulu, et al., 2017; Sebsibie, 2015). Further, the main causes for traffic crashes and their countermeasures were also studied by many researchers on different sections of road in the country (Emer & Gashaw, 2016; Hunde & Agedede, 2015; Worku, 2015).

But, even though human factor in general and traffic violation in particular, contribution to road traffic crashes is great, there is few studies conducted to show the trend, magnitude and characteristics of road traffic law violations in Ethiopia, Addis Ababa city and the association that exists between different variables with traffic law violations, like driver's socio demographic characteristics and vehicle characteristics.

This study will put the issue with the following main research questions;

1. What is the trend, magnitudes and characteristics of road traffic offences in Addis Ababa City in case of Arada sub-city?
2. What are the most common traffic law violations occurring in the sub-city?
3. Who are the most vulnerable groups to traffic law violations?
4. What is associations of drivers and vehicle's characteristics and crash involvements?
5. Is there differences in traffic offences by driver's and vehicle's characteristics?
6. What is the attitudes of traffic offenders towards road traffic safety (unsafe driving behaviors) by driver and vehicle characteristics?

1.4 Research Objectives

1.4.1 General Objective

The general objective of this research is to analyze traffic offences and to know and understand the associated factors/groups.

1.4.2 Specific Objectives

Specific objectives of this research includes;

- To know the trend, magnitude and characteristics of road traffic offences in Addis Ababa City, in case of Arada Sub city,
- To find out the most common traffic law violations occurring in the sub-city,
- To identify the most vulnerable groups of drivers to traffic law violations,
- To know the associations of vehicle's and driver's characteristics and road traffic crash involvements
- To know differences in traffic offences by vehicle's and driver's characteristics, travel history and road traffic crash involvements
- To know traffic offenders' attitudes towards unsafe driving behaviors and to recommend appropriate actions to reduce traffic offences,

1.5 Scope of the Research study

Because of this huge number of traffic law violations occurring in Addis Ababa city (which is about 60% of total number of traffic offences occurring in the country), this research has used Addis Ababa city as study area. Due to budget and time constraints, a simple random approach has been followed to analyze traffic law violations in the city. As a result, the research focuses on traffic law violations of Arada sub city and the scope of this research is limited to Arada sub city.

1.6. Significance of the Study

It is expected that the results of this study will have the following importance;

Theoretical Significance:

- ❖ Helps road safety experts to know the most common traffic offences, traffic offence characteristics, magnitudes and trends in the sub city,
- ❖ Helps to find how traffic offences are associated to drivers' and vehicles' characteristics and travel history,
- ❖ Finds out whether there is differences in traffic offence types across socio-demographic, socio-economic and vehicle characteristics of traffic offenders and,
- ❖ Associations of road traffic crash involvements and vehicle's and driver's characteristics and hence helps road and transport management agency to make interventions to the traffic offence associated group and hence reduces number of traffic offences thereby reduces traffic crashes.
- ❖ Finally, this study provides how attitudes of traffic offenders towards road traffic safety varies by driver's and vehicle's characteristics.

Practical Significance:

By identifying the most common traffic offences, the magnitude, trend and characteristics of traffic offences and differences in traffic offence types by vehicle's and driver's characteristics and other variables related to traffic offenders, road safety management and road safety engineers can make interventions towards minimizing of traffic offences.

1.7 Structure of the Thesis

This research thesis consists of six chapters and the contents of each chapters are as below,

The next chapter examines the existing literatures related to road safety, traffic law violations; magnitudes, trends and characteristics of traffic law violations, associations of different variables of drivers, traffic law violations and road traffic crashes.

Chapter-3 gives methodology used to obtain the objectives of this study. It provides clear explanations of procedures followed in data collection and method of data analysis.

Chapter-4 gives a results and discussions of the results of the study

Chapter-5 is Conclusions and Recommendations. In this chapter the findings of this research will be concluded. The main findings of the study were highlighted.

Finally, Recommendations were proposed for road safety managers and planners and road safety engineers. In addition, strengths of the study, limitations and directions for future research was addressed.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Definition of Traffic offence

Driving offences types cover a wide terrain with estimates in the thousands (Gibson, 1994). Many are subsumed in subordinate legislation of regulations and orders, but all driving offences are crimes under road traffic law that is separate from criminal law though an integral part of it. There is no absolute hard-and-fast classification and many do not sit exclusively in one category. Nevertheless, the main types follow and some individual offences to illustrate the category were driving below the minimum standard required by law e.g. careless driving; driver competence and physical fitness breaches (drink and drug offences; poor eyesight; medical conditions) driving with inadequate driver documentation or vehicle documentation; (driving unlicensed, uninsured or whilst disqualified; having no vehicle excise license or vehicle registration document), speed limit breaches (failing to observe 30 mph speed limit signs), construction and use offences (driving a vehicle with faulty brakes or tires; using a mobile phone while driving), parking and obstruction offences (obstructing a highway, traffic signals and signs offences (failing to observe hatched line restrictions, red lights, no right turn signs), fraudulent use of, and forged and falsified documentation (forgery of driving license; fraudulently accepting someone else's penalty points, (Corbett, et al., 2008).

2.2 Patterns and trends of driving offences

No perfect measure exists by which to determine the actual incidence of and trends in driving offences, and other than self-report studies, reliance must be placed on annually published statistics of numbers of offences dealt with by official action (Corbett, et al., 2008). Even then, such statistics are prone to the vagaries of factors that include numbers of traffic police officers, other enforcers and automatic camera devices available to detect offences, police prosecution policies and accuracy in collating data, readiness of the infrastructure to process detected offenders and the introduction of new legislation.

The total number of driving offences dealt with by official police action has fallen gradually from a peak of 8.8 million in 1990 to a steady 5-6 million between 1999 to 2005, and is now under 5 million in 2006 (Corbett, et al., 2008). The reason for this drop is largely the result of the Road

Traffic Act 1991, effective from mid1992, which specified that parking contraventions were no longer criminal offences. Thereafter, local authorities have taken over enforcement of parking, obstruction and waiting infringements. If, however, penalty charge notices issued for these offences are included in total motoring offences dealt with by official action which is often how they are reported in the media, a peak was reached in 2004 of 13.5m as parking offences soared. Since then, there has been a slight downturn in most categories of offence year on year (Ministry of Justice, 2008a) with a few exceptions.

Data mining report on traffic offences over 6 years from 2011-2016 in Bhutan, (Ministry of Information and Communication, 2018) showed an increase in total number of traffic offences over the 6 years except for 2015. It was found that the most common traffic offences in the country were mobile phone using while driving, 11%, drink and driving 9.8%, (if the level of alcohol in their blood exceeds 0.08gm per 100milliltres while driving on the road), speeding (driving at a speed in excess of a speed limit sign applying to the road section on which the driver is driving) 9.5%, No driving license on the spot 6.6% and the fifth was invalid registration with 6.2%.

2.3 Who are the Traffic offenders?

Traffic offences are hardly homogenous, and a key distinction between them is whether they occur as unintended errors of omission or commission, or as deliberate violations. In the latter case, the purpose or need to be served by a particular illicit driving action may also vary. It should not be surprising therefore if different offender profiles emerge for those committing different kinds of offence (Corbett, 2003).

Male drivers are overrepresented in traffic offences. According to data mining report about 95% of total traffic offences were caused by male drivers. Another study (Kashona & Pazvakwambwa, 2014) on statistical analysis of traffic offences around Windhoek city in Nigeria showed again about 95% of traffic offences in the city was occurred by male drivers.

Analysis on characteristics of Chinese drivers attending a mandatory training course following license suspension have also showed that in their study that the number of male traffic offenders overrepresented by 87% to their counterpart (Flieter, et al., 2013)

Age is another important factor in traffic offending, with the bulk of evidence showing that younger men and to a lesser extent younger women tend to comply less with the road traffic laws considerably than their respective older counterparts (Corbett, et al., 2008). But, young drivers are not the only culprits, and some other groups are at higher risk of traffic offending. These include mid-aged women often working mothers in professional occupations who were found by (Dobson, et al., 1999) to be at higher risk of poor driving including speeding, lapses and errors; and company car drivers (often older males) found to engage more frequently in risky behaviors like eating or drinking and using a mobile phone while driving, fatigued driving and speeding (Broughton, 2006)

A study on “Mobile phone use as a growing problem of driver distraction” (WHO, 2011) shows that young age and novice drivers (drivers holding driving license with less than a year from the issue date) are more prone to driving distraction and more susceptible to effects of the driving distraction like traffic law violations. The study shows a similar trend in Bhutan (Ministry of Information and Communication, 2018) with both male and female drivers having recorded this offence highest in their first year of driving experience with 11% each for both male and female drivers and being male, young and with higher annual driving exposure were associated with higher scores on aggressive driving (Viktorija & Renge, 2011).

2.4 Common Traffic Offences and their Factors

Study by (Wang, et al., 2015) on common traffic violations of bus drivers of urban china, identified the most common traffic offences which are illegal stopping, 20.2% and distracted driving 3.3%. The analysis of contributing factors suggested rates of illegal stopping were lower on weekends (adjusted IRR=0.81) and at stations with cameras (adjusted IRR=0.89) and were higher on foggy/windy/dusty days (adjusted IRR=1.53). The second most common traffic offence was traffic light signal violations. The incidence rate of running traffic light violation was lower on cloudy days as compared to sunny days (adjusted IRR=0.6). Distracted driving is also another most common traffic offences and the incidence rate of distracted driving was lower on cloudy days, rainy/snowy days and foggy/windy/dusty days as compared to sunny days with adjusted IRR of 0.54, 0.55 and 0.07 respectively.

A report on data mining on traffic offences in Bhutan from 2011-2016, (Ministry of Information and Communication, 2018) also identified the most common traffic offences over the six year

period. These common traffic offences were identified for commercial vehicles by separating into two categories as heavy and medium bus vehicle most common traffic offences and taxi vehicle type traffic offences. For the first class of vehicle types the most common traffic violations are driver not improper dress or not behaving properly, carrying excess passenger than the specified seat and over speeding. For the second vehicle categories the most common traffic offences are driver not improper dress or not behaving properly, using of mobile phone while driving and traffic flow obstruction. In addition to most common traffic offences by commercial vehicles, the report added the most common traffic offences by government vehicles. These are drink and driving, carrying excess passengers than specified seat and mobile phone using while driving. But, the report have not provided the contributing factors of these common traffic offences.

Another study by (Kashona & Pazvakwambwa, 2014) in Windhoek city, Nigeria, identified the most common traffic offences in the city. These are road worthiness, license related problems, over speeding, failing to respect road traffic signs and failing to wear seat belt.

2.4.1 Speeding

Speeding is one of the five risk factors of road traffic crashes identified by (WHO, 2015). In a given set of road and traffic conditions, the frequency of road traffic accidents increases with the speed of traffic and higher the speed, the more rapidly does accident frequency rise with increase in speed (Taylor , et al., 2000). An increase in average speed is directly related both to the likelihood of a crash occurring and to the severity of the consequences of the crash (WHO, 2015). The speeding vehicle not only jeopardizes life but also the safety of other road users and nearby settlements. As the third highest traffic offence in the country, it is obvious that over-Speeding offences can have negative impact on health and social cost on the society.

A report on annual road safety by Bloomberg philanthropies initiatives in Addis Ababa city (Bloomberg, March -April 2017) reported that about 43% of vehicle drivers are driving above the posted speed limit which is significantly higher than the value in round 3 (43% vs 40%, $p < 0.01$). The leading vehicle types observed exceeding the posted speed limit were buses, cargo trucks, pickups and minibuses with 94%, 75%, 75 and 71% and by day of week 39.5% were in evening and 48.9% were in early morning. Study by (Asrat, 2015) on Descriptive Analysis of road traffic

crashes in Addis Ababa city showed that driving a vehicle over speed limit was a cause for 2.7% of total for the year 2008/9-2011/12GC.

2.4.2 Failing to wear seat belt

Failing to wear seat belt for a vehicle driver is among the five risk factors of road traffic crashes identified by (WHO, 2015). They are safety devices and are primarily designed to prevent or minimize injury to a vehicle occupant when a crash has occurred. Seat-belts thus reduces the risk of contact with the interior of the vehicle or reduce the severity of injuries. If this occurs, prevent the occupant from being ejected from the vehicle in an impact, prevent injury to other occupants (for example in a frontal crash, unbelted rear-seated passengers can be catapulted forward and hit other occupants and keep occupants in their seat and thus will reduce speed at the same rate as the car, so that the mechanical energy to which the body is exposed will be greatly reduced (seat belts and child restraint; a road safety manual). Wearing a seat-belt reduces the risk of a fatality among front-seat passengers by 40–50% and of rear-seat passengers by between 25–75% (WHO, 2015).

Study by (Alma & Einav, 2003) indicated that seat belt use significantly reduces fatalities among car occupants, but does not appear to have any statistically significant effect on fatalities among non-occupants. Thus, the findings concluded that 1% increase in usage of seat belt saves 136 lives), and reduces occupant fatalities by about 0.13%.

However, drivers fail to wear these seat belts while driving and engaged in more serious and even severe traffic crashes. Annual road safety report by Bloomberg initiatives (Bloomberg, March - April 2017) conducted observational study in Addis Ababa City over 45,017 drivers on wearing of seat belt and child restraint drivers and found that 99% which is consistent with the results from round 3. But, as compared to drivers, the proportion of seat belt use among front seat passengers was significantly lower for all four rounds (round 4:11%, 3:3.9%, 2:33% and 1:8%).

Similar to previous rounds less than 2% of rear seat passengers were observed wearing seatbelts in round 4. It was further stated in the study that the seatbelt use ranged from 51% to 3% among saloon car and bus drivers respectively. It also showed that there is a difference in seatbelt usage between female and male (8.5% vs 4.5%, $p < 0.001$) and seat belt use was higher on weekdays than weekends (59.7% vs 57.0% $p < 0.01$).

2.4.3 Drink Driving

Driving under the influence of alcohol and any psychoactive substance or drug increases the risk of a crash that results in death or serious injuries. In case of drink-driving, the risk of a road traffic crash starts at low levels of blood alcohol concentration (BAC) and increases significantly when the driver's BAC is ≥ 0.04 gm/dl (WHO, 2015).

A study on the sentinel surveillance of substance abuse and trauma, showed that 31% of non-fatally injured drivers in South Africa have BAC levels exceeding the country's limit of 0.08gm/dl (Peden.M, 2001).

A Data mining report on traffic offences 2011-2016, (Ministry of Information and Communication, 2018) reported that drink driving is among the three most common traffic offences in the country. Overall, the three highest weekdays for "Drink Driving" offences were on Saturdays, Fridays and Mondays.

Recent study on drink driving was conducted by initiative for road safety by Bloomberg philanthropies (Bloomberg, March -April 2017) in Addis Ababa city. The result showed that 3.5% of drivers were tested positive for any alcohol while 3.3% drivers exceeded the legal limit of 0.04% which is significantly lower value than the previous study round (round 3:5.9%, round 2:4.5% and round 1: 9.7%). The study further disaggregated the drink driving by vehicle types as buses (6.7%), saloon cars (4.5%) SUVs/4WD (3.6%) and pick up/light trucks (3.5%). In the study no motorcycle driver tested for any amount of alcohol. By time of day, there was significant difference in drink driving rates in the evening as compared to during day (7.9% vs 0.9% $p < 0.01$). There was no difference by gender in drink driving rates between male and female drivers. Similarly, there was no difference between driver age, day of week and driving rates.

2.4.4 Mobile phone using while driving

The expansion of mobile phones has brought to the rising number of pedestrians and drivers who use mobile phones in daily traffic activities. Numerous studies have examined the effects of mobile phone use on the behavior of drivers, (Daliper, et al., 2016).

Drivers using mobile phones are approximately 4 times more likely to be involved in a crash than drivers not using a mobile phone (WHO, 2015). Using a phone while driving slows reaction times (notably braking reaction time, but also reaction to traffic signals), and makes it difficult to keep in

the correct lane, and to keep the correct following distances. Hands-free phones are not much safer than hand-held phone sets, and texting considerably increases the risk of a crash.

A study on “mobile phone use as growing problem of driver distraction” (WHO, 2011) shows that young and novice drivers (drivers holding driving license with less than a year from the issue date) are more prone to distraction and more susceptible to effects of distraction.

Data mining report on traffic offences in Bhutan (Ministry of Information and Communication, 2018) showed that mobile phone violations in country was the highest among top three traffic offences registered with 37.6% of top 3 traffic offences in the country. The report further identified that mobile phone offences were recorded highest in the age group of 27-31 and 28-34 year respectively for male and female drivers. The report thus suggested that young drivers are prone to using mobile phones while driving compared to other age groups. However, the prevalence of using mobile phone while driving offences decreases with the increase in driver’s age and driving experience.

2.4.5 Failing to wear Helmet

Wearing a motorcycle helmet correctly can reduce the risk of death by almost 40% and the risk of severe injury by over 70% (WHO, 2015). Recent study in Addis Ababa by Bloomberg Philanthropies (Bloomberg, March -April 2017) on 5,694 motorcycles in Addis Ababa city showed that the overall prevalence of correct helmet use among motorcycle riders (drivers and passengers) in round 4 was 24%. Which was significantly lower compared to round 3(24% vs. 32%, $p<0.01$). As compared to previous rounds, there was a steady decrease in the proportion of correct helmet use among drivers (round 3:43%, 2:37%, 1:41%, $p<0.01$). When disaggregated by gender, there was a significant difference in proper helmet wearing rates between male and female passengers (24.5% vs. 2.6%, $p<0.01$). Correct helmet use was virtually nonexistent for among passengers. Correct passenger helmet wearing rates in Addis Ababa have been consistently low across all rounds (round 4:3%, 3: 3%, 2:3%, and 1:2 %).

2.4.6 Red light Running

Red light running is another risk factor for road traffic crashes identified by (WHO, 2015). In addition, a study by (Al-Ghamdi & Ali, 2003) on Analysis of traffic accidents at urban intersections in Riyadh, 2003GC indicated that red light running at intersections is a major cause for accidents

in Saudi Arabia. It is a big challenge to the transport professionals in the kingdom of Saudi Arabia because of the rise of human fatalities and associated financial losses which result from red light running violations. The study further revealed that, the problem of red light running in Saudi Arabia has a rate of 32 for every 100 vehicles which is 10 times more than USA and Australia.

2.5 Differences in traffic offence types by vehicle and driver characteristics

Relationship of traffic offences and driver characteristics had been studied by different researchers like (Wu, et al., 2016) examined that red light running was committed by taxi drivers as compared to non-professional drivers.

Another study by (Liew, et al., 2016) examined the influences of gender and driving experience on different traffic offence types and results indicated that male drivers have high scores in speeding, red-light running, tail gating and using emergency lane and high experienced drivers were more prone to commit speeding, red-light running, dangerously cutting into traffic, using mobile phone while driving and driving with non-compliance specification vehicle.

Another study by (Newman, et al., 2014) on exploring differences in driving behavior across age and years of education of taxi drivers in Addis Ababa city, revealed that more educated and older age drivers reported engaging in more unsafe driving behaviors than younger and less educated drivers. Literatures on attitudes towards unsafe driving behaviors, differences in traffic offences by age, gender, job, marital status, education level, driving experiences and vehicle characteristics were rare in Addis Ababa city, Ethiopia.

2.6 Do Road Traffic crashes are associated with Traffic offences?

With road deaths estimated to become the world's third biggest killer overall by 2020 (Jacobs et al, 2000), a pertinent question is whether there are links between road traffic offending and crash involvement. Surprisingly, relatively little research has been conducted to explore this question, but what has been done supports a correlation (Stradling, 1997).

Study by (Liew, et al., 2016) showed that there is significant relation between gender and their crash involvements and another study by (Birsan, et al., 2017) showed that higher violations score are positively associated with increases in self-reported crashes and citation likelihoods.

Another study by (Barraclough, et al., 2016) yielded a correlation between road traffic crashes and traffic offences. In the analysis, the study used a meta-analysis of 144 effects drawn from 99 road safety studies and used potential impacts of age, time period, crash and offence rates, crashes severity and data type sourced from either self-report surveys or archival records were considered. After analysis an average correlation of $r=0.18$ was observed over a mean time of 3.2 years. Evidence emerged suggesting the strength of this correlation. Stronger correlations between crashes and offences were generally found in studies involving younger drivers.

