

# Assessment of Magnitude and Associated Factors of Road Traffic Accidents Among Minibus Taxi Drivers in Megenagna, Torhailoch and Saris, Addis Ababa, Ethiopia

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## To cite this article:

Frewengel Melake Weldeslassie, Tewodros Kassahun Tarekegn, Teame Kiflom Gaim, Salem Sium Mesfin, Bemnet Kassaye Ketsela, Solomon Endale Dagnachew, Amanuel Girma Balcha, Mohammed Abdurahman Yassin, Fortuna Melake Weldeslassie. Assessment of Magnitude and Associated Factors of Road Traffic Accidents Among Minibus Taxi Drivers in Megenagna, Torhailoch and Saris, Addis Ababa, Ethiopia. *Journal of Health and Environmental Research*. Vol. 8, No. 3, 2022, pp. 197-211. doi: 10.11648/j.jher.20220803.14

**Received:** August 7, 2022; **Accepted:** September 17, 2022; **Published:** September 29, 2022

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**Abstract:** Road Traffic accidents (RTA) are one of the main leading cause of morbidity and mortality throughout the world. According to the report of the statistics of WHO, RTA take lives of millions of people annually, ranging higher in the developing countries, particularly in the sub Saharan region. In Ethiopia RTA caused losses of thousands of people and high economic damage, and categorized as one of the top national health burdens. Objective: the aim of the study was to assess the magnitude of the road traffic accidents and associated risk factors among taxi drivers. Methods: A cross-sectional quantitative study was conducted among 840 Taxi drivers in selected zones of Addis Ababa (Saris, Torhailoch and Megenagna), from 1<sup>st</sup> September to 20<sup>th</sup> December, 2021. The drivers selected randomly from all the minibus taxi drivers in the selected regions. The questionnaire was first prepared in English and then translated to Amharic. To check the validity of the questionnaire, pretest was conducted. Data was collected by distributing self-administered questionnaires and SPSS version 20 was used for data entry and analysis. Result: From the total 840 participants, more than half (56.9%, 478) were having history of RTA. Accordingly, 39.3%, 21.8%, 18.8% and 20.1% of the respondents who previously involved in RTA explained their accident was caused by over speeding, drunk driving, passing traffic lights and other predisposing factors, respectively. And majority of them (93.3%) drove more than 7 hours per day, whilst few (6.7%) drove less than 7 hours. Most of the accidents (41.0%) occurred at market places, and the least (10.0%) happened around recreational areas. And most of the accidents (46.8%) were carried out by the less experienced drivers. Conclusion: The magnitude of RTA among Minibus taxi drivers is high in this study. Most of the accidents happened on minibus taxis without mechanical defects and on asphalt with good road condition, and this indicate there is behavioral and awareness problem that might attributed from economic status, substance use and lack of awareness about traffic rules. Recommendation: The community should be given enough awareness about road safety measures and we strongly advise the Ministry of Transport to give special concern for the ethical issues of the traffic police officers and the way driver licenses are issued.

**Keywords:** Assessment, Magnitude, Associated Factors, RTA, Minibus Taxi Drivers

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# 1. Introduction

## 1.1. Background

People for centuries and millennia have been moving from place to place to carry out their day-to-day activities. To facilitate their movement, people use different ways of transportation including road, air, water, train etc. It is an accepted fact that of all modes of transportation, road transport is easily accessible to people. According to WHO (2011), and Wade et al (2011), road transportation provides benefits both to nations and to individuals by facilitating the movement of goods and people. It enables people to have increased access to jobs, markets, education, recreation and health care. ECA (1989) and Atnafuseged (1996) noted that, road transportations have major advantages compared with others means of transport due to its flexibility, which allow people to run business from door-to-door over short distances at the most competitive prices. In Africa, over 80% of goods and people are transported by roads and in Ethiopia road transport accounts for over 90% of freight and passenger movements in the country every year [52].

Road traffic accidents (RTA) are a major public health problem worldwide, accounting for almost 1.24 million deaths per year and it is a number one cause for the death among those aged 15-29 years. Men are more affected than females (M: F - 3:1). According to the WHO report on 2013, although middle income countries only have half of the world's vehicles, they have 80% of RTA related deaths; unlike the high income countries which have RTA related death rates of 8.7 per 100,000 population middle and low income countries have higher rates 20.1 and 18.3 respectively. Among these all deaths fifty percent of all RTA related deaths are among pedestrians (22%), cyclists (5%) and motorcyclists (23%) [1].

Road traffic accidents are among the top leading causes of deaths and injuries of various levels. Ethiopia is experiencing highest rate of such accidents resulting in fatalities and various levels of injuries. Addis Ababa, the capital city of Ethiopia, takes the lion's share of the risk having higher number of vehicles and traffic and the cost of these fatalities and injuries has a great impact on the socio-economic development of a society [50]. Road traffic HR is highest in countries under development (21) and underdeveloped (18.3) and smallest in developed countries (8.7) according to WHO (2013). At the same time, Europe has the lowest (10.3) RTHR and Africa (24.1) and the Eastern Mediterranean have the largest (21.3) RTHR (WHO 2013) [2].

Among African countries, Ethiopia has a relatively high burden, the UN Economic Commission for Africa reported that 15,086 road traffic crashes occurred in Ethiopia in 2008 resulting in a mortality rate of 95 deaths per 10,000 vehicles, and causing losses of over 82 million Ethiopian Birr (\$7.3 million USD) [3, 55]. It is challenging to accurately estimate the public health burden and causes of RTCs in Ethiopia for a number of reasons. Most reported statistics are based on police data, which is believed to underreport true rates of death from RTA in many countries statistics are based on

police data, which is believed to underreport true rates of death from RTA in many countries [4, 5-7, 55]. In addition, most academic studies conducted in Ethiopia are restricted to Addis Ababa or are part of a large multi-country study. For example, studies have shown that speedy driving accounted for 13-50% of RTA in Ethiopia, Ghana, and Kenya [3, 8, 55].