Another study by (Flieter, et al., 2013), on characteristics of Chinese drivers attending a mandatory course following license suspension revealed that among the respondents about one third of them were involved in road traffic crashes while violating traffic laws in the previous year. The relationship between road traffic crashes and traffic law violations were limited. There was no association between number of driving under influence offences and self reported crash involvement. However, there was small, positive significant correlation between road traffic crashes and number of speeding infringements received in the past 12 months period.

2.7 Road Safety Management in Addis Ababa City

Addis Ababa is experiencing a period of substantial growth and progress. The development of transport system has been a key factor in this, given its central role in economic and social life of city. However, the road transport system faces major challenges into the future and none more so than the ongoing loss of lives and livelihoods resulting from road traffic crashes. (Bloomberg, March -April 2017). The response to these road transport problems must be informed by science, and fit the society. To do this in Addis Ababa city a number of government bodies are responsible for road safety issues. Hence, these number of government body form Addis Ababa city road safety council. Addis Ababa road safety council comprises the following members; Deputy Mayor (chair), head of road transport bureau, police commissioner, general manager (AACRA), Head of health bureau, Head of Education bureau, Director of traffic management agency, director vehicle and driver regulation and director public and freight transport.

Some of the functions of the council are:

- Meet at least four times in a year and provide essential governance for road safety strategy, planning, implementation and review.

- Review the most recent results and data regarding road fatalities and serious injuries in the city and consider what if any further action is required to improve results.
- Review progress in the implementation of Addis Ababa road safety strategy and in particular multi sectoral work programs to give effect to that strategy
- Identify and analyze critical road safety policy issues regarding road/vehicle/user safety standards, gaining compliance with safety standards.

Traffic law enforcement is one way to reduce number of road traffic crashes. Hence, it is the goal of road safety strategy in the city. Traffic police under police commission and traffic law controllers under AACRTMA were responsible for enforcing traffic laws.

2.8 Traffic law enforcement in Addis Ababa city

As explained above traffic polices and personnel from Addis Ababa road and traffic management agency were responsible for traffic law enforcement in the city. In the city, there are 10 sub city and every sub city has a traffic police department. Their responsibility is to make drivers to drive according to the traffic laws and regulations of the city. In addition to making drivers to do accordingly with the traffic laws and regulations since there are also laws against pedestrians in the city, they also enforce these laws. But, in most of the streets of the city these pedestrian laws were not experienced by pedestrians and the enforcing body was not enforcing too.

Traffic law enforcement in the city is based on traffic laws and regulations made by the country in general and city in particular. The city has its own traffic laws and regulations in addition to the country traffic laws and regulations. These traffic laws and regulations has categories and these categories were made based on the gravity of the action or offence. The city renews (former laws) and adds (new traffic laws) from time to time because of newly emerging technologies and newly emerging different traffic offence types.

The level of enforcement ranges from fine (in money) to driver license suspension and revocation depending on the severity of the traffic offence. The main traffic laws in the city, even though they are categorized in different categories are over-speeding, drink and driving (driving under influence like alcohol content in blood greater than 0.08gm/dl and in breath greater than 0.04gm/dl), red-light running, illegal parking, over loading, driving while using mobile phone and discussed under data description with their category.

2.9 Points awarded for traffic offenders

2.9.1 Points given for the first time traffic offenders

Drivers violating traffic rule and regulations are awarded with points which increases with the category type of the traffic offence and also on its gravity. Points given to traffic offending vehicle drivers with their corresponding amount of fine were shown in the table below.

Table 2 Points given for the first time traffic offenders

No	Traffic offence Category	Points for the Offence	Amount of fine for the offence
1	Category One	0	100
2	Category Two	1	150
3	Category Three	2	200
4	Category Four	3	250
5	Category Five	4	300
6	Category Six	22	Driving License Revoked for 6 Months
7	Category Seven	28	Driving License will be revoked for 1 year

Table 3 Points given for Second time and above traffic offenders

No	Points	Amount of fine in ETB
1	2-6	300
2	7-11	350
3	12-16	400
4	17-21	License will be revoked for 3 months and refreshing courses
5	22-27	License will be revoked for 6 months and refreshing courses
6	Greater than 28	Driving license will be rejected. After a year s/he take refreshing courses and driving trainings then, and takes driving license back.

2.10 Research Gap

Despite statistics indicating that Addis Ababa city has highest number of road traffic crashes (Admassie, 2015; Asrat, 2015; Tulu, 2015; Hirpa, 2016), and traffic offences nationally (figure-2), there is limited scientific literatures identifying the most commonly occurring traffic offence types, magnitudes, trends, characteristics of traffic offences and whether differences in traffic offence types exists by socio-demographic characteristics of traffic offenders, socio-economic characteristics of traffic offenders, travel history of traffic offenders and other driver and vehicle related variables.

Knowing the most common traffic offences, magnitudes, trends and characteristics, identifying the influencing factors and differences in traffic offence types by different socio-demographic, socio-economic characteristics and other variables related to driver and vehicle helps in making interventions towards reducing number of traffic offences. So, this study analyzes traffic offences, identifies the common traffic offences, and differences in traffic offences by different categories of socio-demographics of drivers, socio-economic characteristics, travel history and other driver and vehicle related variables.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1 Study area

This study is conducted in Arada sub-city which is one of the ten sub-cities of Addis Ababa, Ethiopia. The sub-city covers an area of 949.86ha and population size of about 211,201 (99,165 male and 112,336 female) which makes it one of the densely populated sub-cities in Addis Ababa (Central Statistical Agency, 2007). It was selected randomly as study area for this research, and fortunately, the sub city is found at the center of Addis Ababa city, where vehicles from every corner of the Addis Ababa City can be available. The sub city is located in the Northern area of the city nearby the center. It borders the districts of Gullele in the North direction, Yeka in the East direction, Addis Ketema in the West Direction and Kirkos in the South direction.

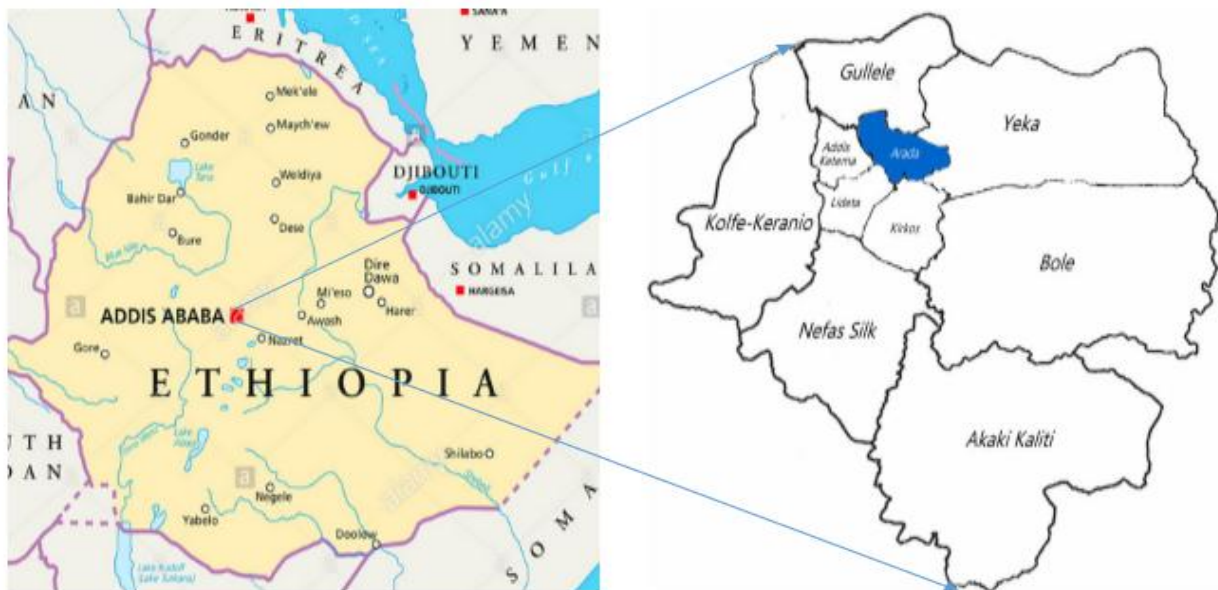


Figure 3 Study area (Shaded region)

3.2 Methods

3.2.1 Secondary Data Collection

Traffic offence data from the traffic offence document was captured for this study from November 2007 to November 2010 E.C because the data is full from this time interval. Traffic offence data

were available in soft copy and contains monthly number of registered traffic offences by their category and subcategories; six categories and 115 sub-categories, vehicle types by their codes, age of drivers, license level of traffic offenders and gender of drivers who were involved in traffic law violations.

3.2.1.1 Data Description

- I. *Age*-is the age of traffic offenders and given in 3 crude intervals. These age interval is 18-30 years, 31-50 years and above 50 years. These age category was done by Addis Ababa city driver licensing Authority.
- II. *Gender*-is gender of traffic offenders.
- III. *Month*-month in which traffic offence was made.
- IV. *Driver's license level*- The licensing system of the city was two types. These are the old licensing system and the new licensing system. The *old driver licensing* system has seven license level from level one through level seven and the new driver licensing system which is now fully applied in the city has about 14 license levels which are given based on the type of vehicle, the purpose of vehicle and other criteria. These driver's license level types are, *motor (for motorcyclists)*, *Auto (for family vehicle drivers like automobile)*, *Taxi-1 and Taxi-2 (for taxi drivers)*, *Public (Public-1 and Public-2 for drivers driving vehicles used by publics)*, *Derek (Derek-1, Derek-2 and Derek-3 for drivers driving vehicles involved in loadings of materials)*, *Fesash (Fesash-1 and Fesash-2 for drivers driving vehicles involved in transport of liquid materials like, Botte)* and *Liyu (Liyu-1, Liyu-2 and Liyu-3 for different purpose drivers like Excavator drivers, Loader drivers, Crane)*
- V. *Vehicle Code*- Vehicles were represented by different codes (numbers and numerals) on their plate and the plate were colored with different colors for different types of vehicles. Code-1 vehicles are Taxi vehicles engaged in taxi transport service in the city, Code-2 vehicles are private vehicles used for personal and family purposes, Code-3 vehicles are commercial vehicles which are mostly engaged in commercial road transport use or car hire businesses and vehicles owned by government and vehicles owned by red cross, religious societies, non-business associations and similar other organizations are coded as Code-4 and Code-5 respectively. The others (code-6, 7, 8 and 9) were represented by others or 6.

Table 4 Vehicle Identification by Code and Letter Combination

No	Type of plate	Color Combination and Number/Letter Combination	Description
1	Taxi plate	White ground, red letters and numerals and code number "1" in a red circle on the left	issued for vehicles engaged in taxi transport services
2	Private plate	White ground, dark blue letter and code "2" in a blue circle on left	for private motor cars for personal, family purposes
3	Commercial plate	White ground, dark green letters and code "3" in green circle on the left hand side	Vehicles registered as commercial use, car business
4	Government plate	White ground with black letters and code number "4" in black circle on the left hand	issued for vehicles owned by government agencies
5	Religious/civic society	White ground, orange colors and code number "5" in a black circle on the left	for vehicles owned by the red cross, religious, NGOs
6	Temporary plate	White ground with red letters and numerals and with the legend "የጊዜያዊ" on the left	To be issued for vehicles for temporary use
7	Transferable plate	White ground with light blue letters and legend "ተላለፊ" on the left	issued for any inventory vehicles owned by a manufacturer, for temporary
8	Special Equipment	White ground with red letters and numerals with the legend "ልዩተ" on the left	To be issued for any special mobile equipment
9	Police plate	Yellow ground with black letters and legend "ፖሊስ" on the left	To be issued for vehicles owned by police
10	Embassies, International organizations and Aid plate	<p>a) White ground, light blue letters and "የተመ", "CD" and "UN" on yellow stripes on the left and right</p> <p>b) White ground, light blue letters and "የተመ" and "UN" on the left and right</p> <p>c) White ground, light green letters and "ኩዲ", "አሕ" and "AU" and "CD" on the left and right</p> <p>d) White ground, light green letters and "አሕ" and "AU" on the left and right</p> <p>e) White ground, black letters "ኩዲ" and "CD" on yellow stripes at center and right</p> <p>f) White ground, light orange letters "CD" on the left and right hand side</p> <p>g) White ground with orange letters and numerals "ኢት" "ETH"</p>	<p>a) for vehicles of "UN" personnel with diplomatic status</p> <p>b) To be issued for vehicles owned by "UN" and the personnel thereof</p> <p>c) for vehicles of "AU" personnel with diplomatic</p> <p>d) for vehicles owned by "AU" and the personnel thereof</p> <p>e) for vehicles of diplomatic corps</p> <p>f) for vehicles of aid institutions' personnel with diplomatic status</p> <p>g) for vehicles of aid institutions and personnel thereof</p> <p>Indicates vehicles engaged in cross country commercial road transport service or owned by the Federal government agencies</p>

Source: Addis Ababa City Road and Traffic Management Agency

VI. *Category of traffic offences-*

Traffic offences were categorized in to 7 categories and 115 subcategories based on their severity by Addis Ababa city driver licensing authority.

Category One Traffic Offences

- Pedestrian illegal road, Pulling vehicles or other rolling things on roads improperly and illegally, Not using enough loading vehicle part, i.e Sponda, Illegal noising by vehicles speakers (even though no sound limit by the city), no signal for overloading, on road car washing, motorcycles not wearing helmet, driving below allowed speed (no minimum speed limit in the city), driving bicycle without wearing helmet, driving without posting the word “Trainer” on vehicles driven by trainers, training driving on improper area, training driving at improper time, pedestrian’s illegal road crossings and not having first aid kit,

Category Two Traffic offences

- Parking very near to traffic signals, right edge slow moving, parking damaged vehicles over street above allowed time, drivers not using his/her two hands over steer, , training driving vehicles without permission, driving vehicles whose plate was covered and either damaged or cut, driving without its line, improper back movement, , driving in improper lane,

Category Three Traffic offences

- Traffic flow obstruction, vehicles double stopping, vehicles crossing an island, drivers and passengers not wearing seat belt, illegal U-turn, and parking on curves, changing direction at 25m without showing signal, driving with improper gap, parking damaged vehicles for more than allowed time, placing Soil, sand and stone on roads, loading unnecessary materials with public, driving vehicles with large amount of fuel emissions, drivers failing to use lighting when light is necessary, showing signal where the driver is actually not going, driving with children under seven in front seat

Category Four Traffic Offences

- Disrespecting prohibited traffic signs, overloading, disrespecting traffic police orders, vehicle showing forward direction arrow, loading and unloading at prohibited area, driving vehicle with visible mechanical problem, failing to give priority for vehicles, driving with non-renewed license, sight obstruction on vehicle part. The other traffic offences of this category includes, driving with not fulfilling lighting parts, failing to take turning direction, using rolling material on ground with speed of less than 10km/hr., parking on bus stop area,

parking on restricted area like hospital entrances, loading and unloading on restricted area, giving less precaution around side of railway line, failing to give priority for vehicles, using lighting that power greater than allowed, stopping and start driving without showing signal, stopping on zebra, failing to respect restricted sign, driving with children below 13 years in front seat, failing to give priority for other vehicles in case of emergency, failing to post reflectors on vehicles, using TV, radios and others, failing to make the vehicle yearly inspection, stopping heavy vehicle for more than two hours on roads.

Category Five Traffic Offences

- To give priority on intersections, loading and unloading people while vehicle is in movement, improper overtaking, driving vehicle with open doors, loading vehicle with over height, over length and out of its width, using additional seat in vehicles, obstructing traffic flow, parking on zebra, speeding at public areas like schools, churches, mosques and hospitals, drivers failing to clear dusty and liquid material wastes from vehicle on roads, illegal parts, and driving vehicle with non-standardized license level.

Category Six Traffic Offences

- Failing to give priority for pedestrians, red light running, speeding, drivers failing to use light when light is necessary, driving on prohibited road or direction, loading or unloading people on center of road, causing traffic accident and failing to be at the area, illegal using of light and over noise, over-loading, stopping vehicle on bridge, failing to respect obligatory traffic sign, using over light in urban, using over light in urban areas, drink and driving (an alcohol content of above 0.08gm/dl in blood and 0.04gm/dl in breath), chewing chat and driving, cannabis use, causing traffic crashes and failing to take the injured to medical services, driving while using phone, driving without driving license, giving money or other things for beggars at signal and disturbing traffic signs

Category Seven Traffic offences

- Are one or more of the offences in the other categories and are very grave traffic offences (e.g., driving beyond speed, driving outside road, etc.) together with causing damages to property (an added element for a traffic offence to fall under this category). In addition to fines, temporary suspension (e.g.3 months) and revocation/cancellation of a driving license (for recidivism) are also other forms of penalties for this type of traffic offence. This

category of traffic offences were not recorded by traffic police department and not included in the analysis.

3.2.1.2 Data Checking

Secondary data of traffic offences registered in Arada sub city of Addis Ababa city was checked from incomplete and meaningless words. For example, in the sub city's traffic offence data base mistakes like months of year and category of traffic offences were either over jumped or missed or duplicated/repeated. In this case, the latter was used for the next month or the next following traffic category because it was assumed the minor mistakes while documentation.

3.2.1.3 Method of Analysis

Traffic offences data was arranged into traffic offence types, traffic offences by vehicle type using codes of vehicles, traffic offences by license level of drivers, traffic offender's gender, age and temporal traffic offences with month for analysis to make tangible recommendation for action. These data were thoroughly analyzed using descriptive statistics after omission of incomplete and undefined expressions found within the data. Percentages, bar charts, pie charts and time series plots are the mainly used descriptive statistics in this analysis.

Data on individual traffic offenders like, traffic offender's age (in small intervals) and experience as well as educational level of the traffic offenders were not registered. So, the analysis was done with the available data for the analysis for 2007 E.C-2009 E.C.

3.2.2 Primary Data Collection through Questionnaires

3.2.2.1 Source Population

All motor vehicle drivers in Addis Ababa city.

3.2.2.2 Study Population

Traffic offenders of all motor vehicle drivers in Addis Ababa City who were fined and ordered by traffic personnel to pay amount of fine to Arada sub city during the study period.

3.2.2.3 Inclusion Criteria

Only traffic offenders in Addis Ababa city sent to Arada sub city traffic police department to take back their driving license and vehicle plate for traffic offending were included in this research to obtain the objectives of this research.

3.2.2.4 Exclusion Criteria

Every traffic offenders have a chance to fill the questionnaires but only those who were willing to participate were contacted. Motor cycle traffic offenders were excluded from the study due to difficulty in data collection because the driving license of traffic offender and vehicle's plate was on separate locations or rooms.

3.2.2.5 Location and times

For data collection, one office next to one of the offices of police commission department of Arada sub city was selected considering that I can easily get traffic offenders and can conduct my data collection process. Since the area was inside the compound of the police department, legal permission was asked the head of police department of traffic police and the area was permitted to conduct the questionnaires. First of all, drivers were asked whether they are willing or not willing to participate in the questionnaires after my brief explanation of the purpose of the study.

3.2.3 Sampling

3.2.3.1 Sample size determination for traffic offenders

Number of traffic offenders involved in traffic offences were calculated by the sample size determination of Cochran's formula for the unknown population because the exact number of drivers that were traffic offenders were not accurately known. (Scott & Smith, 2015). It was assumed that the common and traditional confidence level, 95%, +/-5% (e) standard error for precision, and (p=0.5, assumed standard deviation) and hence q=1-p=0.5. A 95 % confidence level

gives us Z values of 1.96. So,
$$N = \frac{z^2 pq}{e^2} = \frac{1.96^2 * 0.5 * 0.5}{0.05^2} = \frac{3.8416 * 0.25}{0.0025} = \frac{0.9604}{0.0025} = 384.16$$

= 385 traffic offenders, So, a randomly selected sample of 385 traffic offenders in the sub city in our target population should be required to give the confidence levels the study needs.

3.2.3.2 Data Collection

Data for this study was collected for over 6 weeks starting from January, Thursday 24, 2018 G.C. to April 22, 2018 G.C for randomly selected weeks. This time variation was selected to consider all traffic offenders coming to the traffic police department in time variation for this study.

3.2.3.3 Data Collection Instruments

Structured questionnaire paper was specifically prepared, translated to federal language which is Amharic language and duplicated.

3.2.3.4 Data Collection Procedures

Respondents were randomly selected traffic offenders found in Addis Ababa City particularly, those drivers who committed traffic laws and referred to Arada sub city police department. These traffic offenders were assumed to be easily contacted at the police department when they are going to take their driving license and vehicle plate for the traffic offence they involved in.

Before starting the delivery of the questionnaires to the respondents, they were asked whether they are willing to participate or not, then it was carried out. In this study, 385 drivers were willing to answer the prepared questions excluding those unwilling and failed to finish all the questions among those drivers referred to Arada sub city police department. These drivers referred to the police department for their commission of traffic law and to take back their suspended driving license and vehicles plate.

Data was collected for the following sections.

Section-I the Socio-Demographics of driver's and other related variables

Consists of respondent's age, marital status, driving experience, job, and variables like license level, licensing body and monthly salary.

Section-II Vehicle characteristics questionnaires;

Includes vehicles service year, vehicle type, vehicle code and typical week kilometers travelled by traffic offenders.

Section-III Traffic offence and traffic crash history of drivers;

Questions on number of traffic offences in the past 12 months, types of traffic offences they involved in and frequency, whether they are involved in road traffic crashes and type of crashes.

Section-IV Traffic offender's attitudes towards Traffic laws;

Attitudes of offenders towards unsafe driving behaviors like failing to wear seat belt, drink driving laws, speed limits, and red light running. Data on how these unsafe driving behaviors affects road safety were collected and analyzed descriptively.

3.2.3.5 Data Description

Different literatures were followed to make classifications of variables used in this study (Clos, 2017; Huang, 2014; Barry, et al., 2015; Asefa, et al., 2014).

Table 5 Description of data

Age	18 - 23 years old
	24- 29 years old
	30 - 35 years old
	36-41 years old
	42-47 years old
	48-53 years old
	above 53 years old
Gender	Male/Female
Job	Government/Private/Driver/Student/Others
Marital status	Married
	Single
	In-friendship/Cohabited
	Widowed
Education level	Primary
	Secondary and Preparatory
	Diploma
	First Degree and above
Driving Experience	0-2 years
	3-5years
	6-10years
	11-15 years
	>15years
License level	1,2,3,4,5 and others
Licensing body	Oromia Region
	Addis Ababa City
	Amhara Region
	Tigray Region
	South Nations and Nationalities Region
	Others
Vehicle service year	0-5years
	6-10years
	11-15years

	16-20years
	>20years
Vehicle type	Taxi
	Minibus
	Bus
	Car
	Automobile
	Heavy vehicles
Vehicle Codes	Code-1,2,3,4 and others
Vehicle owner	Private
	Government
	Other organizations
Mean weekly km travelled	<50km
	50-100km
	101-150km
	151-200km
	201-250km
	>250km
Monthly salary	<1500 ETB
	1501-3000ETB
	3001-4500ETB
	4501-6000ETB
	>6000ETB
Frequency of traffic offences	In number

Attitudes towards different driving offences in their threat to road traffic safety were collected on selected types of driving behaviors like speeding, drink driving, red-light running, mobile phone using while driving, failing to wears seat belt and others. Their attitudes were collected as extremely serious, very serious, moderately serious, slightly serious and not at all serious threat to road traffic safety.

3.2.4 Variables of the study

Dependent Variable

The number and type of traffic offences the respondent involved in the past 12 months was the dependent variable of this research.

Independent Variables

For this research a number of independent variables were used. These were;

Socio-demographic characteristics of traffic offenders like age, gender, job, marital status, education level, driving experience, license level, licensing body, salary, and vehicle characteristics like vehicle type, code, vehicle service year and typical week kilometer travelled.

3.2.5 Data Quality Control Measures and Data checking

Before going to collect the whole data for this study, pilot study was conducted and analyzed on data from 33 respondents which is in the interval of 5%-10% of sample size. After pilot study, the whole data for this study was collected and were checked for missing and out of range values (For example for variables that exist out of range like age when reported as less than 18 years). No missing or out of range values were identified by checking due to cancellation of respondent's response if incomplete.

3.2.6 Methods of Analysis

Data analysis involves computations certain measures along with searching for patterns of relationships that may exist between dependent and independent variables. The data was analyzed according to the nature of data and objectives of the research. Descriptive analysis was done prior to the analysis and were used to analyze, present and interpret data. Frequency tables, percentages and cross tabulations, were widely used in the analysis to generate values of dependent and independent variables.

3.2.6.1 Independent T-test

In comparing mean difference of number of traffic offence across gender, an independent t-test was used because gender has only two groups.

3.2.6.2 One-way ANOVA test

One way ANOVA was used to explore differences in mean number of traffic offences, across driver's and vehicle's characteristics. Because, the independent variables are categorical (more than two levels), this inferential statistics is selected. Assumptions for both independent t-test and one way ANOVA were;

- The dependent variable is normally distributed.(Appendix-D; A-E)
- The groups have approximately equal variance.(Appendix-D, F)

3.2.6.3 Chi-Square tests

Chi-square Test of Independence determines the associations between two categorical variables. Hence, it is used in this study to obtain associations of driver's and vehicle's characteristics and crash involvement because these variables are categorical in nature.

It tests the following Hypotheses;

Null: There is no associations between driver's characteristics, vehicle's characteristics and crash involvements;

Alternative: There is an associations between driver's characteristics, vehicle's characteristics and crash involvements.

Where driver characteristics are; age, gender, job, education level, driving experience, marital status, license level, salary

And vehicle characteristics were; vehicle type, vehicle code, vehicle owner, vehicle service years, weekly km travelled

- 5% Statistical significance was assumed.

CHAPTER FOUR

4. DESCRIPTIVE ANALYSIS OF TRAFFIC OFFENCES IN ARADA SUB-CITY

4.1 Characteristics of traffic offences over three years in Arada sub-city

In Arada sub-city, over three years about 154,436 (95.6% by male) traffic offences have occurred, caught by enforcement bodies, and fined. These number is the traffic offences caught, registered and fined. There are also more many traffic offenders not caught and found to be traffic offenders since there is no advanced technology based traffic law enforcement in the city and existence of underreporting of traffic offences and road corruption also exists.

Overall, traffic offences over the study period, 46669 (30.2%) were registered in 2007, 50586 (32.8%) were in 2008 and 57181 (37%) were in 2009 E.C. From the analysis over the study period, it was seen that the number of traffic offences in the sub city is increasing from year to year with the growth rate of 8.3% and 13.04% in 2008 E.C and 2009 E.C. respectively. It showed an average decreasing rate of 2.4% over the three years for females and for male traffic offenders it showed an average increasing rate of 13.7% over the three years. This might be due to the increased safety issues like public awareness, licensing system issues and establishment of the city's traffic management agency because female are more cautious to road use than male. So, as traffic safety is more connected with driver's behavior than driving skills, female drivers develop a more cautious approach to road use while male more likely engage in risky driving behaviors (Harre, et al., 2000). Therefore, this might be the reason behind decrease in number of female traffic offenders.

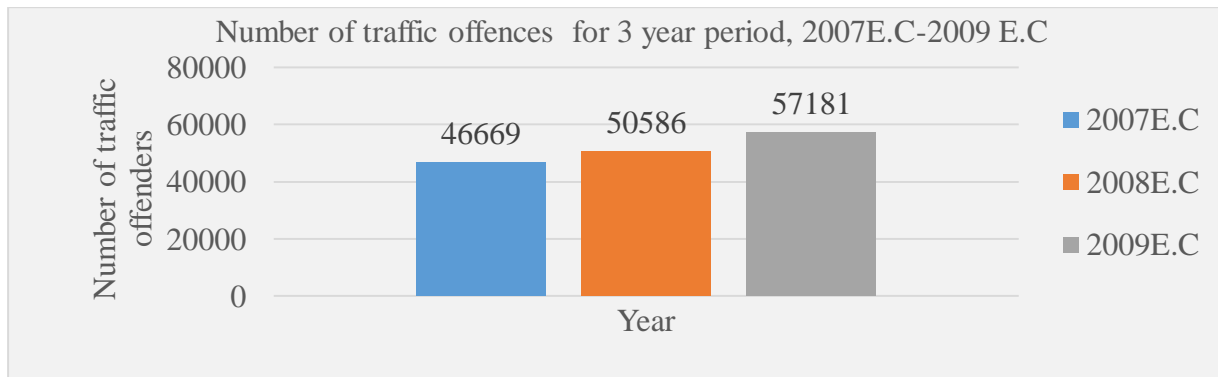


Figure 4 Number of traffic offences for 3 year period (2007E.C -2009 E.C)

The growth rate in road traffic offences has an average increasing value of 10.7% for both gender over the three years in the sub city. The main types of these registered traffic offences as indicated in figure-11 comprises of; traffic flow obstruction (12.9%), disrespecting prohibited signs (11.3%), parking on prohibited areas or illegal parking (8.5%), overloading (8.2%), driving while talking on phone/mobile phone distraction (7.8%), driving with no license (5.4%), disrespecting orders of traffic police (5.2%), red light running (4.4%), driving on prohibited roads (2.6%) parking on zebra (2.5%) are the top 10 major traffic offences among the top twenty five traffic offences indicated by the analysis. Additionally, the other characteristics of traffic offenders and vehicle's, like age, gender, types of vehicles involved in traffic offences by codes, license level of offenders, temporal variation of traffic offences was discussed under the following subtopics.

The following histogram clearly shows increasing trend of the total number of traffic offences in the sub city with their gender over 3 years (2007E.C-2010 E.C).

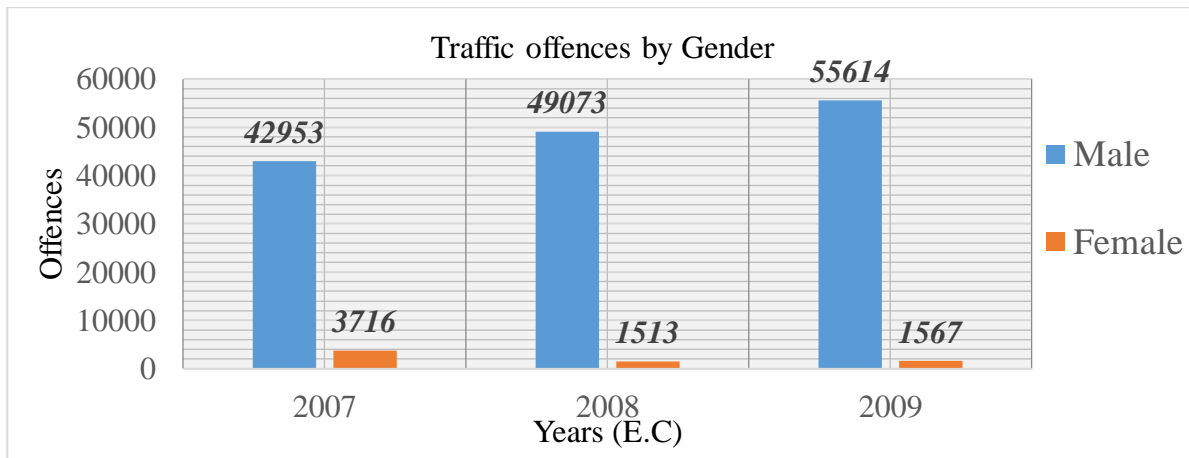


Figure 5 Traffic offences by gender for 3 years in Arada Sub-city

4.1.1 Traffic Offences by Gender of Drivers

Table-6 and figure-6 shows the gender composition of drivers involved in traffic offences. It shows a great variation between gender, male traffic offenders were, 147,640 (95.6%) and female offenders were, 6,796 (4.4%) in the city. In table-5, the ratio of male to female driver population in the city is about 5:1, and it is smaller than the corresponding ratio in case of number of traffic offenders which is 21:1 by more than four times. This indicates that male are more violating traffic rules and regulations than female by at least four times. This might be due to the cause that professional driving jobs are dominated by male drivers. It is worth nothing that female involvement

in paid employment (or self-employment) is low in Ethiopia (Vogt, 1999). In addition, Kilometers travelled per annum by women as drivers are most probably lower than men.

Table 6 Traffic offenders and licensed drivers by gender (2007 E.C-2009E.C)

Gender	Number of traffic offenders	%	Number of licensed drivers	%
Male	147640	95.6	614228	85.6
Female	6796	4.4	116220	14.4
Total	154436	100	730448	100
Ratio	21:1		5.3:1	

Source: Addis Ababa City Road and Traffic Management Agency (licensed drivers up to September, 2018 G.C)

4.1.2 Traffic Offence by Category of Offences

The new traffic law (No 395/2009 and 27/2009) has seven categories of traffic offences according to their gravity and aggressiveness categorized by FTA and AACTMA. These categories are from category one through category seven offence types. Under each traffic offence categories there exists specific traffic offence types which were listed under each traffic offence category.

From figure-7 below category-4, 3 and 2 ranked 1 to 3 respectively. Disrespecting traffic signs, overloading, disrespecting traffic police orders and illegal parking were the main among category 4 traffic offences. Traffic flow obstruction, failing to wear seatbelt, parking on curves and illegal U-turns were the main among category-3 traffic offences. And, driving with noisy sound, parking near traffic signals and driving on improper lane were the main among category-2 traffic offences.

Therefore, concerns should be given to these categories and specific types of traffic offences to manage the increasing number of traffic offences in the city.

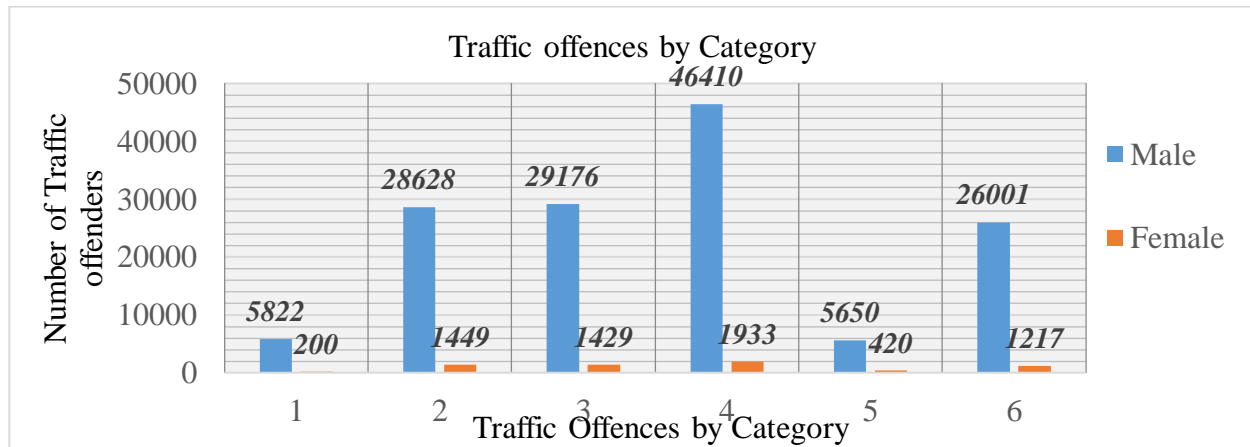


Figure 6 Traffic offences by Category for Arada Sub city over 3 years (2007E.C-2009E.C)

4.1.3 Monthly Variation of Offences

Traffic offences were analyzed monthly as shown below by time series plot in figure-7. From all 12 months, May is the month with the lowest traffic offences over the 3 years with only 7000 male offenders and 346 female offenders (figure-7). It might be the cause that the month is the hottest month in the city and which didn't give comfort for all movements especially for pedestrian to make movement from place to place in this month. In addition to this, this month is also characterized by having three public holidays like international labor day, May 1, Freedom day, May 5, Derg Downfall Day, May 28(with no government works) and with included weekend days where traffic flow decreases greatly. Hence, this might be the reason behind lowest traffic law offences in the month.

Low numbers of traffic law offences were also occurred in months of October 10078, with 9931 male and 147 female offenders and April 10,348, with 9,780 male and 568 female offenders as indicated on time series graph which might be variation in road traffic enforcement level or other reason which requests further study.

Traffic offences over three years showed highest number of traffic offences in figure-7 in December, it showed an increase of 7.4% from October and in July which showed an increase of 120% from that of May and August showed an increase of 108% from May to some extent which might be either there is poor traffic law enforcement levels exists in these months or highest traffic flow exists and needs further research. Therefore, proper intervention and enforcement of traffic laws should focus this months to negotiate this increase in traffic offence number.

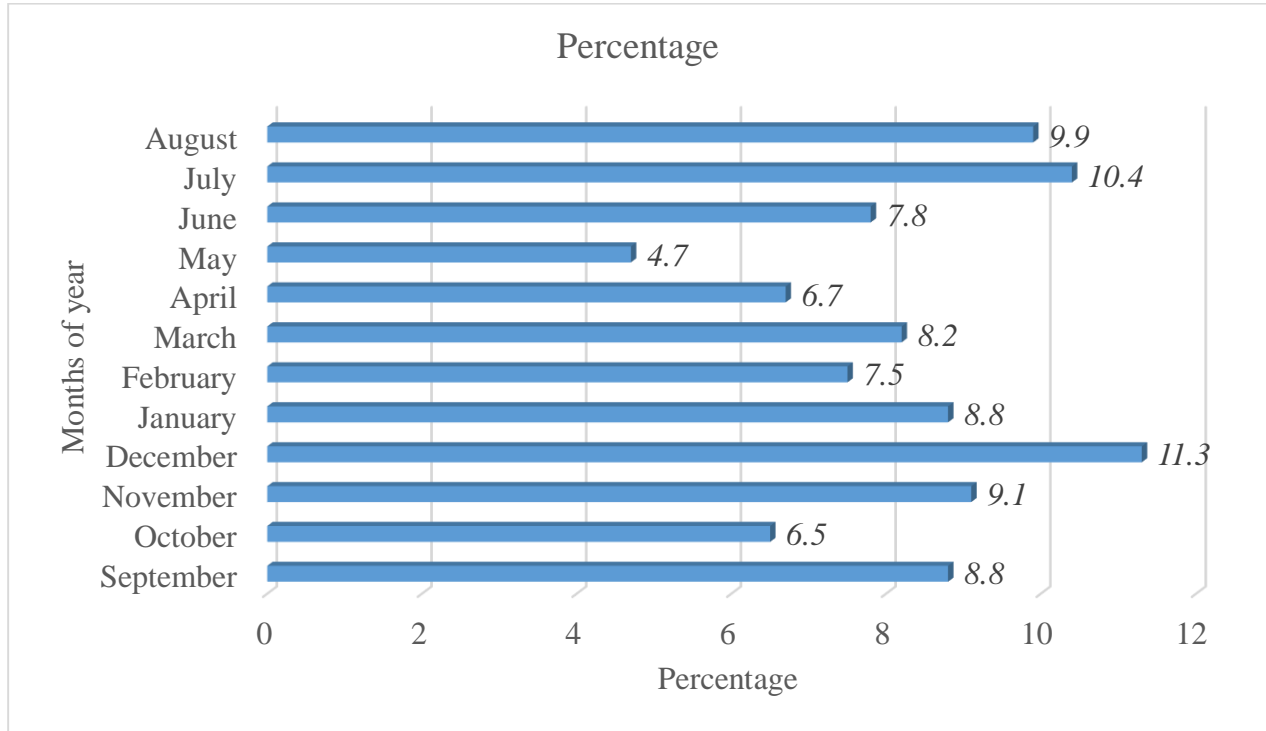


Figure 7 Monthly variation of traffic offences for Arada Sub-city over (2007-2009 E.C).