Risk factors such as poor vehicle maintenance (including tires, brakes, and lights), narrow roads, and driving old vehicles were identified in Ethiopia, India, and Libya [9, 10, and 55]. However, it should be noted that the causes of road crashes are normally multi-factors.

According to the Federal Police Commission report, the death rate due to car accident is significantly increasing among pedestrians and passengers from time to time in Ethiopia [6]. A total of 25,110 accidents and 3,415 fatalities were recorded in Addis Ababa during 2000-2009. The majority of fatalities were pedestrians 2970 (87%), followed by passengers 297 (9%) and drivers 148 (4%) [11, 56].

## 1.2. Problem Statement

The global report on road safety in 2015 reports that the number of road traffic deaths globally has plateaued at 1.25 million between 2007 -2013. Between 20 and 50 million people suffer non-fatal injuries, with many incurring a disability as a result of their injury [4, 12]. Road traffic crashes cost most countries 3% of their gross domestic product. Road traffic accidents cause considerable economic losses to individuals, their families, and to a nation as a whole. These losses arise from the cost of treatment as well as loss of productivity for those killed or disabled by their injuries, and for family members who need to take time off work or school to care for their injured family member. Without sustainable action, road traffic crashes are predicted to become the 7th leading cause of death by 2030. About 90% of the world fatalities from road traffic accidents occur in low and middle income countries, even though these countries have approximately 54% of the world's vehicles [51].

In Africa, the number of road traffic deaths and injuries have been increasing over the last 3 decades [13, 54]. According to the 2015 Global status report on road safety, the WHO African Region had the highest rate of fatalities from road traffic injuries worldwide at 26.6 per 100 000 population for the year 2013 [4, 14]. Rather the 2009 Global status report on road safety which was presented the first modeled regional estimate of a road traffic death rate, which was used to statistically address the underreporting of road traffic deaths by countries with an unreliable death registration system and The report stated, Africa had the 7.2 per 100 000 population, despite Africa having the highest model estimate of 32.2 per 100000 population [15]. The low reported death rate reflects the problem of missing data due to non-availability of road traffic data systems, which has a direct impact on health planning including pre hospital and emergency care and other responses by government agencies. The increased burden from road traffic injuries and deaths is partly due to economic development, which has led to an increased number of vehicles on the road [15, 16]. Given that

air and rail transport are either expensive or unavailable in many African countries, the only widely available and affordable means of mobility in the region is road transport [4, 14, 17].

However, the road infrastructure has not improved to the same level to accommodate the increased number of commuters and ensure their safety and as such many people are exposed daily to an unsafe road environment [13, 14]. Ethiopia, a developing country in Africa, has witnessed a number of the most risky roads in the world and has followed to overtake a determined road spreading out guiding principle in the past 15 years [18]. The Ethiopian National Road Safety Coordination Office cites a road crash fatality rate of 114 deaths per 10 000 vehicles per year but the actual figure may be higher due to an improper reporting system [18, 19]. This compares to a mortality rate of one death per 10 000 vehicles per year in the United Kingdom and an average mortality rate of 60 per 10 000 vehicles across 39 sub-Saharan African countries [18].

In Ethiopia, the rate of road traffic accidents (RTAs) is very high; because of road transport is the major transportation mechanism along with poor road infrastructure, poor enforcement of traffic laws and other factors. The Ethiopian traffic control system archives data on various aspects of the traffic system, such as traffic volume, concentration, and vehicle accidents; with more vehicles and traffic, the capital, Addis Ababa, takes the lion's share of the risk, with an average of more than 20 accidents being recorded every day and even more going unreported (WHO, 2009) [20].

Addis Ababa is the capital city of Ethiopia with an area of 527 km<sup>2</sup> and a total population of more than 3 Million. It has 10 sub-cities, among these KolfeKeranio (546,219) being most populated followed by Nefas SilkLafto (335,740) and Bole (328,900). The health service coverage of Addis Ababa is 71%. There are 5 hospital, 24 health centers, 32 health posts & more than 500 private health institutions providing health services. One of the serious health problems facing Addis Ababa is road traffic accidents which results in the destruction of loss of life and property. The rapid rate of road traffic accident in the city has brought with a complex urban health problems [21, 22].

Reports from Addis Ababa Traffic Police Central Bureau the statistical data show the following; In Addis Ababa City, annual average traffic accident growth had been 8.75 for the years 2000 to 2005, which is One – third of the whole of accidents register in Ethiopia on the same years. 288 lives and 15,850,618.5 amounts in ETB, lost on an average from 1996 to 2005 [23]. Not only in Ethiopia. It is estimated that more than 5 million people between 17-40 years of age die annually as a result of RTAs worldwide. Currently RTA is the tenth leading cause of disease burden in the developing countries, especially in the Sub-Saharan African countries [24]. However, it is often possible to minimize injury and crash consequences by providing effective pre-hospital services promptly. In most low-and middle-income countries (LMICs), transportation of road traffic victims, is usually provided by relatives, taxi drivers, truck drivers, police

officers and other motorists who are often untrained [25, 52].

Recent studies conducted (Abegaz *et al.*) also reported an average of 1.2 deaths per every fatal crash in Addis Ababa – Adama/Hawassa main road [26]. Between September 11, 2013 to September 10, 2014 there were a total of 382 fatal road traffic crashes in Addis Ababa city. Some crashes had more than one fatality; therefore the total number of victims was 662 among these 411 were dead. Fatalities were predominantly male (351 deaths, 91.3%), with an average of 34 deaths/month [27].

Frequently the first person on the scene is likely to be another driver, and may prove to be the ideal population to be singled out for training. This study focuses on intercity drivers because it accounts for a large number of drivers, routes and population movement and therefore may represent the greatest opportunity for road traffic accident care intervention [23].

So, in our research we will assess the magnitude and associated factors among taxi drivers in Addis Ababa. It can subsequently be used by stakeholders and local road safety measures to identify priorities and devise targeted interventions and preventive measures to improve road safety among road users.

This research also might enlighten the right authoritative figures to act on the much needed improvement on the health service department response towards road traffic accident so that to prevent or reduce mortality and morbidity upon the victims.

### ***1.3. Significance of the Study***

Road traffic accident in Ethiopia, specifically in Addis Ababa is becoming the main concern of the government and other supportive and responsible institutions who essentially consider the road safety and the public in general.

This study will contribute to know the magnitude of road traffic accident among taxi drivers in Addis Ababa city. This study will also help everyone to have a clue so as to define the factors related to road traffic accident among taxi drivers in Addis Ababa.

In addition, this study will put forward the possible prevention and control alternatives to the decision makers and other stake holders in order to minimize and control mortality and disability caused by Minibus taxi related RTA in Addis Ababa.

This research can also be used as a significant reference for further researches conducted in Addis Ababa and nationwide.

In addition, the study will help the whole communities of Addis Ababa and other attachment areas to be sufficiently informed of the magnitude and risk factors associated with road traffic accident, and this will enable them to develop preventive and awareness determination strategies and policies.

The study will also help the government to plan health services which help to reduce the prevalence and severity of road traffic accident.

## 1.4. Literature Review

### 1.4.1. Introduction

Certain scientific researches, scholars, institutions and countries have attempted to define road traffic accident. However, the term continued to be ambiguous and challenging to define. This literature reviews will explore certain concepts and ideas on RTAs and control mechanisms. As a result, the definition, causes and control mechanisms of RTAs will be discussed in detail.

### 1.4.2. Global Road Traffic Accident

Worldwide, an estimated 1.2 million people are killed in road crashes each year and as many as 50 million are injured. Projections indicate that these figures will increase by about 65% over the next 20 years unless there is new commitment to prevention and in low income and middle-income countries deaths are expected to increase by as much as 80% [28].

The morbidity and mortality resulting from accidents are greater than any other disease entity worldwide [29-31]. Road-traffic accidents (RTA) account for a substantial part of these accidents and are the most common cause of fatality from accidents in most parts of the world [29, 31]. Globally, more than a million people die each year from RTA and 20–50 millions are injured or disabled [31]. A disproportionate number of victims are from younger age groups consequently causing an enormous loss of “potential life years” and negatively impacting the workforce [31]. Road traffic accident injuries are the second leading cause of death—after AIDS [29, 31]. And studies have shown that the incidence is rapidly increasing. Of RTA, automobile accidents are the most common cause, followed by motorcycle related Accidents [32, 33].

### 1.4.3. Road Traffic Accident in Developing Country

A cross-sectional cohort study was conducted among commercial inter-city drivers in Nigeria. From 229 participants 11.4% had no formal education while 35.4%, 44.5% and 3.5% had primary, secondary and post-secondary school education respectively and 5.2% did not indicate their level of education. Based on their driving experience Mean driving experience of the participants was 26.1 years, ranging from 20 to 42 years, 86.4% were making one trip per day while the remaining 13.6% were making two trips per day. 15.7% had witnessed RTA before; 10.0% witnessing it once, 5.2% twice and one respondent had witnessed RTA four times. Of the participants 34.5% defined first aid as what is done for the patient at the accident site. Others defined it as getting the patient to the nearest hospital or care site (9.6%), controlling bleeding (3.1%), providing oral hydration (2.6%), and giving medications such as Panadol (1.8%). The remaining participants were uncertain [34].

Participants were asked to prioritize the basic first aid concepts of breathing maintenance, homeostasis and fracture splinting. A majority (59.9%) correctly prioritized airway management first, while only 3 7.6% identified the correct order for all the three care areas. In relation to safe patient

positioning after a traumatic event 18.3% believed placing the victim sideways, 75.1% face-up position and 16.9% believed face down positioning was best. Related to wound management and homeostasis, (44.5%) believed a tourniquet should be used for on-going severe bleeding, (51.5%) believed a dressing and pressure should be applied and (4%) responded that the wound should be left alone. Considerations for fracture management (88.5%) believed splints could be used for obvious fractures while (7.0%) believed splints should not be used; (12.7%) were undecided. Unconsciousness was cited as the greatest indication to transport the patient to the hospital (58.5%). Others believed that traumatic wounds (8.7%) and fractures (5.2%) were representative of the need for hospital care. The cited first aid provided by the participants included pouring water on the victims (10.5%), stopping bleeding with compression or tourniquets (7.6%), applying wooden splints (3.5%) and calling the police (2.9%). Additional actions included “separating dead from the wounded and taking the wounded to the hospitals”, and “blowing air on them, placing them on a seat and taking them to the hospital”. 1.7% of the participants claimed to have abandoned the victims at the accident site while another (2.2%) said they took the patients to the police. The result showed for the necessity to provide first aid for RTA patients, (80.3%) felt it was necessary. Of those who felt it was necessary, the majority felt it would help prevent unnecessary deaths and improve patient outcomes [34].