When analyzing monthly variation of traffic offences over the three years

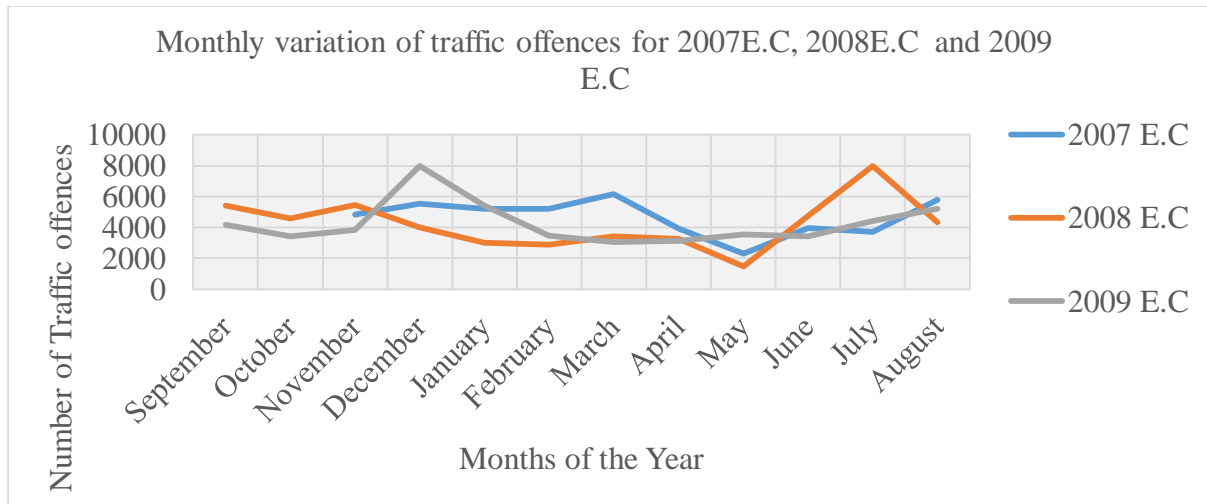


Figure 8 Monthly variation of traffic offence for 2007 E.C, 2008E.C and 2009 E.C

4.1.4 Traffic offence variation by age of offenders

Overall, 729900 licensed drivers in Addis Ababa city, majority (57.64%) were drivers within 31-50 age group. The rest age groups, 18-30 and above 50 years, consists of 22.35% and 20.01% respectively. The age group 31-50 years considered as adult stage and shares almost half of

traffic offenders over three years in Arada sub city with 49.1% but this share is less than their corresponding share in licensed driver's population. Whereas, the age group of 18-30 year shares 35.8% which is much higher than their corresponding driver population share. The other age group which is above 50 years shares 15.1% in traffic offender's population and this share is less than their corresponding share in licensed driver population in the city which is 20.01%. Therefore, as it can be seen from table-7 below, it can be concluded that drivers within age groups of 18-30 were most prone to traffic offences than other age categories. This is because of young age drivers over-estimate their driving skills and under-estimate the risks of aggressive driving. This result is in line with (Viktorija & Renge, 2011; Kashona & Pazvakwambwa, 2014; Hennessy & Wiesenthal, 2002; Elander, 1993). From their proportion the second offending age category were drivers who are above 50 years of age.

Table 7 Comparison of licensed drivers population and traffic offender's population by Age

Age	Licensed Drivers population	Licensed Drivers percentage	Traffic Offenders Population	Traffic Offenders Percentage
18-30 years	163134	22.35%	55289	35.80%
31-50 years	420714	57.64%	75828	49.10%
above 50 years	146052	20.01%	23319	15.10%
Total	729900	100.00	154436	100.00

4.1.5 Traffic offences by license level of offenders

In table-8 below, the composition of Addis Ababa driver's license level was indicated. This composition was only made from the latest available and registered driver's license level for 186,771 drivers. The data was not available for all drivers in the city. From the table-8, it can be seen that only two license levels, license level-2 (Automobile) and level-3 (Taxi-1, Taxi-2, Derek-1, Public-1) with (40.5%) and (39.66%) respectively, contain more than 80% of Addis Ababa city driver's license level. These two license level share about 70%, 54,237 (35.12%) and 54,414 (35.2%) respectively.

Drivers with license level 4 (Public-2, Derek-2, Fesash-1) have share of 11.5% in driver's license composition in the city and 18.13% in total number of traffic offences. Similarly drivers with license

level-6 (Dozer drivers, excavator drivers, Liyu-1 and Liyu-2) share 0.04% in license composition and 0.2% in traffic offences. Therefore, comparing license level composition and traffic offences by license level, drivers with license level of 4, 5 and 6 were more involved in traffic offences than drivers with other license level noting that not all licensed drivers involved in driving. In contrast, license levels of 1, 2 and 3 were less involved in traffic offences as compared to the other types of license levels as depicted in table-8.

Therefore, special consideration has to be done towards these two types of license level types to increase driver's compliance with traffic rule and regulations in the city and hence decrease the chance of involvement of drivers in road traffic crashes.

Table 8 Comparison of Licensed drivers and traffic offender's population by license levels

License Level	Licensed Drivers population	Licensed Drivers percentage	Traffic Offenders Population	Traffic Offenders Percentage
1	6214	3.4	2934	1.9
2	74022	40.5	54257	35.12
3	72486	39.66	54414	35.23
4	21018	11.5	27999	18.13
5	8956	4.9	14517	9.4
6	75	0.04	308	0.2
Total	182,771	100.00	154436	100.00

4.1.6 Traffic offences by codes of vehicles

Code 2 (private plate) and code 3 (Commercial plates) share more than 75% of total offences. From the share of vehicles proportion by codes of vehicles, vehicles coded 3 showed higher in both proportions offence and in number. Vehicles coded 1 share 6.2% in vehicle proportion but 22.4% in traffic offences. Code-1 vehicles are mostly taxi vehicles and they are involved mainly in public transportation in the city. Hence, they have many kilometers of travel in the city and experience many movement repetitions through the city. Therefore they might have higher exposure to road than other vehicles especially within the city. This could be solid evidence that taxi vehicles and others coded 1 vehicles are more involved in traffic offences than other vehicle types and the finding is supported by (Emenike & Akpu, 2017).

The second most offending vehicle type was vehicles coded 5 which share 0.7% in vehicles number, and, 0.5% in traffic offences and vehicles coded 4 shares 4.9% in number of vehicles and 1.4% in traffic offences. Therefore, from comparison, this shows that government vehicles are less involved in traffic offences. The least offending vehicle type was vehicles represented by others and coded with symbols like T, UN, DC, and ፖሊስ having 6.9% in total number of vehicles, but, only 0.6% in total traffic offender vehicles.

Table 9 Comparison of Vehicle code and traffic offender's population by codes of vehicles

Code of vehicles	Vehicles population	Percentage (%)	Traffic offenders population	Percentage (%)
1	30159	6.2	34593	22.4
2	172778	34.8	48802	31.6
3	231072	46.5	67180	43.5
4	24519	4.9	2162	1.4
5	3930	0.7	772	0.5
Others (6)	34315	6.9	928	0.6
<i>Total</i>	<i>486773</i>	<i>100.00</i>	<i>154436</i>	<i>100.00</i>

4.1.7 The Major Traffic Offences

The traffic offence data was further analyzed to investigate the other major traffic offences. In figure-9 the major (top-25) traffic offences of the sub city over the study period were shown.

Traffic flow obstruction, 19901 (12.8%) is the most committed traffic offence which indicates that for every 100 vehicles fined, about 13 individuals are recorded for this type of traffic offence. The second and third major types of traffic offences were disrespecting prohibited signs 17484, (9.8%) and 13189, (8.9%) respectively. This finding was supported by (Flieter, et al., 2013) in cases of disrespecting prohibiting traffic signals. But, the study identified speeding, drink driving, using inappropriate driving license, license plate destroyed/not displayed as the most common traffic violations. In addition, illegal stopping, violating traffic signals and distracted driving were identified as the most common traffic violations by (Wang, et al., 2015) in China, Beijing. This

study finding was in contrast to findings of (Emenike & Akpu, 2017) in speeding (33%). But, similar finding was found in cases of overloading, illegal parking, failure to obey traffic signs, dangerous overtaking and mobile phone using while driving.

The other fourth and fifth major traffic offences are overloading (8.23%) and using mobile phone while driving (7.9%). These top five traffic offences constitute 47.63% of all traffic offences. Therefore, enforcement activities should give greater concern for these major traffic offences.

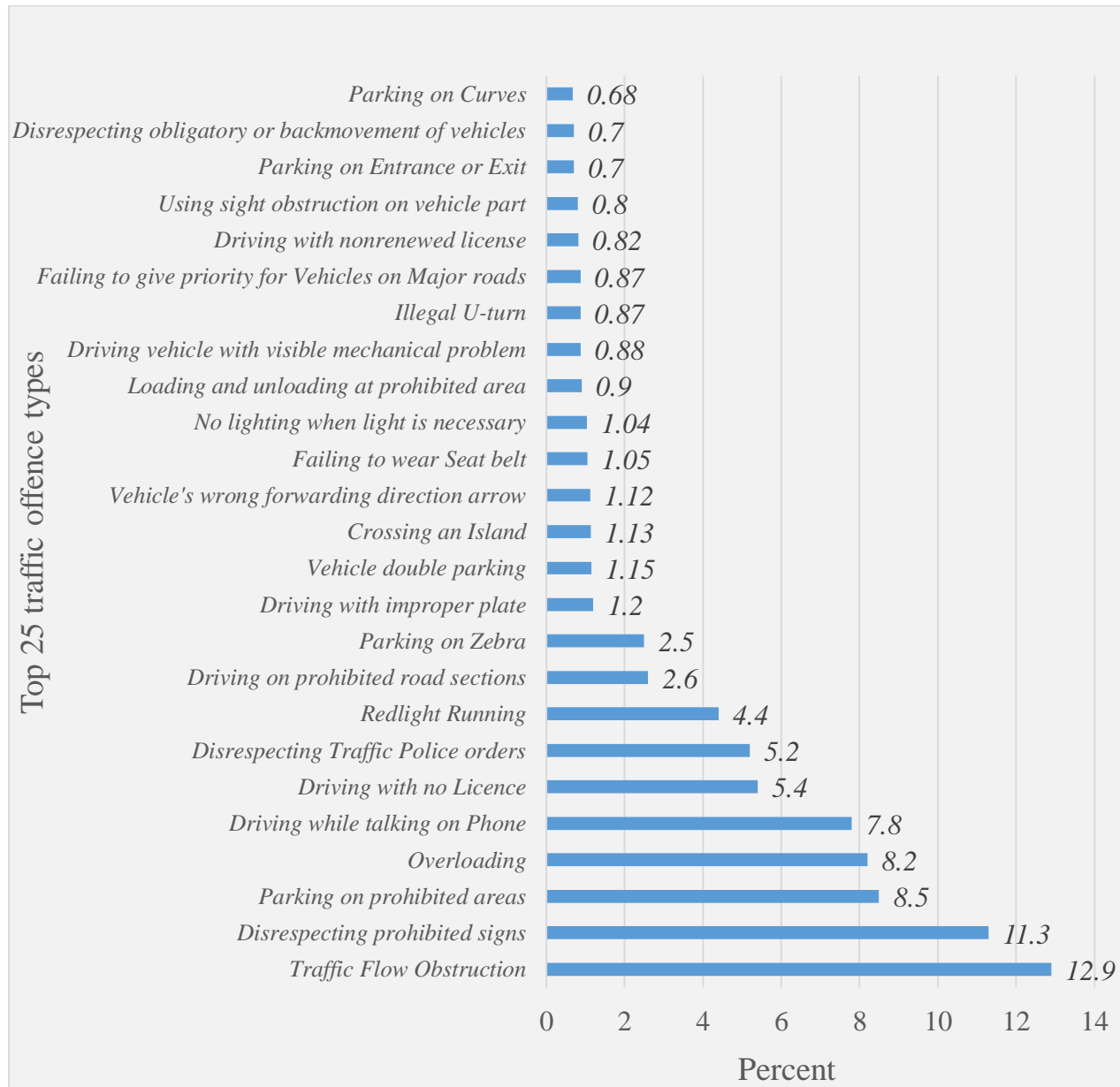


Figure 9 Top 25 Traffic offences of Arada sub-city over 3 years (2007-2009 E.C)

4.1.8 Top 25 traffic offences by category

Category-4 and category-3 traffic offence were the first and the second highest category in the top 25 major traffic offences with about 40% and 26.4% of the total traffic offences respectively. Category-1 and 5 traffic offence types were not found in this major traffic offences.

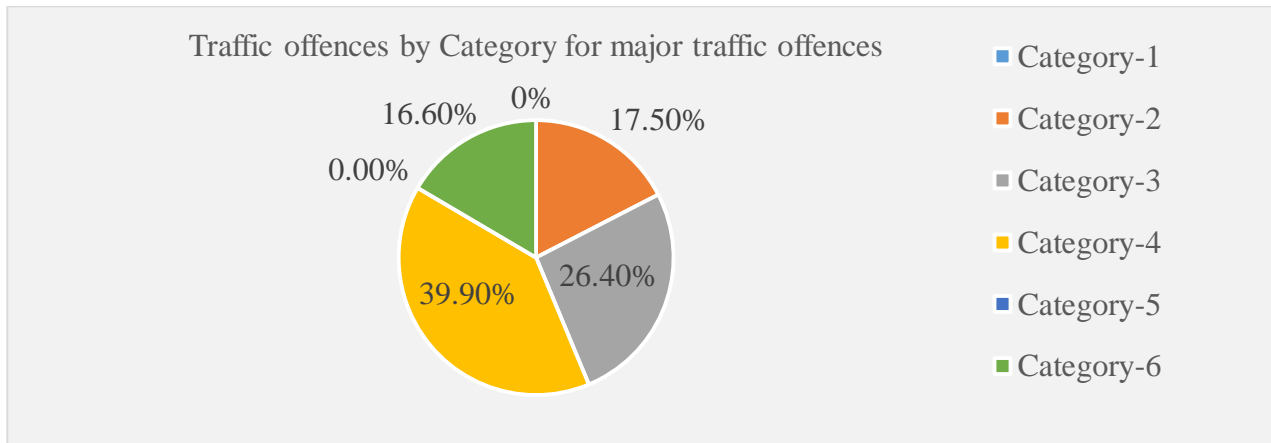


Figure 10 Top-25 Traffic offences by Category

4.1.9 Top 25 traffic offences by vehicle codes

As indicated below vehicles coded 1, 2, 3 and 4 showed higher percentage in total traffic offender's population than vehicles involved in top-25 traffic offences. But, vehicles coded 5 share only 0.5% in total number of vehicles involved in traffic offences, but shares 1.25% in top 25 major traffic offences and vehicles coded others (6) share 0.6% in total number of traffic offenders and share about 8.3% in top-25 traffic offences. Therefore, vehicles coded 5 and others (6) were more involved in major top-25 traffic offences than other vehicles. This type of vehicles are red-cross, religious and non-governmental vehicles and their exposure to road is less as it is obvious that they only engage in non-business activities as compared to code-1, code-3 and code-2 vehicles. Therefore, they might involve in the most common traffic offences. Vehicles coded 1, 2 and 3 were almost equally involved in the top-25 traffic offences as compared to their composition in total number of vehicles involved in traffic offences in the sub-city.

Table 10 Traffic offences of Arada sub-city by codes of vehicle for top 25 traffic offence

Vehicle code	Traffic offenders population	Percentage (%)	Rank	Traffic offenders population involved in top-25	Percentage (%)	Rank
1	34593	22.4	3	13829	18.8	3
2	48802	31.6	2	21847	29.7	2
3	67180	43.5	1	30748	41.8	1
4	2162	1.4	4	117	0.16	6
5	772	0.5	6	919	1.25	5
Others(6)	928	0.6	5	6098	8.3	4
Total	154436	100.00		73558	100.00	

Table-11 below, shows the number of risk factors of traffic crashes occurred in the sub city. From the table-11, it can be seen that the highest traffic offence registered was red light running with 6781 offences. Annually, averagely about 2260 red-light running was recorded in the sub city and about 6 red-light running was recorded daily in the sub-city.

Table 11 Number of risk factors of traffic offences occurred in the sub city

Risk Factors	Gender		Total
	Male	Female	
Speeding	0	0	0
Red-light Running	6309(93.1%)	472(6.9%)	6781
Failing to wear seat belt	1561(95.8%)	67(4.2%)	1628
Drink Driving	789(98.9%)	8(1.1%)	797
Failing to wear Helmet	759(98.3)	13(1.7%)	772

From the total number of risk factors involved about 94.4% were by male traffic offenders and the left 5.6% were by female traffic offenders. When comparing this result with the total number of traffic offences in this study by gender, there is almost the same involvement of male and female traffic offenders in both the risk factor traffic offences and the other traffic offence types. For every 23 traffic offenders of failing to seat belt, one of them is recorded by female drivers. In addition,

for every 98 drunk drivers at least one is female driver and in every 58 traffic offenders of failing to wear helmet at least one is female driver.

Therefore, comparing involvement in risk factors of road traffic crashes by gender, female drivers were more involved in red-light running and less involved in drink and driving than other risk factors of road traffic crashes which is in every 13 red-light traffic offence type, one of them is recorded by female traffic offenders

Table-12 below shows traffic offence composition by vehicle codes. Commercial vehicles coded-3 share about 42.5% in involvement of risk factors. The other offending type of vehicles which are code 2 vehicles, includes mostly of automobiles and family vehicles constituting about 28.2%. Code-1 in which taxi vehicles are included, share 25.9%. The other types of vehicles are code 4, code 5 and other codes (T, ET, CD, UN, and Police) with 1.3%, 0.6% and 1.6% respectively.

In total of traffic offences, vehicles coded 1 share 22.4% only, but in case of involvement in risk factors of traffic crash offences, they share 25.9% and vehicles coded-6 or others share 0.6% in traffic offending vehicles but, 1.6% in involvement of risk factors. Similarly, vehicles coded 4 have a share of 1.4% in traffic offending vehicle population but only 1.3% in involvement of risk factors. This comparison result shows that, vehicles with code 1, vehicles code 5 (Religious and civic society plate) and coded 6 (T, UN, DC, ፖሊስ vehicles) were more involved in risk factors of road traffic crashes and this result is in line with the findings of (Emenike & D.N.Akpu, 2017) and vehicles coded 4, coded 3 and coded 2 were less involved in risk factors of road traffic crashes

Table 12 Involvement in risk factor traffic offences by vehicle codes

Vehicle code	Population of traffic offenders	Percent	Rank	Involvement in risk factors	Percent	Rank
1	34593	22.4	3	2583	25.9	3
2	48802	31.6	2	2812	28.2	2
3	67180	43.5	1	4239	42.5	1
4	2162	1.4	4	128	1.3	5
5	772	0.5	6	59	0.6	6
6(others)	928	0.6	5	158	1.6	4
Total	154436			9978		

4.2 DIFFERENCES IN TRAFFIC OFFENCES BY DRIVER AND VEHICLE CHARACTERISTICS

4.2.1 Descriptive Results

Overall 385 traffic offenders involved in the study conducted from January 24, 2018G.C-April 22, 2018G.C, 86.5% were male. The other characteristics of respondents were summarized in table-13.

Table 13 Descriptive results of respondents

Variable	Category	Frequency	Percent (%)
Age	18 - 23 years old	113	29.4
	24- 29 years old	114	29.6
	30 - 35 years old	101	26.2
	36-41 years old	33	8.6
	42-47 years old	11	2.9
	48-53 years old	8	2.1
	above 53 years old	5	1.3
Gender	Male	333	86.5
	Female	52	13.5
Job	Government worker	46	11.9
	Private worker	126	32.7
	Driver	178	46.2
	Student	35	9.1
Marital Status	Married	233	60.5
	Single	136	35.3
	In-friendship/cohabited	7	1.8
	Widowed	9	2.3
Education Level	Primary	70	18.2
	Secondary and Preparatory	187	48.6
	Diploma	47	12.2
	First Degree and above	81	21.0

Table 14 Descriptive Results of respondents

Variable	Category	Frequency	Percent (%)
Driving Experience	0-2 years	70	18.2
	3-5years	151	39.2
	6-10years	123	31.9
	11-15 years	4	1.0
	>15years	37	9.6
License Level	1	55	14.3
	2	75	19.5
	3	166	43.1
	4	35	9.1
	5	21	5.5
	Other	33	8.6
Licensing Body	Oromia Region	68	17.7
	Addis Ababa City	235	61.0
	Amhara Region	12	3.1
	Tigray Region	24	6.2
	SNNP region	34	8.8
	Others	12	3.1
Vehicle Service year	0-5years	106	27.5
	6-10years	104	27.0
	11-15years	29	7.5
	16-20years	62	16.1
	>20years	84	21.8
Vehicle Type	Taxi	126	32.7
	Minibus	77	20.0
	Bus	25	6.5
	Car	43	11.2
	Automobile	96	24.9
	Heavy vehicles	18	4.7

4.2.2 Differences in traffic offences by drivers' and vehicles' characteristics

The current findings shows that significant associations between number and type of traffic offences and certain socio-economic and socio-demographic characteristics, indicating that there are significant differences in traffic offences among different social groups. These differences were also revealed in studies of (Roni, 2018).

Table 15 below shows the mean for both male and female traffic offenders for different measures of traffic offences. The t-values were found for each category of traffic offence are presented in table-15 along with their statistical meaning at 5% error. Comparing male and female, men showed higher score in all types of traffic offences under study except traffic flow obstruction. This result is in line with results of (Beatriz, et al., 2012). Further, men showed higher score in speeding (p-value=0.002<0.05), illegal parking (p-value=0.011<0.05), overloading (p-value=0.016<0.05) and failing to give priority for pedestrians (p-value=0.036<0.05) and it is statistically significant and this finding is also supported by (Liew, et al., 2016; Michelle, 2013; A.N, et al., 2017).