### 1.4.4. Road Traffic Accident in Ethiopia

The construction of roads is one of the major focal areas of the government to fast-track economic growth. Although the vehicle population growth rate per annum is increasing, the number of total vehicles remains low compared to other developing countries. Currently road density and number of vehicles per 1,000 populations in Ethiopia are low compared with other African countries. Road traffic crashes pose a significant burden in Ethiopia, as is the case for other developing countries. Currently, developing countries contribute to over 90% of the world’s road traffic fatalities [35].

According to the WHO, Ethiopia has the highest rate of fatalities per vehicle in the world. Uganda ranks second in road fatality rates in the world behind Ethiopia. Emergency medical systems are often poor and injury prevention programmers' are rarely available [36]. In Ethiopia, like other developing countries, injuries are common but little attention is being given to this problem [53] One - year (July 2005-June 2006) retrospective descriptive study in Addis Ababa conducted were 40,752 out-patient department visits, of which 956 were hospitalizations with 35 deaths occurring as a results of injury which accounted for 27% of all emergency and 3% of all regular visits, 5% of all hospitalizations and 3% of deaths. The patients were predominantly young males. Even though falls were the commonest causes of unintentional injury, road traffic injuries were the main burden of the health facility being the commonest cause among young male and also accounted for 61% of injury related admission, 52% of injury related death,

and leading cause of repeated visits. A total of 44% of unintentional injuries were categorized under ‘other accidental causes’, only 6 deaths were reported in the outpatient department, and the conditions of one third of the patients at discharge were not recorded [37]. According to Ethiopian police reported Six years (July 2005 - June 2011) of police

reported crash data were analyzed, consisting of 12,140 fatal and 29,454 injury crashes on the country’s road network. The 12,140 fatal crashes involved 1,070 drivers, 5,702 passengers, and 7,770 pedestrians, totaling 14,542 fatalities, an average of 1.2 road user fatalities per crash [38].

Conceptual Framework

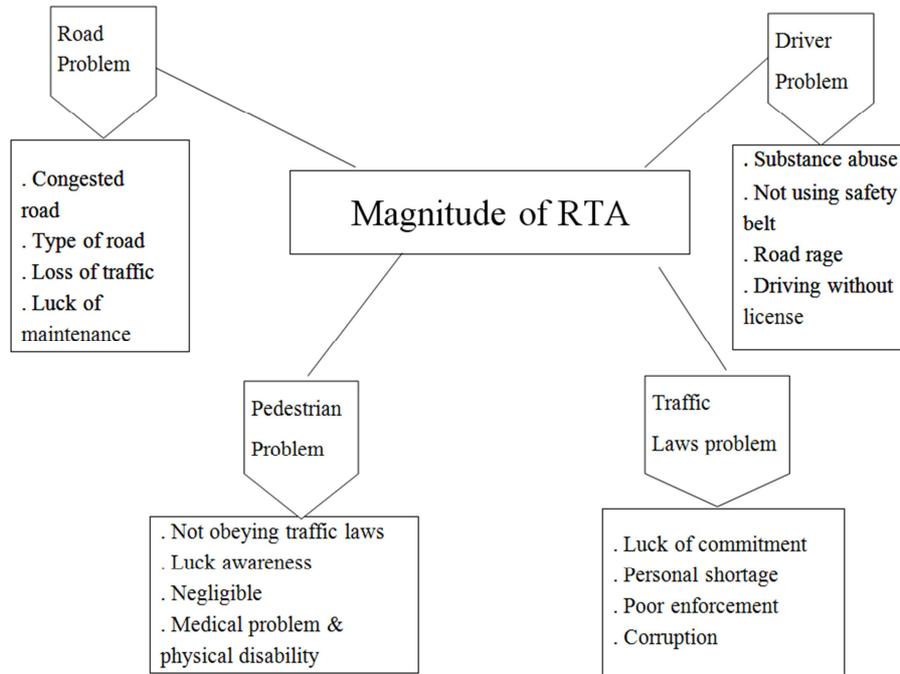


Figure 1. Conceptual Framework.

1.5. Objective

1.5.1. General Objective

To assess the magnitude of road traffic accidents and associated risk factors among mini bus taxi drivers in Addis Ababa, Ethiopia, 2021.

1.5.2. Specific Objective

- 1) To assess the extent of the mini bus taxi traffic accidents in Addis Ababa, Ethiopia, 2021.
- 2) To identify associated factors for the occurrence of mini bus taxi traffic accidents in Addis Ababa, Ethiopia, 2021.

2. Methodology

2.1. Study Design and Study Area

Community based cross-sectional quantitative study design was carried out to study this research. And the study was conducted in selected zones/regions of Addis Ababa, which is the capital city of Ethiopia. The areas selected for the study were Megenagna, Saris and Torhailoch zones.

2.2. Study Population

The study population were all mini bus taxi drivers in Addis Ababa.

2.3. Study Period

The study was conducted from 1<sup>st</sup> September 2021 up to 20<sup>th</sup> December 2021.

2.4. Sampling Method and Sample Size

Randomly selected mini bus taxi drivers in the randomly selected sub-cities which are currently providing public service at Megenagna, Saris and Torhailoch Zones. The internet had been browsed to get additional information. The sample size was calculated using sample size determination for single population.

Proportion. The following formula was used to estimate the minimum number of taxi drivers required for the study.

$$n = \frac{(Z\alpha/2)^2 P (1-P)}{D^2}$$

Where, N=maximum sample size to represent large population;

Z=with 95% confidence level (Z=1.96);

D= margin of sample error;

Where Z $\alpha$ /2 (critical value) =1.96 for 95%;

P=50% (28) d= 0.05.

$$n = \frac{(1.96)^2 * 0.5(1-0.5)}{(0.05)^2}$$

$$n = \frac{(3.8416) * (0.25)}{0.0025}$$

$$n = 384$$

10,000.

N-the total number of taxi drivers (11860), so we did not take correction formula.

Population correction factor if the population is less than

Design effect  $422 * 2 = 844$

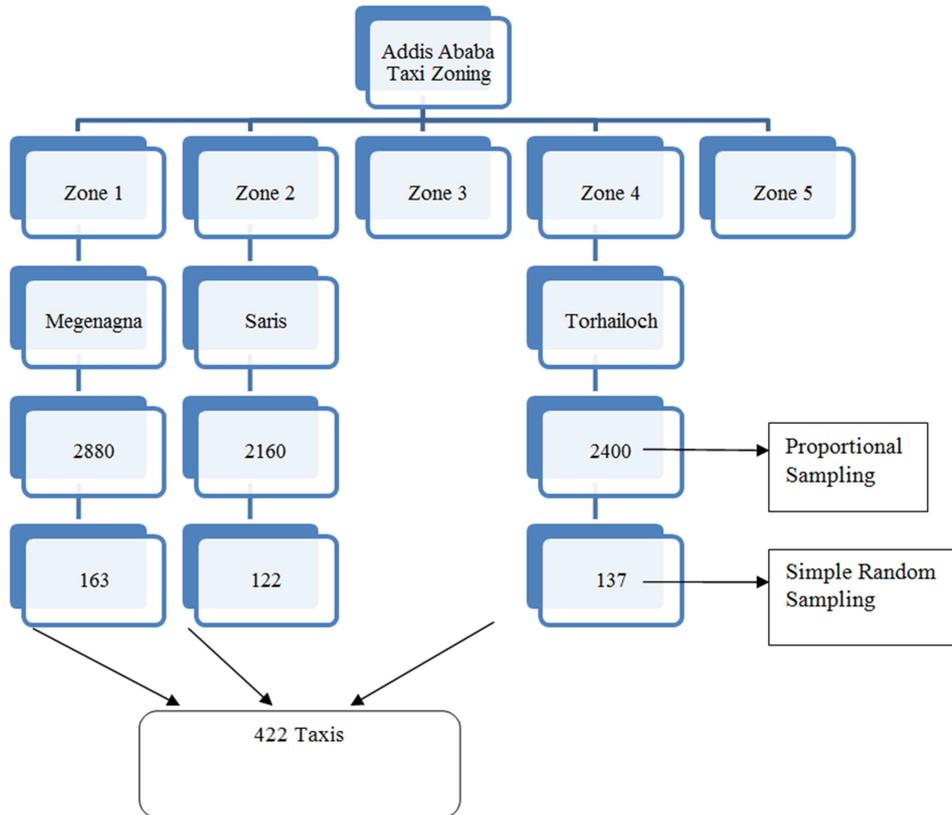


Figure 2. Two stage sampling technique.

We used a two stage sampling technique with simple random sampling (lottery method) for the mentioned zones and the numbers are proportionally allocated.

## 2.5. Inclusion and Exclusion Criteria

### 2.5.1. Inclusion Criteria

All minibus taxi drivers who were attended and active at the time of data collection.

### 2.5.2. Exclusion Criteria

- 1) Other public service drivers or drivers owing private car.
- 2) Drivers and pedestrians that are not interested to participate in the study.

## 2.6. Variables

### 2.6.1. Dependent Variables

Magnitude of Road Traffic Accidents in mini bus taxi drivers.

### 2.6.2. Independent Variables

Socio demographic and other variables related to mini bus taxi drivers:

- 1) Sex

- 2) Age

- 3) Traffic laws

- 4) Pedestrian problems

- 5) Driver problems

- 6) Road problems

- 7) Health Condition

- 8) Movement of pedestrian or mini bus taxi driver during RTA

- 9) Driving experience

- 10) Educational background

- 11) Driver vehicle relationship

- 12) Poor car maintenance service

- 13) Vehicle defect

## 2.7. Data Collection

The means of data collection was Self-administered questionnaires.

### 2.7.1. Data Quality Control

The questionnaire was pretested among 42 taxi drivers.

### 2.7.2. Data Quality Management

Once the study began we checked for the completeness, accuracy and clarity of the questionnaire on a daily basis.

Any ambiguities, incompleteness encountered were addressed on the following day before we started the coming day activities. We made sure all the data are entered and cleaned carefully.

### 2.8. Ethical Consideration

Permission was taken from the head of Hayat Medical College and Transport authority. The respondent was well assured that their information was secured. They were well informed about the purpose, significance of this study and were willing to give a written consent to answer our questionnaire. Taxi drivers and pedestrian identity were not exposed in the questionnaire.

## 3. Result

### 3.1. Sociodemographic Variables of the Minibus Taxi Drivers

A total of 844 taxi drivers participated in the study, from them 99.52% (which indicates 840 taxi drivers) participated till the end of the research. According to the Sociodemographic variable of age, many of the drivers (28%) were above the age of 35 years. Moreover most of the research participants were male (99%), Orthodox Christian (62.9%), Amhara (42.9%), High school level of education (45.1%) and Married drivers (48.5%). The median monthly income of taxi drivers was 500.00-1500.00 ETB (233, 27.7%).