Table 15 Differences in traffic offences by gender of traffic offenders (independent sample t-test)

Traffic offence	Male (Mean)	Female (Mean)	Df	p-value
Speeding	1.44	1.0667	104	0.002*
Red light Running	1.5410	1.3333	68	0.301
Illegal Parking	1.4706	1	34	0.011*
Overloading	2.5	1	11	0.016*
Failing to wear seat belt	1.5092	1	22	0.666
No priority for pedestrians	1.5810	1	20	0.036*
Failing to give priority for vehicles	1.444	1.333	10	0.816
Failing to respect traffic police order	1.3	1	10	0.676
Using Mobile phone While driving	1.8462	1.5	21	0.452
Traffic flow obstruction	1.4884	1.5	45	0.976

Table 16 shows differences in different age groups by different traffic offence types. Differences in age group among different traffic offences were found and there is statistically significant differences in cases of red light running (p-value=0.012<0.05) and failing to wear seat belt (p-value=0.000<0.05). Traffic offenders of older than 53 years showed statistically significant higher score in red light running (p-value=0.012). This result is in contrast to findings of (Retting , et al., 1999; Wilson, 1990) in which red-light runners are mostly younger than 30 years. Younger traffic offenders (24-29 years) showed higher score in failing to wear seat belt than other age groups and the difference is statistically significant at 5% significance level (p-value= 0.00<0.05). This result is supported by (Wilson, 1990; A.N, et al., 2017).

Table 16 Differences in traffic offences among age of traffic offenders (ANOVA output)

Traffic offence types	Mean of Age Categories							F	P-value
	18-23	24-29	30-35	36-41	42-47	48-53	>53		
Speeding	1.461	1.415	1.41	1.1111	1.33	----	1.000	.711	.586
Red light Running	1.281	1.733	---	1.7222	1.33	-----	2.000	3.49	.012*
Illegal Parking	---	1.909	1.26	---	---	---	1.000	2.11	0.13
Overloading	---	2.3	2	---	---	----	---	0.07	0.79
Disrespecting Traffic signal	-----	-----	1.41	1.5455	1.00	----	----	0.58	.566
Failing to wear seat belt	1.000	1.666	1.00	----	----	----	----	17.3	0.00*
No priority for pedestrians	1.3	2.001	----	----	-----	1.363	-----	0.91	0.41
Disrespecting police order	1.000	1.750	----	----	-----	----	-----	2.22	0.16
Traffic flow obstruction	1.636	1.600	1.35	1.000	----	----	----	0.66	0.58

The differences in traffic offences by job of traffic offenders were shown in the table 17 by using one way ANOVA. Statistically significant differences were found in cases of red light running (p-

value=0.003<0.05), failing to respect traffic signals (p-value=0.02<0.05) and traffic flow obstructions (p-value=0.008<0.05). Private workers showed higher score in red-light running and the difference is significant. Drivers and government workers have higher score in failing to respect traffic signals. Additionally, drivers have showed higher score in traffic flow obstruction which is statistically significant.

Table 17 Differences in traffic offences among traffic offenders job. (ANOVA results)

Traffic offence types	Mean for each Job Category					F	P-value
	Government	Private	Driver	Student	Others		
Speeding	-----	1.2647	1.3617	1.6250	-----	2.354	0.100
Red light Running	1.000	1.6364	1.6042	-----	-----	6.433	.003**
Illegal Parking	1.4167	1.4783	-----	-----	-----	0.034	0.854
Overloading	-----	2.6667	2.1111	-----	-----	0.355	0.564
Failing to respect Traffic signals	2.0000	1.3158	2.000	-----	-----	4.740	0.02*
Failing to wear seat belt	1.0909	1.0833	-----	-----	-----	0.004	0.952
No priority for pedestrians	1.000	1.000	1.4211	-----	1.000	0.595	0.626
No priority for vehicles	1.400	1.500	1.400	-----	-----	0.015	0.985
Failing to respect traffic police order	1.000	1.000	1.600	-----	-----	0.656	0.542
Traffic flow obstruction	-----	1.000	1.6389	-----	-----	7.622	0.008**

In the following table 18 differences in different traffic offences were found among different marital statuses. Mean number of traffic offences and F-values were calculated. The corresponding p-value for each traffic offence type with their statistical meaning were indicated. Statistically significant differences were found for speeding (p-value=0.022<0.05) and overloading (p-value=0.006<0.05). Traffic offenders who are in friendship ship has showed higher score in speeding and offenders who are singles showed higher in overloading and the difference is statistically significant. This might be due to their assumption that driving is not dangerous activity, the danger and the risk involved is not perceived to be directly applicable to individual at personal level. Further, young male drivers over rate their driving skills (Roni, 2018).

Table 18 Differences in traffic offences among different marital statuses (ANOVA results)

Traffic offence types	Mean for Marital status Categories				F	P-value
	Married	Single	In friendship	Widowed		
Speeding	1.593	1.3636	2.000	1.000	1.490	0.022*
Red light Running	1.593	1.3636	2.000	2.000	2.422	0.074
Illegal Parking	1.516	1.000	1.000	-----	0.544	0.586
Overloading	1.666	5.000	3.500	-----	9.516	0.006**
Failing to respect Traffic signals	1.454	1.000	2.000	-----	0.97	0.396
No priority for pedestrians	1.363	1.400	1.00	-----	0.279	0.759
No priority for vehicles	1.363	2.000	-----	-----	0.817	0.387
Failing to respect traffic police order	1.000	1.333	1.000	-----	.141	0.871
Using mobile while driving	1.6667	1.700	2.000	-----	0.042	0.959
Traffic flow obstruction	1.6087	1.3478	2.000	-----	1.017	0.370

Table 19 below shows differences in traffic offences by education level of traffic offenders. Differences in mean number of traffic offences were found in all education level but not statistically significant differences were found among the level except for traffic flow obstruction which is statistically significant at 5%. Traffic offenders with primary education only showed higher score on traffic flow obstruction ($p\text{-value}=0.032<0.05$). Traffic flow obstruction includes activities of drivers on road that causes the disturbance to the flow of traffic. For example it includes closing roads, illegal changing lanes, stopping inner-lane, preventing other drivers from passing and cutting in too close in front of vehicle being overtaken. This might be due to their inability to come up with informatory and regulatory road marks. But results of study by (Roni, 2018) showed that less educated drivers were mostly involved in failing to wear safety devices.

Table 19 Differences in traffic offences among different education level (ANOVA results)

Traffic offence types	Mean for Education categories				F	P-value
	Primary	Secondary	Diploma	Degree		
Speeding	1.5417	1.2889	1.5833	1.0833	2.560	0.059
Red light Running	1.000	1.500	-----	1.6364	0.701	0.500
Illegal Parking	1.0909	1.4167	-----	1.8333	2.004	0.151
Overloading	-----	2.500	2.125	-----	0.189	0.673
Not respect Traffic signals	-----	-----	1.4167	1.500	0.155	0.698
Failing to wear seat belt	-----	1.0909	1.0833	-----	0.004	0.952
No priority for pedestrians	1.400	1.400	-----	1.2857	0.248	0.624
No priority for vehicles	1.000	1.6667	1.500	1.500	0.48	0.705
Not respecting traffic police	1.000	1.000	1.375	-----	0.214	0.811
Mobile phone While driving	-----	-----	1.6667	1.7273	0.18	0.895
Traffic flow obstruction	1.6667	1.625	-----	1.000	3.744	0.032*

Comparing driving experiences of traffic offenders, differences in traffic offences were noticed even though this differences are not statistically significant except for speeding and red light running. Traffic offenders with 3-5 years of diving experience have showed significant higher score in speeding (p-value=0.036) and traffic offenders with 11-15 years of driving experience have showed higher and statistically significant difference at 0.05 (with p- value of 0.036<0.05 and 0.004<0.05) score in red light running (p-value=0.004). This finding is also supported by (Liew, et al., 2016). Novice drivers have showed higher score in traffic flow obstruction but, the difference is not statistically significant at 5% significance level.

Table 20 Differences in traffic offences among driving experiences of traffic offenders

Traffic offence types	Mean for Driving Experience Categories					F	P-value
	0-2	3-5	6-10	11-15	>15		
Speeding	1.421	1.9774	1.3182	-----	1.5455	-2.748	0.036*
Red light Running	1.285	1.3913	1.7727	2.000	-----	4.815	0.004**
Illegal Parking	-----	1.000	1.5517	1.000		0.891	0.420
Overloading	-----	2.00	-----	-----	3.00	1.25	0.29
Failing to respect Traffic signals	-----	1.500	1.4545	-----	1.333	0.115	0.892
No wear seat belt	1.090	1.0909			1.000	0.043	0.958
No priority for pedestrians	-----	1.400	1.300	-----	1.500	0.173	0.843
No priority for vehicles	1.363	-----	-----	-----	2.000	0.817	0.387
Using Mobile phone While driving	1.000	1.5333	2.1429	-----	-----	1.009	0.382
Traffic flow obstruction	1.750	-----	1.4138	-----	1.500	0.678	0.513

In table 21 below, Vehicle with 0-5 years of service and 6-10 years of service have showed higher scores in red light running. This difference was statistically significant at 5% ($P\text{-value}=0.001<0.05$). Further newer vehicles showed higher score in speeding but not significant. This result is in line with results of (B, et al., 1991). On the other hand, vehicles with service of 11-15 years showed higher score in mobile phone using while driving and this difference was statistically significant at 5% ($p\text{-value}=0.046<0.05$). New vehicles with 0-5 years of service have showed higher scores but not statistically significant difference on red light running which might be due to the vehicles' operating efficiency, overloading and traffic flow obstruction. In contrast to study by (Roni, 2018) older vehicles were not ticketed for failing to wear seat belt.

Table 21 Differences in traffic offences among vehicle service year of traffic offenders

Traffic offence types	Mean for vehicle service year categories					F	P-value
	0-5	6-10	11-15	16-20	>20		
Speeding	1.66	1.391	1.500	1.11	1.083	1.28	0.281
Red light Running	1.66	1.782	1.000	1.000	1.416	5.02	0.001**
Illegal Parking	-----	-----	1.000	1.166	1.625	1.34	0.274
Overloading	2.44	1.500	2.250	-----	-----	0.36	0.703
Disrespecting Traffic signals	1.33	1.500	-----	-----	1.000	0.54	0.590
Failing to wear seat belt	1.08	1.090	-----	-----	-----	0.00	0.952
No priority for pedestrians	-----	1.363	1.250	1.428	-----	0.15	0.858
No priority for vehicles	1.00	2.000	1.000	1.375	-----	0.71	0.569
Using Mobile phone While driving	-----	-----	2.750	1.142	1.666	3,60	0.046*
Traffic flow obstruction	1.62	1.666	1.000	1.000	-----	2.43	0.077

Table 22 shows differences in traffic offences by vehicle type. Differences in traffic offences were statistically significant for overloading and failing to give priority for vehicles. Taxis showed higher score in overloading and failing to give priority for vehicles. The difference in mean score is statistically significant at 5% for both over loading and failing to give priority for vehicles (p -value=0.032<0.05) and (p -value=0.004<0.05). Taxi is characterized by providing transport service for peoples in the city frequently in addition to other public transportations. Hence, they engage in overloading practices most the time. Therefore, this might be the reason behind this result. In addition, taxi drivers have work related effects in which they reported higher crash involvement in their work (per kilometer travelled) than their personal vehicle and engage in variety of less safe driving behaviors than general driving population (Downs, et al., 1999; B, et al., 1991). Hence, they also engage in many aggressive driving like failing to give priority for vehicles.

Table 22 Differences in traffic offences among vehicle types (ANOVA results)

Traffic offence types	Means for vehicle type categories						F	P-value
	Taxi	Minibus	Bus	Car	Automo	Heavy		
Speeding	2.694	2.500	2.500	1.000	-----	-----	0.414	0.473
Red light Running	1.578	1.3529	-----	-----	1.5625	1.5556	0.621	0.604
Illegal Parking	1.900	1.300	-----	1.200	-----	-----	1.721	0.195
Overloading	3.200	-----	1.571	-----	-----	-----	6.182	0.032*
Failing to respect Traffic signals	1.600	-----	-----	1.375	1.4545	-----	0.282	0.757
Failing to wear seat belt	1.083	-----	1.000	1.200	-----	-----	0.637	0.539
No priority for pedestrians	1.400	1.333	-----	1.333	-----	-----	0.045	0.956
No priority for vehicles	2.500	-----	-----	-----	-----	1.200	13.41	0.004*
Failing to respect traffic police order	1.000	-----	-----	1.333	-----	-----	0.312	0.588
Traffic flow obstruction	1.642	1.000	1.500	-----	1.6667	-----	2.23	0.98

In the following table 23 differences in traffic offences by salary of traffic offenders were shown. Differences in traffic offences is statistically significant for speeding and red light running among salary categories at 5% significance level. Traffic offenders whose monthly income was in medium income showed higher score in speeding (p-value=0.001) and drivers of low socio-economic traffic offenders showed higher in failing to wear seat belt. This result is inconsistent with findings of (Roni, 2018). On the other hand this group showed no score in red light running. Traffic offenders

with income of 3001ETB-4500ETB have higher score in red light running and the difference is statistically significant (p-value=0.015).

Table 23 Differences in traffic offences income level of traffic offenders (ANOVA results)

Traffic offence types	Means for Salary Categories					F	P-value
	<1500	1501-3000	3001-4500	4501-6000	>6000		
Speeding	1.833	1.2353	1.133	1.916	1.425	4.8	.001**
Red light Running	-----	1.3571	1.733	-----	1.346	4.4	0.015*
Illegal Parking	-----	1.00	1.277	-----	1.785	1.6	0.203
Overloading	-----	2.1667	-----	-----	2.333	0.0	0.843
Failing to respect Traffic signals	1.500	1.333	1.667	-----	1.333	0.3	0.794
Failing to wear seat belt	-----	1.200	1.083	-----	1.00	0.6	0.539
Failing to give priority for pedestrians	-----	1.1818	1.667	-----	1.500	1.7	0.202
Failing to give priority for vehicles	-----	1.667	-----	-----	1.166	1.8	0.209
Failing to respect traffic police order	-----	1.000	1.333	-----	-----	0.3	0.588
Using Mobile phone While driving	-----	1.500	2.000	-----	-----	1.2	0.281
Traffic flow obstruction	-----	1.619	1.35	1.500	-----	0.7	0.497

Therefore, medium income traffic offenders were highly involved in speeding and red light running than other income classes, the difference is statistically significant.(p-value=0.001<0.05) for speeding and (p-value=0.015<0.05) for red light running.

4.2.3 Road Traffic Crashes and Traffic offences Relationship

4.2.3.1 Crash involvement

In this study, 14.3% of traffic offenders under study reported crash involvement in the previous year (mean =1.897) and (std. deviation=0.532) with serious only (8.8%), slight (34%), property damages only (50.9%) and 6.23% others. No respondent reported that he/she involved in fatal crash. This result shows positive association of traffic offences and road traffic crashes and it is also in line with findings of (Asefa, et al., 2015; Goldenbelg , et al., 2013; Simon & David, 2015; Mohammed , et al., 2016).

Table 24 Responses on crash involvement

Have you involved in crashes?		Frequency	Percent	Cum. Percent
Valid	Yes	55	14.3	14.3
	No	283	73.5	87.8
	I do not know	45	11.7	99.5
	Refused	2	.5	100.0
	Total	385	100.0	

Table 25 Responses on type of road traffic crashes

What type of road traffic crashes?		Frequency	Percent
Valid	Slight Crashes	131	34.0
	Property damages only	196	50.9
	Serious only	34	8.8
	Fatal	0	0
	Others	24	6.23
Total		385	100.0

The association between crash involvements and different variables were analyzed by non-parametric correlation (chi-square test). It was hypothesized that there is no associations between driver characteristics, vehicle characteristics and road traffic crash involvement in crashes.

From proportion (table-26), traffic offenders of 24-29 years and private and students job category has the significant higher score in crash involvement. Hence, the null hypothesis is rejected. In case

of gender, there is also an association between gender and crash involvement but there is no significant difference between both genders in crash involvement. This result is supported by (Peter F, et al., 1999). From proportion, male showed higher involvement in traffic crashes than female and the association is not significant at 5%. A possible reason behind this result might be due to the fact that male drivers has more number of kilometers driven as compared to female drivers and number of female drivers is significantly lower than the numbers of male drivers in addition to their varying driving behavior. Sudden reactions of male to events, their nervousness as well as their desire to prove themselves through their driving skills create a basis for crashes This result is in line with results of study by (Schmitz, et al., 2014) in which men are more likely to violate traffic laws and ultimately becoming involved in crashes. (Center, 2004).

From the analysis, associations between age and crash involvements were found and it is statistically significant at 5% significance level. The age group 24-29 years showed higher score in crash involvement than other age groups. This is because youngest age groups have higher exposure to road environment than elderly groups. This is in line with results of (Sayyed, et al., 2017; A.F & O, 1989; Burgut, et al., 2010) in which youths aged 18-25 years old have higher risk of driving violations and crash involvements.

Clearly, driving is a complex activity and includes cognitive, visual and bodily processes. Moreover, the ability to drive safely and skillfully is a process that takes 8 to 9 years (Sayyed, et al., 2017), older people are more experienced and cautious than young drivers. So, they exhibit self-control behavior that leads to better risk estimation while driving In addition, that younger drivers under estimate risks, overestimate their abilities, disobey traffic laws and believe that traffic violation are socially acceptable (Forward, 2010). With regard to job of traffic offenders again statistically significant associations in job and crash involvements were found. Private and student job category showed significant higher score in involvements of road traffic crashes. Associations of crash involvements and marital status, were also found and it is statistically significant. Widowed and single traffic offenders showed higher in traffic crash involvements

In table 26, the association using chi-square was tested for the association of education level of traffic offenders, driving experience, their license level and licensing body and involvement in road traffic crashes was tested and showed an association in all the factors. Traffic offenders with first degree and above, novice drivers with 0-2 years of driving experience, license level one, Amhara

region licensed traffic offenders have showed higher proportion of involvement in road traffic crashes. This finding is against the findings of (Liew, et al., 2016; Pierluigi, et al., 2016) in case of driving experience, gender and crash involvements and supported by results of (Sayyed, et al., 2017) in cases of drivers with degree and above education level.

With regards to marital status and crash involvement, widowed traffic offenders showed significant difference in involvement of road traffic crashes (p-value=0.00). This might be due to the cause that divorce may be a potentially stressful life event that might leave some individuals temporarily anticipated to operate vehicles safely and supported by (Augustine & Michele, 1998; Kristina, et al., 2014).

In table 26, Chi-square test showed a statistically significant association in all the variables and road traffic crashes. From the analysis it was found that new vehicles with 0-5years, buses and cars, vehicles coded three, privately vehicles showed higher score in involvement of road traffic crashes.

Table 26 Non-Parametric test for association of age, gender, job, marital status and crash involvements, (Chi-square results).