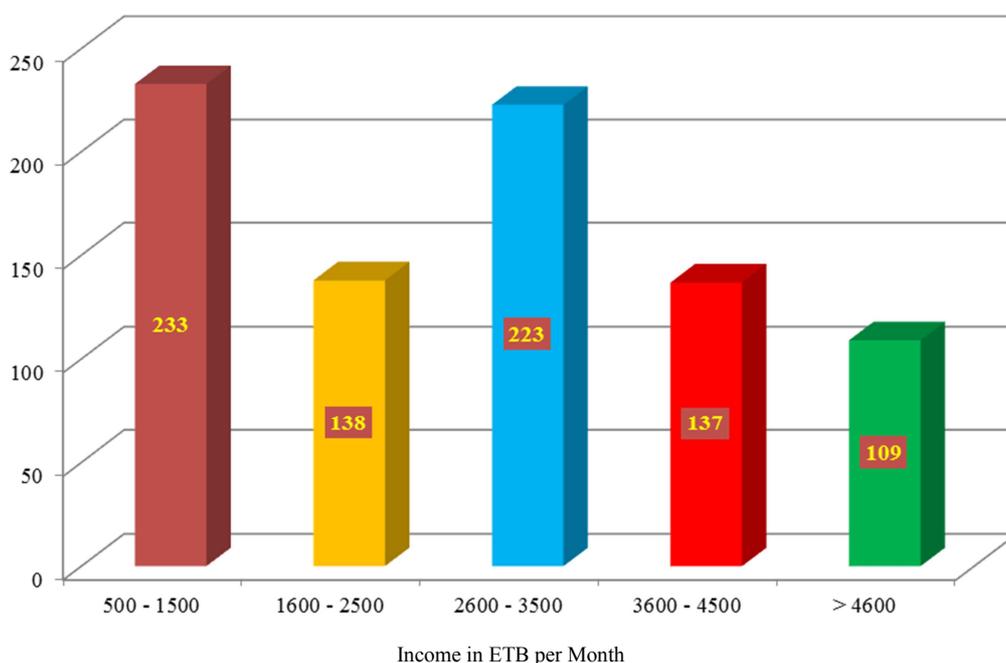


Figure 3. Income per month (ETB) of minibus taxi drivers.

Table 1. Socio demographic data of the minibus taxi drivers.

Variable	Frequency	Percent%
Age (in years)		
18-20	30	3.6
21-25	161	19.1
26-30	225	26.8
31-35	189	22.5
>35	235	28.0
Sex		
Male	832	99.0
Female	8	1.0
Religion		
Orthodox	528	62.9
Muslim	191	22.7
Catholic	37	4.4
Protestant	75	8.9
Other	9	1.1
Ethnicity		
Amhara	360	42.9
Tigre	133	15.8
Oromo	171	20.4
Gurage	117	13.9
SNNPR	59	7.0

Variable	Frequency	Percent%
Level of Education		
Can't read / write (Illiterate)	30	3.6
Basic Education	100	11.9
Elementary School	189	22.5
High School	379	45.1
Post High School level	142	16.9
Marital Status		
Not Married	388	46.2
Married	407	48.5
Divorced	39	4.6
Widow	6	0.7

### 3.2. Results Regarding Taxi Driver and Vehicle Relationship

Table 2 illustrates that, more than half (56.9%) of the participants were Recruits. Most of our research participants (37.4%) had driving experience of 3-10 years. All the respondents had legal driver's license, accordingly more than three-fifth (62.8%) of the drivers had the "taxi" driving license, and the remaining (26.2%) and (11%) of the research

participants had "Hizbe 1" and "3<sup>rd</sup> level" driving license levels respectively. And more than three-fifth (64.3%) of the drivers service their car by every >5000KM. 387 (46.1%) spend 7-10 hours on driving per day while 340 (40.5%) spend more than 10 hours on driving. Majority of the drivers 638 (76%) add extra passengers, from them 629 (98.6%) gave a reason of "to get money". More than half (53.6%) of the participants were used to work as a taxi assistant before, in which (58.3%) out of them worked within the range of 1-3 years as a taxi assistant.

Table 2. Driver-Vehicle Relationship of Minibus Taxi Drivers.

Variable		Frequency	Percent%
What is the relationship between driver& vehicle?	Owner	362	43.1
	Recruit	478	56.9
	Rental	0	0
	Other	0	0
	< 1 Year	52	6.2
How long have you been driving?	1-2 Year	245	29.2
	3-10 Year	314	37.4
	>10 Year	229	27.3
	Yes	840	100.0
Do you have a driver license?	No	0	0
	Hizbe 1	220	26.2
If yes, what is the level of your license?	Taxi	528	62.9
	3 <sup>rd</sup> Level	92	11.0
	Every 3000KM	68	8.1
With how many distance do you service your car?	Every 5000KM	232	27.6
	Every > 5000KM	540	64.3
	< 7 hours	113	13.4
Time spending on driving per day	7-10 hours	387	46.1
	>10 hours	340	40.5
	Yes	638	76.0
Does the drivers add extra passengers?	No	202	24.0
	"To get money"	629	98.6
If yes, what is the reason?	"To give extra service"	9	1.4
	For other reason	0	0
	Yes	450	53.6
Have you ever worked as a taxi assistant before?	No	390	46.4
	1-3 Years	262	58.3
If yes, for how many years?	4-6 Years	129	28.7
	7-10 Years	45	10.0
	>10 Years	14	3.0

### 3.3. Results Regarding Drivers Involved in RTA

Table 3 indicates more than half of the respondents (56.9%) already had history of RTA. Over speeding (39.3%)

was reported the highest among other possible causes of RTA and the remaining 104 (21.8%) and 90 (18.8%) were caused by drunk driving and by passing traffic lights respectively and the remaining 96 (20.1%) mention other

causes of RTA. From the drivers who already have history of RTA, majority of them (65.3%) had been working previously as taxi assistant. And most of them had driving experience of 1 up to 2 years and high school level of educational background. Above half (53.1%) of the participants with RTA record, service their car after travelling long distance (more than 5000KM), and most of them (46.9%) drove more than 10 hours per day. Majority of the accidents (41.0%) occurred near the market, while (20.9%) and (14.6%) occurred at road intersections and near schools. The associated car problem was 190 (39.7%) had no mechanical defect on the car and 130 (27.2%) had brake problems. Most of the RTA occurred on wide & straight (39.7%), asphalt with good condition (47.3%) and dry (54.4%) roads. More than half (55.6) of the RTA took

place during day time, and despite the general expectation most of them (39.1%) happened during good weather climate. More than three-fifth (62.1%) of the participants replied that there was no injury of pedestrian during their RTA but the remaining (37.9%) responded there was evidence of pedestrian injury. And most of these injuries (35.4%) happened when the pedestrian crossing outside the zebra cross. More than half (54.8%) of our research participants were under the influence during the RTA in which 51% out of them were using alcohol and the remaining 41.2% and 6.9% were using chat and drugs (medication) respectively. The degree of the level of influence by these influential factors was high (32.1%), moderate (45.4%), and mild (22.5%). The associate level of injury due to RTA was minor in 226 (47.3%) and major 86 (18.0%).

**Table 3.** Minibus taxi drivers who have previously involved in RTA.

Variables		Frequency	Percent%
Do you have history of RTA?	Yes	478	56.9
	No	362	43.1
Possible cause of RTA	Over speeding	188	39.3
	Drink during drive	104	21.8
	Pass traffic light	90	18.8
	Others	96	20.1
From drivers having history of RTA	Worked as taxi assistant	312	65.3
	Haven't worked as taxi assistant	166	34.7
Year of driving experience of the drivers having history of RTA	1-2 Years	224	46.8
	3-10 Years	214	44.8
	> 10 Years	40	8.4
Level of education of the drivers who have history of RTA	Can't read or write	21	4.4
	Basic education	73	15.3
	Elementary	142	29.7
	High school	198	41.4
	Higher grade education	17	3.6
With how many distance do the drivers with history of RTA service their car?	Preparatory	27	5.6
	Every 3000KM	28	5.9
	Every 5000KM	196	41.0
	>5000KM	254	53.1
Time spending on driving of the drivers with history of RTA	< 7 hours	32	6.7
	7-10 hours	222	46.4
	> 10 hours	224	46.9
Where does the RTA occurred?	Near market	196	41.0
	Near school	70	14.6
	Road intersections	100	20.9
	Near residential area	64	13.5
What was the associated Car problems?	Around recreation areas	48	10.0
	No mechanical defect	190	39.7
	Brake problems	130	27.2
	Tire problems	74	15.5
	Other problem	84	17.6
What was the road's Geographical state?	Wide & straight	190	39.7
	Wide & sloppy	94	19.6
	Wide & up-down	60	12.6
	Zigzag	74	15.5
What type of road Surface was it?	Uphill	6	1.3
	Downhill	40	8.4
	Other	14	2.9
	Asphalt with good condition	226	47.3
	Asphalt with poor condition	164	34.3
	Coarse	80	16.7
	Other	8	1.7

Variables		Frequency	Percent%
What was the state of the road during RTA	Dry	260	54.4
	Wet	159	33.3
	Muddy	59	12.3
What time did the RTA occur?	Day	266	55.6
	Night with road light on	89	18.8
	Night with road light off	88	18.4
	Night without road light	35	7.3
What was the climate during the RTA?	Good weather	187	39.1
	Foggy/Cloudy	104	21.8
	Rainy	112	23.4
	Warm	61	12.8
Was there a pedestrian injured during the RTA?	Stormy	14	2.9
	Yes	181	37.9
	No	297	62.1
If Yes, What was Her/his movement during the RTA?	Crossing on zebra cross	34	18.8
	Crossing outside zebra cross	64	35.4
	Walking on the side of the road	36	19.9
	Walking on the left side of the road	26	14.4
	Walking on the right side of the road	14	7.7
Any influential factor of drivers leading to RTA	Other	7	3.8
	Yes	262	54.8
	No	216	45.2
	Alcohol	136	51.9
If yes, what influential Factor was there	Chat	108	41.2
	Drug or medication	18	6.9
	Mild	59	22.5
Level of influence by these influential factors	Moderate	119	45.4
	High	84	32.1
	Minor	226	47.3
Level of injury due to RTA	Moderate	166	34.7
	Major	86	18.0