Socio-Demographic characteristics of traffic offenders	Is there traffic crashes when you violate Traffic Laws?				Statistics	
	Yes	No	I do not know	Refused	Chi-Square	P-value
Age					113.36	0.000*
18 - 23 years	15(0.14%)	90	1	0		
24- 29 years	21(0.18%)	71	24	0		
30 - 35 years	13(0.13%)	72	17	0		
36-41 years	4(0.13)	26	0	0		
42-47 years	1(0.13%)	8	0	0		
48-53 years	0	5	4	2		
>53 years	1(0.1%)	10	0	0		
Gender					5.522	0.137
Male	43(0.13%)	245	43	2		
Female	12(0.23%)	37	3	0		
Job					24.153	0.004*
Government	3(0.06%)	29	14	0		
Private	21(0.17)	91	14	0		
Driver	25(0.14%)	132	18	2		
Student	6(0.17%)	30	0	0		
Marital Status					30.151	0.000*
Married	30(0.13%)	155	40	2		
Single	23(0.16%)	117	2	0		
In friend ship	0	6	1	0		
Widowed	2(0.22%)	4	3	0		

Table 27 Non-Parametric test for association of Education level, Driving experience, Salary, Licensing body and crash involvements,

Socio-Demographic characteristics of traffic offenders	Is there traffic crashes when you violate Traffic Laws?				Statistics	
	Yes	No	I don't know	Refused	Chi-Square	P-value
Education Level					67.627	0.00*
Primary	7(0.1%)	61	2	0		
Secondary and Preparatory	26(0.13%)	135	26	0		
Diploma	1(0.02%)	27	17	2		
First Degree and above	21(0.25%)	59	1	0		
Driving Experience					34.865	0.000
0-2 years	16(0.22%)	53	1	0		
3-5years	23(0.15%)	114	14	0		
6-10years	8(0.06%)	85	28	2		
11-15 years	1(0.25%)	3	0	0		
>15years	7(0.18%)	27	3	0		
Salary					32.083	0.001
<1500 ETB	6(0.33%)	12	0	2		
1501-3000ETB	20(0.2%)	69	12	0		
3001-4500ETB	16(0.15%)	92	26	0		
4501-6000ETB	0	18	0	0		
>6000ETB	13(0.12%)	91	8	0		
Licensing Body					87.276	0.000
Oromia Region	14(0.21%)	51	3	0		
Addis Ababa City	16(0.06%)	175	42	2		
Amhara Region	9(0.75)	3	0	0		
Tigray Region	8(0.33%)	15	1	0		
South Nations and Nationalities	2(0.06%)	32	0	0		
Others	6(0.6%)	6	0	0		

Table 28 Non-Parametric test for association of Vehicle service year, Vehicle type, code of vehicle, owner of vehicle, weekly km travelled and crash involvements (Chi-square results)

Socio-Demographics characteristics of traffic offenders	Is there traffic crashes when you violate Traffic Laws?				Statistics	
	Yes	No	I don't know	Refused	Chi-Square	P-value
Vehicle Service Year					41.428	0.000
0-5years	23(0.22%)	59	24	0		
6-10years	12(0.12%)	82	8	2		
11-15years	2(0.07%)	27	0	0		
16-20years	10(0.16%)	51	1	0		
>20years	8(0.11%)	63	13	0		
Vehicle Type					29.847	0.012
Taxi	22(0.16%)	82	21	1		
Minibus	4(0.05%)	62	10	1		
Bus	7(0.28%)	17	1	0		
Car	11(0.25%)	26	6	0		
Automobile	11(0.11%)	77	8	0		
Heavy vehicles	0	18	0	0		
Code of Vehicle					35.179	0.000
Code 1	1(0.02%)	36	11	0		
Code 2	19(0.15%)	106	4	0		
Code 3	25(0.18%)	91	22	0		
Code 4	7(0.16%)	31	7	1		
Others	3(0.13%)	18	2	1		
Owner of Vehicle					35.821	0.000
Private	54(0.15%)	251	32	2		
Government	1(0.03%)	19	14	0		
Other Organization	0	12	0	0		
Weekly km travelled					39.267	0.001
<50km	2(0.17%)	7	3	0		
50-100km	8(0.47%)	11	0	0		
101-150km	7(0.23)	24	0	0		
151-200km	4(0.07%)	52	1	0		
201-250km	25(0.15%)	113	24	2		
>250km	9(0.1%)	75	18	0		

4.2.4 Attitudes towards road traffic safety

4.2.4.1 Gender related attitudes towards Road Safety

Differences were shown in attitudes towards speeding between male and female in the analysis. Interestingly, male traffic offenders believe that speeding is an extremely serious threat to road traffic safety. Female traffic offenders were also believed that speeding is either very serious threat (49.8%) to traffic safety or an extremely serious traffic safety (50.2%). Therefore, both male and female traffic offenders have less permissiveness towards speeding.

Table-29 Responses of Traffic offenders on selected unsafe driving behaviors by gender

How serious threat to road safety		Gender			
		Male	%	Female	%
Speeding is?	Extremely serious threat	167	50.2	29	55.8
	Very serious threat	166	49.8	23	44.2
Red-light running?	Extremely serious threat	242	72.6	37	71.2
	Very serious threat	91	27.4	15	28.8
Using phone while driving is?	Extremely serious threat	215	64.5	44	84.6
	Very serious threat	106	31.8	8	15.4
	Moderately serious threat	12	3.7	0	0
Driving without using seat belt is?	Extremely serious threat	218	65.4	38	73.1
	Very serious threat	103	31	14	26.9
	Moderately serious threat	12	3.6	0	0
Drink driving is?	Extremely serious threat	314	94.3	48	92.3
	Very serious threat	19	5.7	4	7.6

Comparing attitudes towards mobile phone using while driving by gender, 64.5% of male respondents replied that it is an extremely serious threat to road traffic safety and 31.8% very serious threat and 3.6% moderate threat. But, in case of female respondents, 84.6% replied that it is an extremely serious threat to road traffic safety. Similarly, attitudes towards driving without seat belt, 73.1% of female respondents replied that driving without wearing seat belt is an extremely serious threat to road traffic safety which is higher in proportion than male respondents answer.

Generally, females have a negative attitude towards mobile phone using while driving and driving without wearing seat belt than their male counterparts.

4.2.4.2 Age related attitudes towards Road Safety

Differences in attitudes towards traffic safety by age group also of important concern. The differences in attitude may vary based on the type of road traffic safety element. The analysis of this study showed that as age increases the negative attitudes towards speeding increases except for the age group 36-41. Older respondents were the age group who responded that speeding is an extremely a serious threat to road traffic safety among all of them and the age group 36-41 were the least with 37.9% replied that speeding is an extremely serious threat to road traffic safety.

An attitudes towards red light running showed an irregular pattern among the respondents. But, it was seen as a good thing that all of the respondents replied that red light running is either an extremely serious threat to traffic safety (72.5%) or very serious threat to traffic safety (27.5%).

The analysis regarding attitudes towards mobile phone using while driving showed that as age of respondent's increased, the more negative attitudes they have. Different age groups also have varying attitudes towards driving without wearing seat belt. Among the respondents 96.9% of them replied that driving without wearing seat belt is either an extremely serious threat (66.5%) to road traffic safety or is a very serious threat (30.4%) to road traffic safety. But, the attitude has an irregular pattern with age groups.

With regard to drink driving, in the analysis it is showed that almost the same negative response towards drink driving except for 36-41 years age group who replied that drink driving is a very serious threat to road traffic safety (23.7%). All the other age group responded that it is an extremely serious threat to road traffic safety.

Table 30 Responses of Traffic offenders on selected unsafe driving behaviors by their age

How serious threat to road safety		Age (years)						
		18 - 23	24- 29	30 - 35	36-41	42-47	48-53	above 53
Speeding is?	Extremely serious	36	64	65	23	6	0	2
	Very serious threat	77	50	36	10	5	8	3
Drink driving is?	Extremely serious	112	114	79	33	11	8	5
	Very serious threat	1	0	22	0	0	0	0
Red light running is?	Extremely serious	72	96	69	25	8	8	1
	Very serious threat	41	18	32	8	3	0	4
Using phone while driving?	Extremely serious	67	73	78	29	8	0	4
	Very serious threat	36	40	23	3	3	8	1
	Moderately serious	10	1	0	1	0	0	0
Driving without using seat belt?	Extremely serious	76	89	67	8	7	8	1
	Very serious threat	36	25	23	25	4	0	4
	Moderately serious	1	0	11	0	0	0	0

4.2.5 Other Socio-demographic, socio-economic and travel history on attitudes towards road traffic safety

I. Education

In addition to gender and age, differences in education level could also result in differences in attitudes towards road traffic safety. For this study, education level was classified into five groups based on the highest level of education of the respondent possesses (the groups with their proportion was shown in the descriptive table). Respondents with first degree and above fully opposed speeding by replying that speeding is an extremely serious threat to road traffic safety. All respondents replied that speeding is at least moderate threat to road traffic safety with major share by respondents with primary education level. Speeding is extremely serious threat to road traffic

safety for primary, Secondary and preparatory, diploma and first degree and above with 51.4%, 58.1%, 74.5% and 100% respectively. From this result in can be concluded that as education level increases the attitude towards speeding decreases.

Regarding Red light running, similar pattern was observed in attitudes towards red light running by education level of traffic offenders as in case of speeding except for respondents with first degree and above with less threat attitude than diploma holders. 100% of diploma holders and 85.2% of first degree and above holders replied that red light running extremely affects road traffic safety.

Table 31 Responses of Traffic offenders on selected unsafe driving behaviors by education level

How serious threat to road safety?		Education level			
		Primary	Secondary and Preparatory	Diploma	Degree and above
Speeding is?	Extremely serious threat	35	68	24	69
	Very serious threat	35	119	23	12
Red-light running is?	Extremely serious threat	47	116	47	69
	Very serious threat	23	71	0	12
Drink driving is?	Extremely serious threat	59	187	47	69
	Very serious threat	11	0	0	12
Using phone while driving is?	Extremely serious threat	36	129	36	58
	Very serious threat	22	58	11	23
	Moderately serious threat	12	0	0	0
Driving without using seat belt is?	Extremely serious threat	59	128	23	46
	Very serious threat	11	59	12	35
	Moderately serious threat	0	0	12	0

II. Marital Status

The distinctive attitudes towards speeding would also be affected by the respondent's marital status. The marital status was classified as married, single, in friendship and widowed.

The respondent's answer against the threat of speeding to road traffic safety by marital status varied significantly. From all classes of marital status, widowed traffic offenders answered that speeding is an extremely serious threat to road traffic safety with 77.8%. followed by single traffic offenders. Traffic offenders who were married were answered that it is an extremely serious threat (75%) and very serious threat (25%) to road traffic safety. Speeding was moderately serious threat to road traffic safety only by single traffic offenders. Therefore speeding was an extremely serious threat to road traffic safety for widowed married single and in friendship with 77.8%, 75%, 61.8% and 57.1% respectively.

Over all, all respondents replied that red light running was either an extremely serious threat to (72.5%) or very serious threat (27.5%) to road traffic safety.

Attitudes towards red light running, drink driving, Mobile phone using while driving, failing to wear seatbelt and others were summarized in table-32

Table 32 Responses of Traffic offenders on selected unsafe driving behaviors by marital status

How serious threat to road safety		Marital status			
		Married	Single	In friendship	Widowed
Speeding is?	Extremely serious threat	116	67	5	8
	Very serious threat	117	69	2	1
Red-light running?	Extremely serious threat	163	103	6	7
	Very serious threat	70	33	1	2
Using phone while driving is?	Extremely serious threat	143	102	6	8
	Very serious threat	90	22	1	1
	Moderately serious threat	0	12	0	0
Driving without using seat belt is?	Extremely serious threat	136	114	4	2
	Very serious threat	88	22	3	4
	Moderately serious threat	9	0	0	3
Drink driving is?	Extremely serious threat	212	136	5	9
	Very serious threat	21	0	2	0

III. Driving Experience

Driving experience is also another factor varying attitudes towards road traffic safety. Speeding is either an extremely serious threat (75.7%) or very serious threat (24.3%) to road traffic safety by all of the respondents. All Respondents with 11-15 years of driving experience replied that speeding is an extremely serious threat to road traffic safety.

Attitudes of respondents towards red light running increased as driving experience increased except for respondents with greater than 15 years of driving experience. All respondents replied that red light running is either an extremely serious threat (72.5%) to or a very serious threat (27.5%) to road traffic safety. Like in case of speeding all respondents with 11-15 years driving experience replied that red light running is an extremely serious threat to road traffic safety.

Attitudes of traffic offenders towards drink driving, driving without wearing seat belt, mobile phone using while driving were summarized in table-33.

Table 33 Responses of Traffic offenders on selected unsafe driving behaviors by driving experience

		Driving experience				
		0-2 years	3-5years	6-10years	11-15	>15years
How serious threat to road safety						
Speeding is?	Extremely serious threat	32	76	68	4	16
	Very serious threat	38	75	55	0	21
Red-light running is?	Extremely serious threat	43	118	90	4	24
	Very serious threat	27	33	33	0	13
Drink driving is?	Extremely serious threat	59	149	118	0	36
	Very serious threat	11	2	5	4	1
Using phone while driving is?	Extremely serious threat	52	100	81	4	22
	Very serious threat	18	51	31	0	14
	Moderately serious threat	0	0	11	0	1
Driving without using seat belt is?	Extremely serious threat	52	110	67	4	23
	Very serious threat	18	41	44	0	14
	Moderately serious threat	0	0	12	0	0

IV. Job

Attitudes towards road traffic safety was collected with respect to the respondent’s job. Drivers showed less towards the threat of speeding (59.9% replied an extremely serious threat to road traffic safety) as compared to government workers (76.1% replied speeding is an extremely serious threat to road traffic safety) and private workers (73% replied that speeding is an extremely serious threat to road traffic safety).

All of the government private workers and students replied that red light running is an extremely serious threat to road traffic safety. Surprisingly, It was only drivers who replied that red light running is an extremely serious treat to road traffic safety (40.1%) and very serious threat to road traffic safety with 59.9%. Generally, the threat of red light running showed less in drivers as compared to other respondent’s job.

Table 34 Responses of Traffic offenders on selected unsafe driving behaviors by job categories

How serious threat to road safety		Job				
		Government	Private	Driver	Student	Others
Speeding is?	Extremely serious threat	46	90	60	0	0
	Very serious threat	0	36	118	35	0
Red-light running is?	Extremely serious threat	46	126	72	35	0
	Very serious threat	0	0	106	0	0
Drink driving is?	Extremely serious threat	34	115	178	35	0
	Very serious threat	12	11	0	0	0
Using phone while driving is?	Extremely serious threat	24	103	97	35	0
	Very serious threat	22	23	69	0	0
	Moderately serious threat	0	0	12	0	0
Driving without using seat belt is?	Extremely serious threat	23	103	106	24	0
	Very serious threat	11	23	72	11	0
	Moderately serious threat	12	0	0	0	0

V. Weekly kilometers travelled

Attitudes towards road traffic safety by individuals travelling history in one typical week in past 12 months was collected. Typical Week kilometers travelled in typical week was classified into six categories as (George, et al., 2012). Respondents with less weekly kilometer travelling replied higher threat of speeding (83.3% replied speeding is an extremely serious threat to road traffic safety) of speeding to road traffic safety. Less threat as compared to other category of weekly kilometer travelled was answered in respondents travelling more than 250km. Therefore, the analysis showed that as travelling distance increases, the negative attitude towards speeding increases except for respondents driving 201-250km weekly.

The attitudes of respondents towards red light running also showed differences across their weekly driving history. All respondents who drive less than 50km weekly responded that red light running is an extremely serious threat to road traffic safety. But, it is only 58.1% and 67.6% of respondents who replied that red light running is an extremely serious threat to road traffic safety by 101-150km and greater than 250km weekly travelers respectively.

Generally, attitudes towards red light running by travelling history showed an irregular pattern within the six categories.

Table 35 Responses of Traffic offenders on selected unsafe driving behaviors by weekly km travelled

How serious threat to road safety		Weekly km travelled					
		<50km	50-100km	101-150	151-200	201-250	>250km
Speeding is?	Extremely serious threat	8	6	11	29	91	51
	Very serious threat	4	13	20	28	73	51
Red-light running is?	Extremely serious threat	12	18	18	41	121	69
	Very serious threat	0	1	13	16	43	33
Drink driving is?	Extremely serious threat	11	16	31	57	158	89
	Very serious threat	1	3	0	0	6	13
Using phone while driving is?	Extremely serious threat	6	13	23	45	102	70
	Very serious threat	5	6	8	12	52	31
	Moderately serious threat	1	0	0	0	10	1
Driving without using seat belt is?	Extremely serious threat	11	11	16	33	114	71
	Very serious threat	0	8	15	23	49	22
	Moderately serious threat	1	0	0	1	1	9

4.3 DISCUSSIONS

Finding of this study reveals that in the city, there exists large disrespect for traffic rules among motorists and traffic offences are increasing from year to year by 10.7% over 3 years. Overall, 154,336 were registered. The most common types of traffic violations in the city are traffic flow obstruction (12.9%), disrespecting prohibited traffic signs (11.3%), parking on prohibited road areas (8.5%), overloading (8.2%) and driving while using mobile phone (7.9%) and these cover about 48.8%. This finding was supported by (Wang, et al., 2015; Emenike & D.N.Akpu, 2017; Flieter, et al., 2013). But, in cases of speeding, which is the most common traffic offence by (Emenike & Akpu, 2017; Kashona & Pazvakwambwa, 2014). But, which is not recorded in the city and hence, shows poor speed enforcement in the sub-city.

Results show that there is difference in involvement of traffic offences by gender and male (95.6%) were overrepresented in traffic offences. This indicates that male drivers are more violating traffic rules and regulations than female drivers. This might be due to the cause that professional driving jobs are dominated by male drivers. It is worth nothing that female involvement in paid employment (or self-employment) is low in Ethiopia (Vogt, 1999). In addition, Kilometers travelled per annum by women as drivers are most probably lower than men. This result is supported by (Iew, 2017; Kashona & Pazvakwambwa, 2014; Tova, et al., 2009; Viktorija & Renge, 2011; Hennessy & Wiesenthal, 2002).

With respect to age, the age group of 31-50 years, shares almost about half of the traffic offences under study with 49.1% but this share is less than their corresponding share in licensed driver's population. Whereas, the age group of 18-30 year shares 35.8% which is much higher than their corresponding driver population share. Therefore, drivers within age groups of 18-30 were most prone to traffic offences than other age categories. This seems to suggest that young age drivers are more reckless drivers, over-estimate their driving skills; under-estimate the risk and are often caught on wrong side of the traffic law. This result is in line with (Viktorija & Renge, 2011; Kashona & Pazvakwambwa, 2014; Celu Satiskmes Negadijumu Lativija, 2009). From their proportion the second offending age category were drivers who are above 50 years of age.

Results on comparison of traffic offences by license level of drivers and license level population shows that license level 4 (Public-2, Derek-2 and Fesash-1), 5 and license level-6 (Public-2, Derek-2 and Fesash-1) were more involved in traffic offences than other types of license level.

Monthly variation of traffic offences over the three years indicates that traffic offences shows that the highest number of traffic offences in December with 16,711 traffic offences and the lowest in months of May (7,346), October (10,078) and April, (10,348) traffic offences.

When analyzing traffic offences by codes of vehicles, Code 3 vehicles and code 2 vehicle share more than 75% of total traffic offences in the sub city. Vehicles coded 1 are more involved in traffic offences than other vehicle types. These vehicles were Taxi, engaged in transportation of public and any other business activities in the city and hence, they have more kilometers of travel daily. Therefore, their exposure to traffic law violation increases as their kilometer travelled increases and involved in 22.4% of total traffic offences. This result is supported by (Emenike & Akpu, 2017).

The second most offending vehicle type was Vehicles coded 5. In contrast, from comparison, government vehicles, coded 4 and vehicles represented by others i.e coded with symbols like Transferrable, UN, DC, ፖሊስ and etc. are less involved in traffic offences.

Results from t-test reveals that men showed higher score in all types of traffic offences under study except traffic flow obstruction. Further, men showed higher score in speeding (p-value=0.002<0.05), illegal parking (p-value=0.011<0.05), overloading (p-value=0.016<0.05) and failing to give priority for pedestrians (p-value=0.036<0.05) and it is statistically significant and this finding is also supported by (Liew, et al., 2016; Corbett & Caramlau, 2006; Stradling, et al., 2003). Mean speeding score decreases as age increased and this result is in line with findings of (Stradling, et al., 2003). Traffic offenders who are in friendship ship has showed higher score in speeding and offenders who have 3-5year driving experience has showed higher score in speeding and the difference is statistically significant at 5%. In contrast to finding by (Broughton, et al., 2003), speeding was higher in medium weekly distance travelers and taxi vehicle types.

Red-light running is higher in offenders of age group 24-29 years and traffic offenders of older than 53 years. In addition, Private workers showed higher score in red-light running and the difference is significant at 5%. Traffic offenders with 11-15 years of driving experience have showed higher score in red light running. This finding is also supported by (Liew, et al., 2016). Vehicles with 6-10 service years also showed statistically significant higher mean score in red-light running.

Traffic offenders who are single showed higher in overloading and the difference is statistically significant (p-value=0.006<0.05). In addition, taxis showed higher score in overloading and

difference in mean score is statistically significant at 5%, ($p\text{-value}=0.032<0.05$). Traffic offenders with experience of 3-5 years showed statistically significant higher score in speeding ($p\text{-value}=0.036$) which is in contrast to findings of (Catchpole & Styles, 2005).

In consistent to study by (Sullman, 2014; Line, 2016), traffic offenders of 24-29 years showed higher (but not significant difference) score in mobile phone using while driving. This is because of that young drivers often drive recklessly and exceed speed limit to great extent which then leads to traffic crashes (Elander.J, et al., 1993). Further, traffic offenders with 24-29 years showed higher score (statistically significant, $p\text{-value}=0.012$) in red light running.

Traffic offenders with 24-29 years of age also showed statistically significant differences in case of failing to wear seat belt ($p\text{-value}=0.000$). In addition drivers with 0-2, 3-5 years of driving and drivers of cars showed higher score in failing to wear seat belt but the difference is not statistically significant at 5%. Experienced drivers with more than 3 years of driving showed statistically significant higher score in speeding ($p\text{-value}=0.036$) and red-light running ($p\text{-value}=0.004$). This finding is in agreement with those obtained by (L.S, et al., 2007) It seems possible that these results are due drivers are more sensitive to situational conditions that they were likely to behave in a manner that was congruent with the surrounding situation and individuals (Y, et al., 2014).

With respect to failing to respect traffic signals drivers of government vehicles showed statistically higher score ($p\text{-value}=0.02$) and Taxi vehicles also showed statistically significant difference in overloading($p\text{-value}=0.032$).

Results on associations of traffic crashes and traffic offences, about 14.3% of traffic offenders replied that they have involved in road traffic crashes with (8.8%), slight (34%), property damages only (50.9%), 6.7% others and no fatal. This result shows that there is an association between traffic offences and traffic crashes even though it is small and this is in line with (Alver, et al., 2014; Abdel-Aty, et al., 2012; Begg & Gulliver, 2008).

Results of Chi-square, tests of associations of driver and vehicle characteristics and crash involvements reveals that there is no statistically significant difference in gender. This result is in contrast to results of (Liew, et al., 2016). But, in the other variables like age, job, education level, driving experience, salary, vehicle service years, vehicle type and code, owner of vehicle and average weekly km travelled there is statistically significant association between variable groups

and crash involvements. Hence, 24-29 years of age, private workers, and first degree and above, 11-15 years of driving, new vehicles (0-5years), buses, code 3 and private vehicles have statistically significant association with traffic crashes at 5%. Study by (Liew, et al., 2016) revealed that no association of driving experience and road crashes and again result of this study contradicts the result.

Finally, attitudes of traffic offenders towards selected unsafe driving behaviors among traffic offenders were also reported that these unsafe driving were either extremely serious or very serious threat to road traffic safety. This means that they have negative attitudes towards unsafe driving behaviors but despite of this, they still do not completely translate into positive behaviors which is also supported by (Mizenko, et al., 2015; Akaateba & Richard , 2013).

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The conclusions of results from the present study analysis suggest the following;

- It seems that most of vehicles operating on Addis Ababa, Arada sub-city roads are not roadworthy and thus, it is advisable that AACRTMA and traffic police department should pay more attention on this area. Male drivers are overrepresented in the overall traffic offences in the sub city with 95.6% in (secondary data) and 86.5% in (primary data) of study. This is worrisome. More interventions and measures need to be applied which is enough to discourage traffic offences. Many drivers are still ignorant to traffic law and regulations. Therefore, road safety awareness need to be reinforced.
- Youth groups (18-30 years) were to blame for most of traffic offences compared to other groups,
- Taxi vehicles (code-1), code-5, license level 4,5 and 6 were more involved in traffic offences,
- Code 1, 5 and others (T, CD, UN, ET and police) vehicles showed higher involvement in risk factors of road traffic crashes.
- Traffic flow obstruction, disrespecting prohibited traffic signs, overloading, parking on prohibited areas, using mobile phone while driving were the most common traffic offences,
- There exists an association between driver, vehicle characteristics and road traffic crashes; male, 24-29 years old drivers, code-3(commercial vehicles) having degree and above education level, and novice drivers with 0-2 years of driving experience showed significant association with crashes,
- Male drivers, in friend-ship, with medium income, 3-5 years of driving and taxi drivers showed significant higher score in speeding,
- Private workers, 24-29 years old, in friend-ship, with medium income and experienced drivers showed significant higher score in red-light running,

- Traffic offenders highly oppose unsafe driving practices but do not comply. Hence special program should be made for regular traffic offenders.

The results of this study will provide Engineers, policy makers, Road and traffic management agencies with various interventions and applications. For example, enforcement such as cameras and radar which reduce speeding and red light running violations will have a protective influence on road traffic safety. From engineering perspective, application of speed reduction signs and markings would reduce speeding related crashes, better design of road infrastructures including provision of parking areas would reduce illegal parking violations and better design of traffic intersection signals could decline driver's temptations of red light running violations.

Finally, based on the findings, a special need to plan proper intervention to specific target groups and traffic violations are important in behavior modifications and towards the reduction of national crash rates. Nevertheless, the authorities and other organizations must have the same vision and committed in order to solve our nation's concern in context of road safety.

RECOMMENDATIONS

- Special concern should be made to specific target groups like the most Common traffic offences,
- Traffic management agencies, should give more emphasis on youths of 18-30 years of age,
- Traffic agencies in the city should enhance the enforcement of traffic rules and regulations and ensure that every vehicle plying the city's road is fixed with speed limiting devices, Blood alcohol test at every check points, Breath analyzers at different road sections of the city.
- AACRTMA should carry out more campaign on dangers inherent in non-compliance to traffic laws and regulations, introduce smart enforcement technologies, increased road safety inspections and compulsory refresher course for traffic offenders and enhance arrest of traffic offenders and psychiatric test carried out on regular traffic law and regulation offenders are recommended with enhanced collaborations and integrated inspection system.
- More attention should be done on road safety through educational campaigns to make road users know and understand the road traffic laws and regulations and develop road traffic infrastructures like traffic signals, parking areas and increasing public transportations.

Since road traffic offences are predictable and therefore preventable, it is hoped that this study will encourage and facilitate increased cooperation, commitment and innovation towards preventing traffic offences in the city through close coordination and collaboration using holistic and an integrated approach, across many sectors and many disciplines.

Further, the traffic offence database should capture important socio-demographic characteristics like age in small intervals, gender, education level, driving experience, marital status, employment status, time of day, etc. to enable meaningful and actionable insights to assist government, NGO and other associations in making better administration decisions.

STRENGTHS OF THE STUDY

This study has number of strengths

- 1) Mixed several statistical analysis, both descriptive analysis and inferential statistics;
- 2) Selected suitable place for data collection;
- 3) It included both the primary data and secondary data for the analysis;
- 4) Handled the respondents very well to get full information needed for this study and expected information was gained smoothly.

LIMITATIONS OF THE STUDY

There are some limitations of this study. Firstly, the data used for this study are typically for administrative purpose rather than for research purposes. Therefore, available traffic offence data starting from November 2007 was used. In addition, the needed variables like sex, age with small intervals, education level, employment status, driving experience, etc. were not available.

A key limitation in the second part of analysis is that because the data is from self-report, respondents may be uncomfortable expressing their approval or engagement in traffic offences and involvement in traffic crashes. This is likely to produce bias.

Another problem in this study is the self-selected nature of the samples comprising only those individuals who are volunteer to participate. It is important for future research to establish all inclusive study to obtain clearer picture of the individual characteristics that is associated with traffic offences.

The other limitation is that only traffic offenders were analyzed due to the difficulty of data collection for others drivers in the city. The other is exclusion of motor cyclists from the analysis which was made difficult to collect data at the same time because their payment place for their traffic offence were done at separate door.

FUTURE WORK

This research was done only for traffic offenders because of difficulty in data collection through questionnaires. Future researchers will benefit if they do all over the drivers (whether traffic offenders or not) and including motorcycles whether involved or not in traffic offences for all the objectives of the study including the attitudes towards road safety and to obtain factors and/or groups associated to traffic offences and associations of traffic offences and traffic crashes and differences in traffic offences by drivers and vehicles characteristics. Therefore, this is also direction for the future study.

Another is that due to many number of traffic offences only twelve types of traffic offences were analyzed in this research. For example driving without having license, illegal U-turn, driving with fake license, no child restraint and so on. Therefore it will be beneficiary if these traffic offence types were added in the future works.

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QUESTIONNAIRE

HELLO, my name is Gadisa. I am from Addis Ababa University and I am gathering information about traffic safety and Traffic offences in Addis Ababa City. You have been chosen randomly, and I would like to ask some questions about driving practices, traffic offences, crashes and other traffic safety related questions.

Consent

I will not ask your name, address, or other personal information that can identify you. You do not have to answer any question you do not want to, and you can stop the questions at any time. For most people, it takes about 15 minutes, but it can vary from person to person. There are no direct benefits to you and any risks of participating are similar to those typically encountered in your day to day life. Your individual answers are grouped with those of others to maintain your confidentiality. If you have any questions about the study, you can ask me now and if required I will provide a telephone number for you to call to get more information.

1. Section -I

1. What is your age?.....years
2. Are you Male Female
3. What is your Job.....
4. Are you married? Yes No Cohabited Divorced
5. What is your Education level.....
6. What is your Driving Experience?.....years
7. What is your Driving License Level?.....
8. Who is your Licensing school?.....
9. What is your Salary?
 - A. Less than 1500ETB
 - B. 1500-3000ETB
 - C. 3001-4500ETB
 - D. 4501-6000ETB
 - E. Greater than 6000ETB

2. Section-II

- 10. What is the service year of your vehicle?.....years
- 11. What is the Type of vehicle you drive?.....
- 12. What is the Code of your vehicle?.....
- 13. Who is the Owner of the vehicle you drive?.....
- 14. During the last year, in a typical week, about how many km did you drive?
 - A. Less than 50 Km
 - B. 51-100Km
 - C. 101-150km
 - D. 151-200km
 - E. 201-250km
 - F. 251km or more

3. Section-III

- 15. In the past 12 months have you committed traffic offences and been fined?
 - A. Yes
 - B. No
 - C. Neutral
 - D. I don't know
 - E. Refused
- 16. If "Yes" to Number 15 above what type and how many times you made offences?
 - Speeding.....How many.....
 - Red light Running.....How many.....
 - Drink DrivingHow many.....
 - Illegal Parking..... How many.....
 - OverloadingHow many.....
 - Not Obeying Traffic signs..... How many.....
 - Not wearing Seat beltHow many.....
 - Failing to give priority for pedestrians.....How many.....
 - Failing to give priority for vehicles.....How many.....
 - Failing to obey traffic police orders.....How many.....

or Others specify.....

17. Have you ever had a crash while breaking a traffic law?

- A. Yes
- B. No
- C. I do not know
- D. Refused

18. If Yes to number 17 what type of traffic crashes

- A. Fatal
- B. Serious
- C. Slight
- D. Property Damages only
- E. Others

4. Section-IV

19. How serious a threat to traffic safety you think driving over speed limit is?

- A. Extremely serious
- B. Very serious
- C. Moderately serious
- D. Slightly serious
- E. Not at all serious

20. How serious a threat to traffic safety do you think it is, if drivers and passengers do not wear seat belts?

- A. Extremely serious
- B. Very serious
- C. Moderately serious
- D. Slight serious
- E. Not at all serious

21. How serious a threat to traffic safety you think driving after drinking too much alcohol is?

- A. Extremely serious
- B. Very serious
- C. Moderately serious
- D. Slightly serious

- E. Not at all serious
22. How serious a threat to traffic safety you think drivers running red light is?
- A. Extremely serious
 - B. Very serious
 - C. Moderately serious
 - D. Slightly serious
 - E. Not at all serious
23. How serious a threat to traffic safety you think a driving while angry is?
- A. Extremely serious
 - B. Very serious
 - C. Moderately serious
 - D. Slightly serious
 - E. Not at all serious
24. How serious a threat to traffic safety you think distracted driving is?
- A. Extremely serious
 - B. Very serious
 - C. Moderately serious
 - D. Slightly serious
 - E. Not at all serious
25. How serious a threat to traffic safety you think tired driving is?
- A. Extremely serious
 - B. Very serious
 - C. Moderately serious
 - D. Slightly serious
 - E. Not at all serious
26. How serious a threat to traffic safety you think being older drivers is?
- A. Extremely serious
 - B. Very serious
 - C. Moderately serious
 - D. Slightly serious
 - E. Not at all serious

27. How serious threat to traffic safety you think drivers mobile phone using while driving is?

- A. Extremely serious
- B. Very serious
- C. Moderately serious
- D. Slightly serious
- E. Not at all serious

28. How serious a threat to traffic safety you think being young driver is?

- A. Extremely serious
- B. Very serious
- C. Moderately serious
- D. Slightly serious
- E. Not at all serious

.....THANK YOU FOR YOUR RESPONSES!.....

ቃለ- ምልልስ (IN AMHARIC)

ቃለ ምልልስ በአማርኛ ቋንቋ (Questionnaires in Amharic Language)

ስመ ጋዲሳ ይባላል፤ የመጣሁት ከአድስ አባባ ዩንቨርሲቲ ስሆን የአድስ አባባ ከተማ መንገድ ትራፊክ ደህንነት ላይ መረጃ ለመሰብሰብ ነዉ፤ እርሶ እንደ አጋጣሚ ተመርጠዋልና የመንዳት ልምድ፡መንገድ ትራፊክ ደምብ ጥሰቶች፡ትራፊክ አደጋዎችና ለሎች የትራፊክ ደምቦችን ማስከበር ላይ ጥያቄዎችን እጠይቃቸዋለዉ፡፡

ስማቸዉን፡ አደራሻቸዉንና ማንነታቸዉን የምገልፅ መረጃ አልጠይቃቸዉም፤ የአስራ አምስት ዳቂቃ ጥያቄ ስሆን የምትፈልጉትን ጥያቄ መመለስ ትችላላችዉ፤ በፈለጋችት ሰዓት ላይ ማቆም ትችላላችዉ፤ በመሳተፎ ምንም ቀጥታ ጥቅምና ጉዳት አይኖረዉም፤ መልሶቻቸዉም አንድ ላይ ይሁንና ለጥናት ስራ ብቻ ይዉላል፤ ስለ ጥናቱና ልላ ጉዳይ ጥያቄ ካላቹ በፈለጋችት ጊዜና ቦታ ልትጠይቁኝ ትችላላችዉ፤

ክፍል-1

- 1. ዕድሜ
- 2. ጾታ ወንድ ሴት
- 3. ስራ.....
- 4. የጋብቻ ሁኔታ 1/ያገባ 2/ያላገባ 3/በጋዴኛ 4/የፌታ
- 5. የትምህርት ደረጃ
- 6. የማሽከርከር ልምድ.....
- 7. መንጃ ፍቃድ ደረጃ.....
- 8. መንጃ ፈቃዱን የሰጠ ተቆም.....
- 9. ወራሃዊ ገቢ ሰንት ነዉ

ሀ/1500 ብር በታች ለ/1501-3000 ብር ሐ/3001-4500 ብር መ/4501-6000 ብር ሰ/ከ6000 ብር በላይ

ክፍል-2

- 10. የአገልግሎት ዘመን.....
 - 11. የመኪና አይነት.....
 - 12. ኮድ.....
 - 13. ባለቤት.....
 - 14. ባለፈዉ አመት በሳምንት ዉስጥ በአማካኝ ምን ያህል ኪ.ሜ ትነዳለህ
- ሀ/ከ50ኪ.ሜ በታች ለ/50-100ኪ.ሜ ሐ/101-150ኪ.ሜ መ/151-200ኪ.ሜ ሰ/201-250ኪ.ሜ ቀ/ ከ250ኪ.ሜ በላይ

ክፍል-3

15. ላለፈው አንድ አመት ትራፊክ ደምብ ጥሰህ ተቀጥተህ ታዉቃለህ

ሀ/አዎን ለ/አይደለም መ/አላዉቅም ሰ/አልምለሰም

16. ለ15ኛ ጥያቄ መልስህ አዎ ከሆነ ምን አይነትና ለምን ያህል

- ከፍጥነት በላይ መንዳት.....ስንት ጊዜ.....
- ቀይ መብራት መጥሳት.....ስንት ጊዜ.....
- ጠጥቶ ማሽከርከር.....ስንት ጊዜ.....
- ህገ-ወጥ ቦታ መኪና ማቆም.....ስንት ጊዜ.....
- ከመጠን በላይ መጫን.....ስንት ጊዜ.....
- ትራፊክ ምልክቶችን አለማከበር.....ስንት ጊዜ.....
- የመኪና ቀበቶን አለማሰር.....ስንት ጊዜ.....
- ለእግረኛ ቅድምያ አለመስጠት.....ስንት ጊዜ.....
- ለአላፊ መኪና ቅድምያ አለመስጠት.....ስንት ጊዜ.....
- የትራፊክ ህግ አስከባሪዎችን ትዕዛዝ አለመፈፀም.....ስንት ጊዜ.....
- ለሎች.....ስንት ጊዜ.....

17. የመንገድ ደምቦችን ስትጥስ አደጋ አጋጥሞት ያዉቃል

ሀ/አዎን ለ/አይደለም መ/አላዉቅም ሰ/አልመለሰም

18. ለ17ኛ ጥያቄ መልስህ አዎን ከሆነ ምን አይነት አደጋ ነዉ

ሀ/ ሞት ለ/መሃከለኛ ሐ/ቀላል መ/የንብረት ጉዳት ሰ/ሌላ

ክፍል-4

19. ከፍጥነት በላይ ማሽከርከር ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም አይጎዳም

20. ቀበቶ ሳያስር መንዳት ማሽከርከር ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም አይጎዳም

21. በጣም ከጠጡ በሃላ መንዳት ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም አይጎዳም

22. ቀይ መብራት መጣስ ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም አይጎዳም

23. ተናዶ መንዳት ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም
አይጎዳም

24. ሌላ ስራ እየሰሩ መንዳት ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም
አይጎዳም

25. ደክሞ መንዳት ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም
አይጎዳም

26. ካረጁ በሃላ መንዳት ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም
አይጎዳም

27. ስልክ እየተጠቀሙ ማሽከርከር ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም
አይጎዳም

28. በጣም ወጣት ሆኖ መንዳት ማሽከርከር ምን ያህል ትራፊክ ደህንነትን ይጎዳሉ ትላለህ

ሀ/በጣም በክፋኛ ይጎዳል ለ/በጣም ይጎዳል ሐ/ ትንሽ ይጎዳል መ/ በጣም ትንሽ ይጎዳል ሰ/ምንም አይጎዳም

.....ስለ መልካም ትብብርዎ በጣም አመሰግናለዉ!!.....

APPENDICES

Appendix-A

Federal Transport Authority (Total Regional Traffic offenders from 2007E.C to 2009E.C)-Prior Policy

Region	Prior Policy							Total
	01	02	03	04	05	06	07	
Harari	7	248	367	113	29	1	0	765
Somali	4	180	420	73	14	0	0	691
Benishangul Gumuz	0	128	168	105	24	1	0	426
Tigray	179	1060	1727	960	528	7	0	4461
Amhara	42	1396	3934	2050	682	2	0	8106
Addis Ababa	534	69119	1E+05	28592	8270	124	2	217646
Afar	0	144	226	32	8	5	0	415
Oromia	121	4574	12833	8074	2042	83	1	27728
Southern Ethiopia nation and nationalities	107	1118	3255	1321	367	2	1	6171
Dire Dawa	61	487	1172	478	286	2	0	2486
Gambella	26	322	1009	340	9	8	0	1714
Federal	48	1426	1231	672	9771	12	3	13163
Total	1129	80202	1E+05	42810	22030	247	7	283772

Appendix-B

Federal Transport Authority (Total Regional Traffic offenders from 2007E.C to 2009E.C)-New Policy

Region	New Policy													Total
	Auto	T1	T2	P1	P2	D1	D2	D3	F1	F2	L1	L2	L3	
Harari	82	23	24	147	2	49	9	1	0	0	2	0	0	341
Somali	157	0	21	143	1	1	14	24	0	0	0	0	0	364
Benishangul Gumuz	35	26	30	376	4	30	418	4	0	0	0	0	0	923
Tigray	897	859	350	2838	40	220	2433	1693	0	0	0	0	9	9398
Amhara	483	1374	651	5382	31	1742	3710	1026	0	1	0	1	1	15069
Addis Ababa	49644	0	63128	36382	3633	12932	10715	4966	0	60	0	0	198	186884
Afar	53	5	4	237	3	39	147	79	0	0	1	0	0	570
Oromia	9345	3853	12809	65382	606	11134	21810	21487	5	28	3	3	14	147717
Southern Ethiopia nation and nationalities	1901	1057	220	5477	243	1783	1535	258	0	0	0	2	1	13834
Dire Dawa	139	78	243	93	1	58	50	4	0	0	0	1	0	673
Gambella	30	19	0	46	1	11	38	1	0	0	0	1	3	150
Federal	1611	9	1583	2814	501	341	427	270	0	2	8	43	5	8579
Total	64377	7303	79063	119317	5066	28340	41306	29813	5	91	14	51	231	384502

Appendix-C

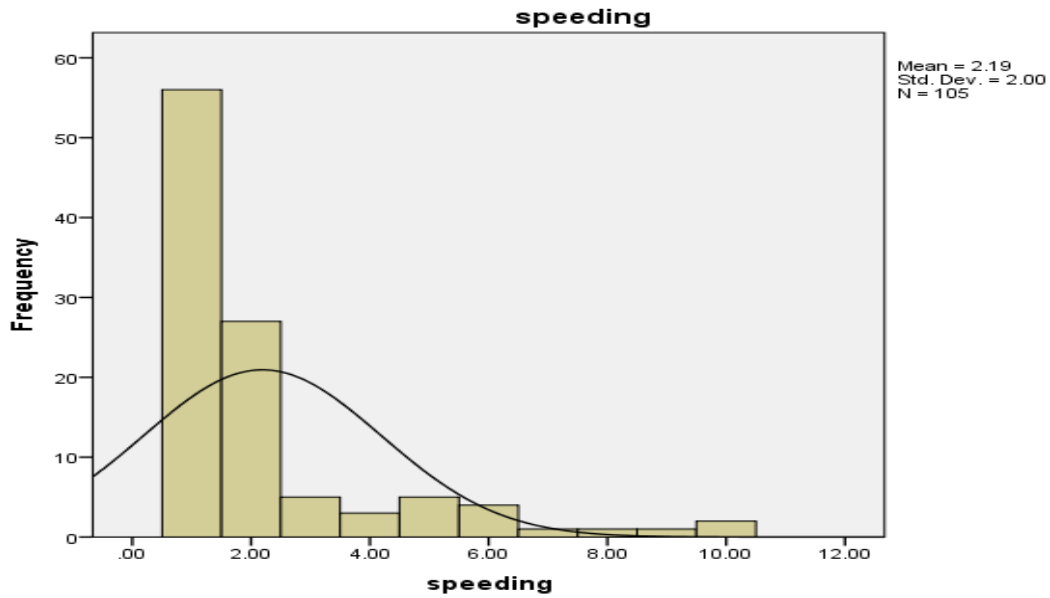
Federal Transport Authority (Total Regional Traffic offenders from 2007E.C to 2009E.C)-Both New Policy and Prior Policy

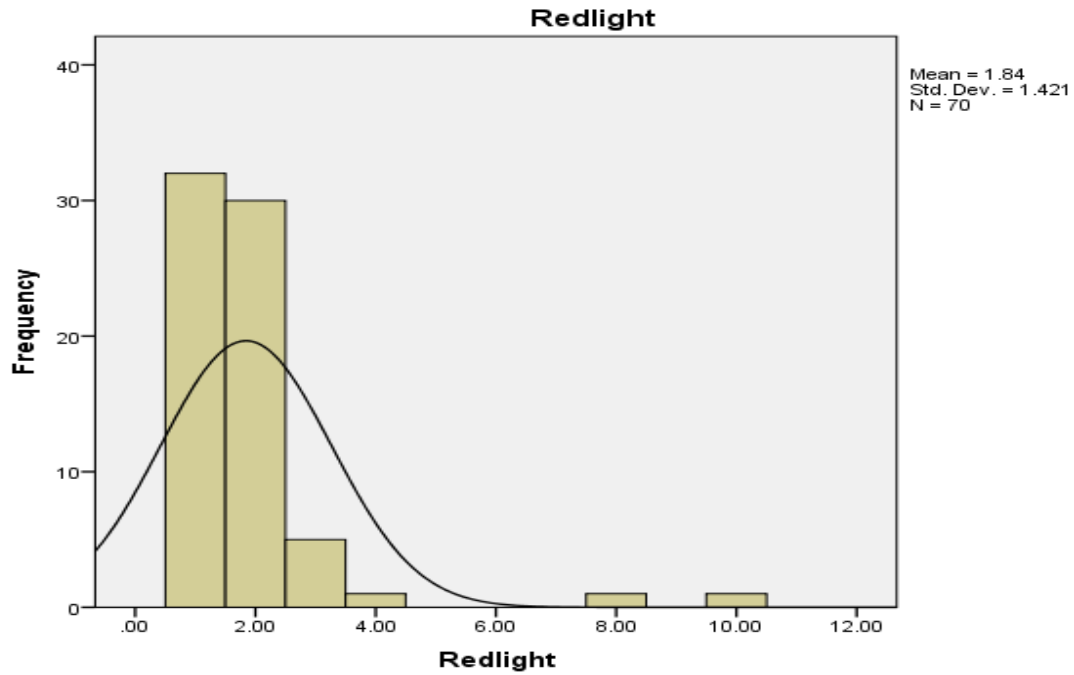
Region	Grand Total
Harari	1106
Somali	1055
Benishangul Gumuz	1349
Tigray	13859
Amhara	23175
Addis Ababa	404530
Afar	985
Oromia	175445
Southern nation and nationalities	20005
Dire Dawa	3159
Gambella	1864
Federal	21742
Total	668274

Appendix-D

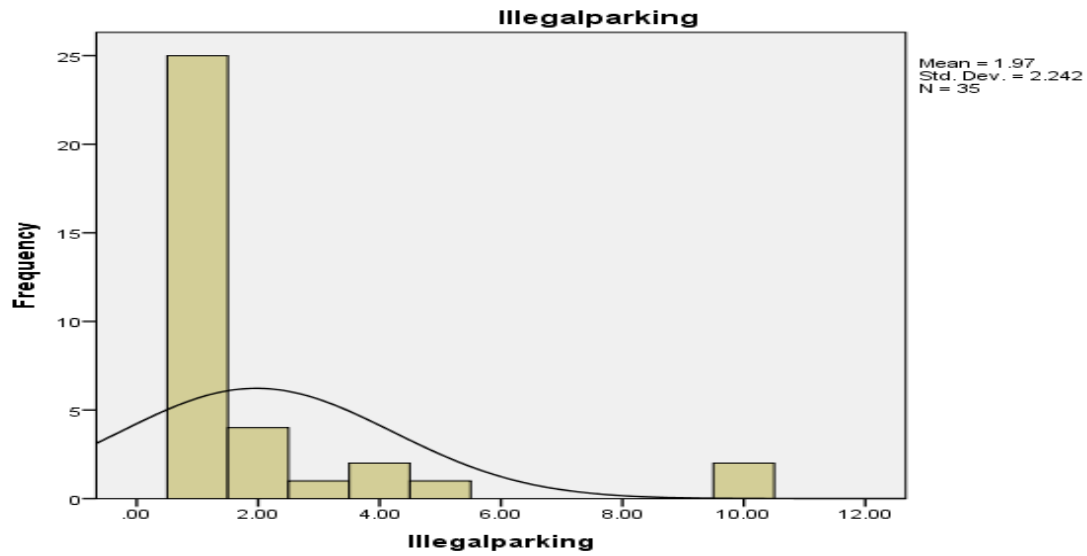
Normality of Traffic Offences frequency by Gender

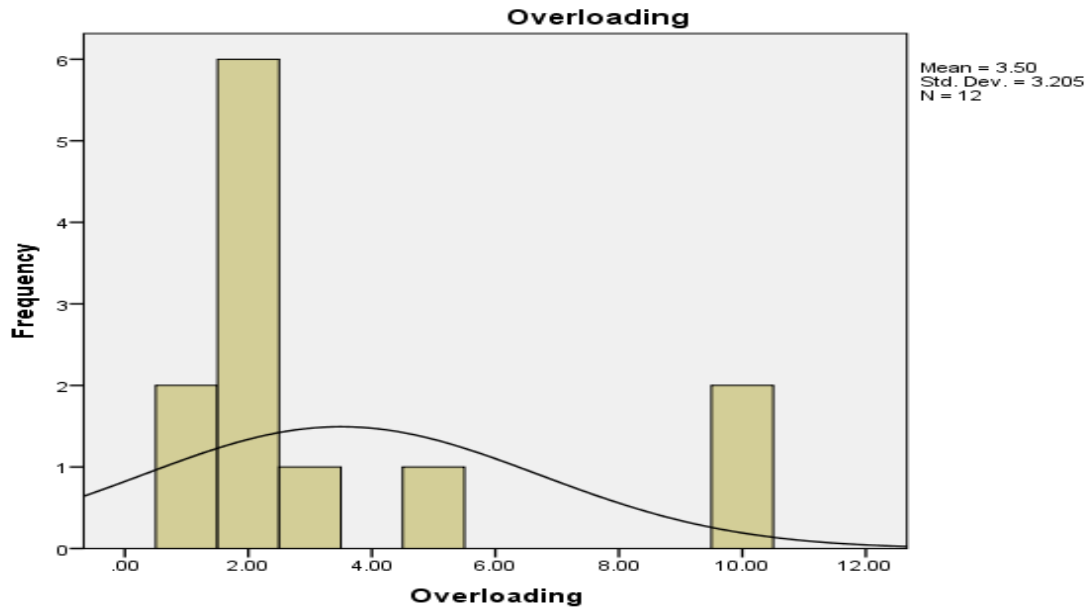
(A) Speeding and Redlight Running



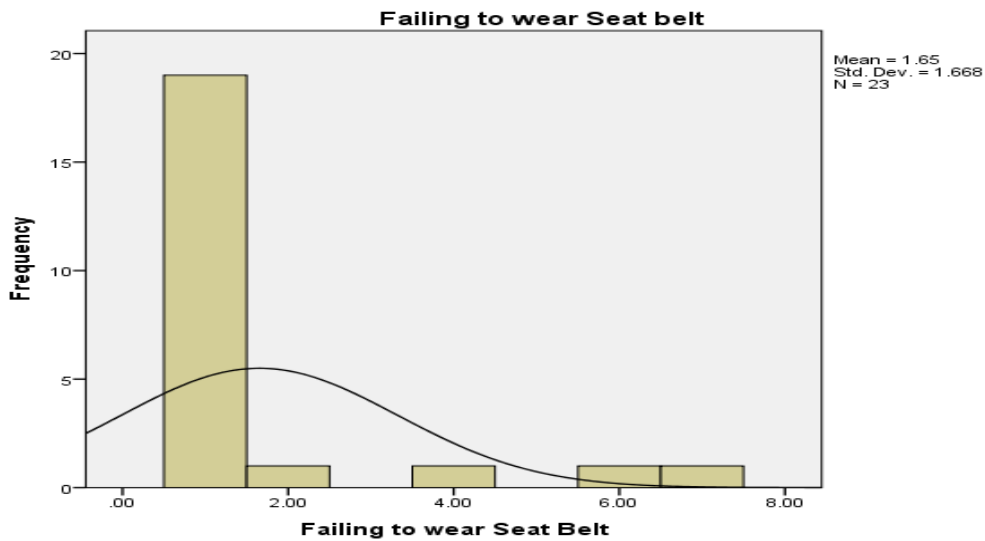
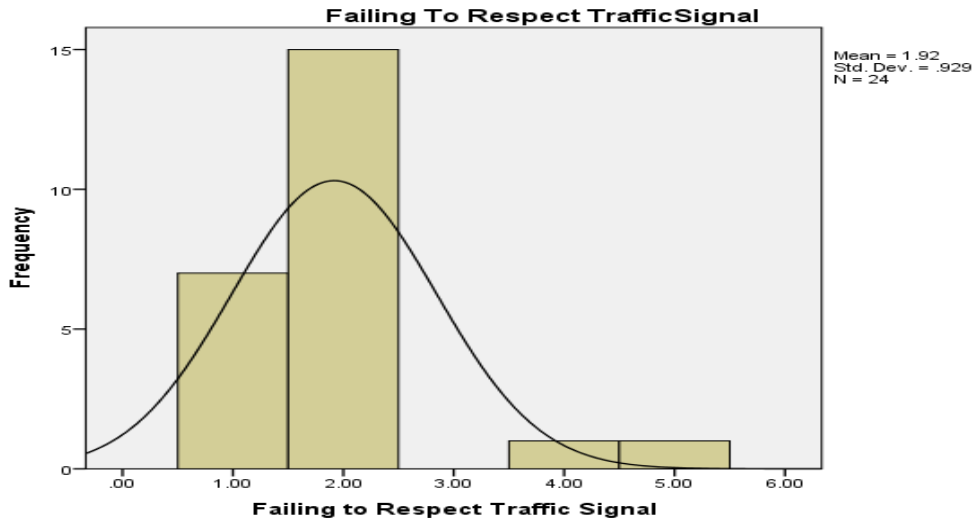


(B)Illegal Parking and Overloading

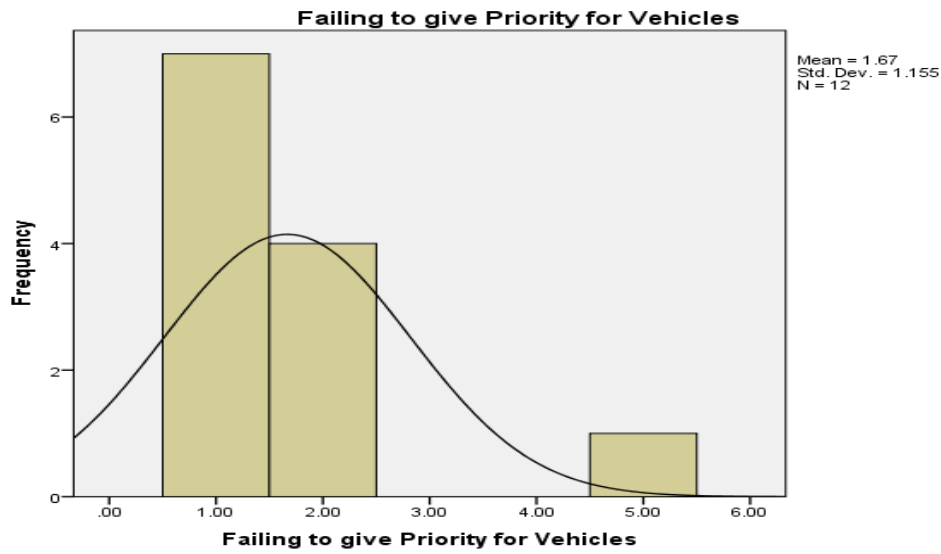
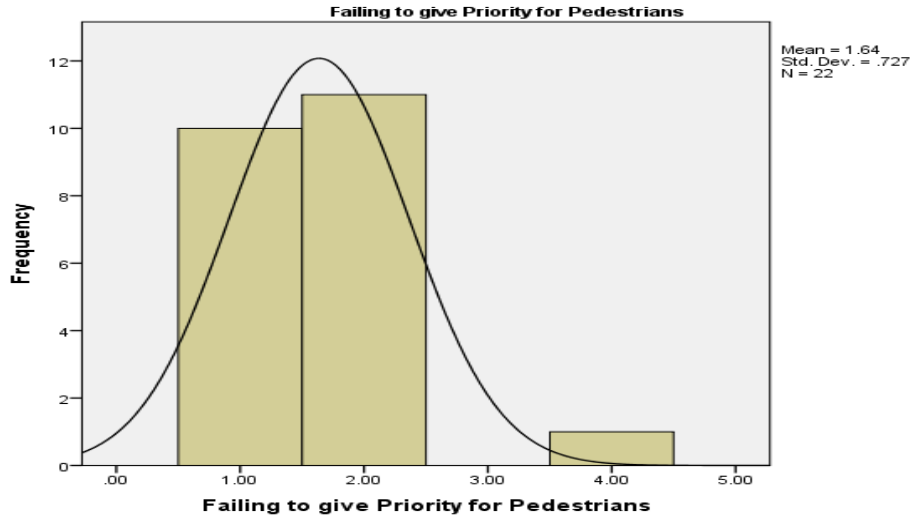




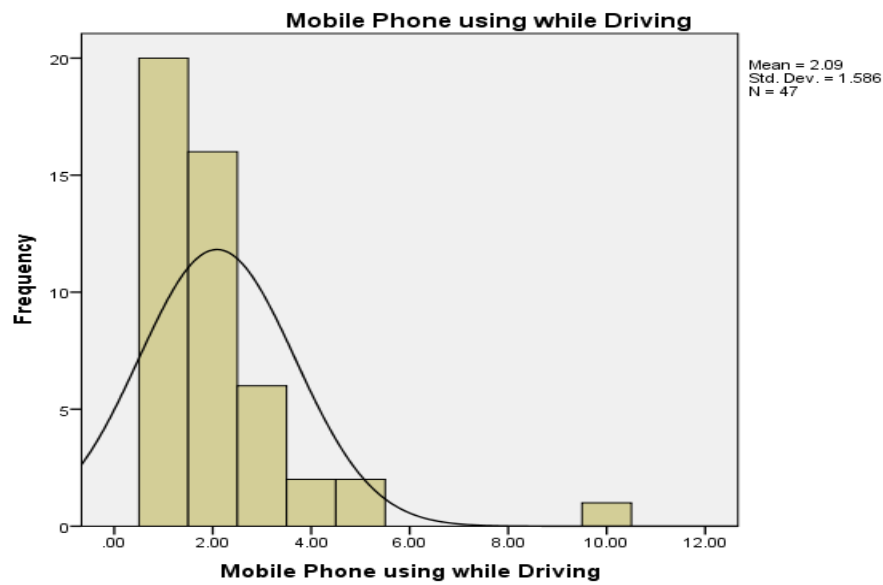
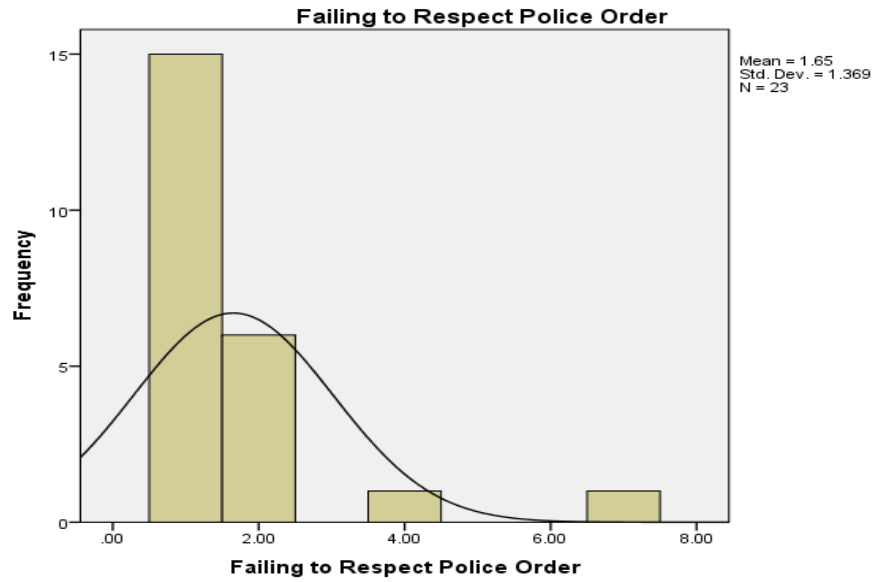
(C)Failing to Respect Traffic Signal and Failing to wear Seat Belt



(D)Failing to give priority for Pedestrians and for Vehicles



(E) Failing to Respect Police Order and Mobile Phone using while driving



F) Checking Equivalence of Variance for Male and Female for all Traffic offences

Traffic Offences	Gender	Variance
Speeding	Male	3.556
	Female	2.701
Red-light Running	Male	2.018
	Female	1.500
Illegal Parking	Male	5.152
	Female	3.155
Overloading	Male	11.78
	Female	0.000
Failing to Respect Traffic Signal	Male	0.848
	Female	0.000
Failing to wear Seat Belt	Male	3.014
	Female	0.000
Failing to Give Priority for Pedestrians	Male	0.533
	Female	0.000
Failing to Give priority for Vehicles	Male	1.694
	Female	0.333
Failing to Respect Police Order	Male	2.910
	Female	0.103
Mobile Phone using while Driving	Male	2.663
	Female	0.251
Traffic Flow Obstruction	Male	1.562
	Female	0.531