### 3.4. Driver's Awareness About RTA

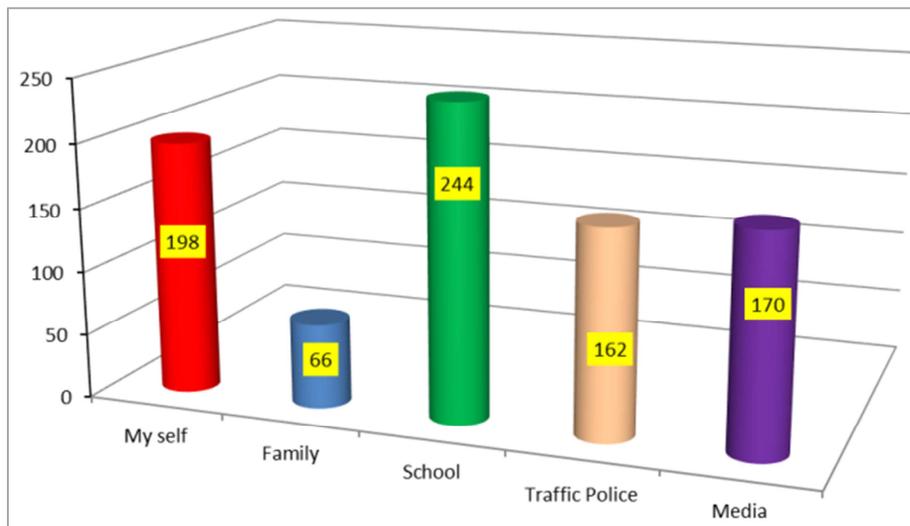
More than Four-fifths (85%) of the research participants believed that the road condition of the city is one of the causes of the RTA. Majority of the drivers (72.6%) rated the traffic police have no commitment to their duties, however the remaining 27.4% have agreed the police officers have sufficient commitment to their duties. Most of the study subjects (58.1%) responded that they get awareness about RTA from traffic bureau, but the remaining (41.9%) did not have awareness about RTA from traffic bureau. More than Three-fourths (75.4%) didn't believe that traffic laws were appropriately enforced in which 39.0%, 34.3% and 26.7% of them stated the reason "not enough traffic lights", "negligence of driver" and "bribing of traffic officers" respectively. While amazingly 5 drivers (0.6%) failed to give any answer regarding traffic law appropriate enforcement. Regarding taxi drivers' source of knowledge and experience

about road safety rules 244 (29.0%), 198 (23.6%) and 170 (20.2%) responded their source as school, myself and media respectively. 816 (97.1%) of the drivers think Addis Ababa city experienced high level of RTA. And 450 (53.6%) think the RTA were due to increasing of cars on the road, 76 (9.0%) thought the road infrastructure, 314 (37.4%) thought the road traffic management and licensing system could be the causes of RTA. From the ranks given as a possible condition of driving lead to RTA over speeding, drunk driving and lack of driving skills scored 352 (41.9%), 308 (36.7%) and 180 (21.4%) respectively. Five hundred forty-six (65.0%) correctly perceived traffic signs, signals and road side marks while driving. And three-fifth (60.0%) give priority for pedestrians. 616 (73.3%) do not think of adding extra passengers can cause RTA in which all of them stated the reason that "it has no relation". While 224 (26.7%) thought it can cause RTA in which majority 164 (73.2%) stated the reason that it "decreases brake stopping power due to load".

**Table 4.** Minibus taxi drivers' awareness regarding RTA.

Variable		Frequency	Percentage
Do you think that the infrastructure (road condition) of the city is the road accidents?	Yes	714	85.0
	No	126	15.0
	No Answer	0	0
How do you rate traffic police cause of the officers' commitment to their duties?	They're committed	230	27.4
	They're not committed	610	72.6
	No Answer	0	0

Variable		Frequency	Percentage
Did you get awareness about RTA from Traffic Bureau?	Yes	488	58.1
	No	352	41.9
	No Answer	0	0
Do you believe that the traffic laws are appropriately enforced?	Yes	202	24.0
	No	633	75.4
	No Answer	5	0.6
If No, State your reason	Negligence of driver	217	34.3
	Not enough traffic lights	247	39.0
	Bribing of traffic officers	169	26.7
	Myself	198	23.6
Who/What is your source of knowledge and experience about road safety	Family	66	7.9
	School	244	29.0
	Traffic Police	162	19.3
	Media	170	20.2
Do you think Addis Ababa has high level of RTA?	Yes	816	97.1
	No	24	2.9
Respondents thought on possible cause of RTA based on environmental status	Road infrastructure	76	9.0
	Road traffic management & licensing system	314	37.4
	Increased Car trafficking	450	53.6
	Over speeding	352	41.9
Possible condition of driving lead to RTA	Drunk drive	308	36.7
	Lack of driving skills	180	21.4
Do the drivers perceive traffic signs, signals and side road marks correctly?	Yes	546	65.0
	No	294	35.0
Do the drivers give priority for pedestrians?	Yes	504	60.0
	No	336	40.0
Does adding extra passengers have relation to RTA?	Yes	224	26.7
	No	616	73.3
If Yes, what could be the relative cause?	Decrease brake stopping power due to load	164	73.2
	Decrease Speed control system due to over load	60	26.8



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

Figure 4. Knowledge of minibus taxi drivers about road safety rules.

### 3.5. Cross Tabulation of RTA with Variables

We used the Pearson’s and likelihood ratio of the chi-square test with p value of 0.05 where main associated factors listed in the table have shown P-value less than 0.05 which indicated there is significant association.

Table 5. Cross tabulation of RTA with variables.

Variable	Chi Square	Likelihood ratio	Significance	Decision
Level of Education	493.013471	662.326524	8.3042E-140	There is association with RTA
Level of Income	613.034938	839.636594	2.339E-131	There is association with RTA

Variable	Chi Square	Likelihood ratio	Significance	Decision
Marital Status	554.155745	718.352441	2.2002E-155	There is association with RTA
Were you a taxi assistant before?	734.019955	946.976314	1.197E-161	There is association with RTA
With how many distance do you service your car?	616.206262	763.434762	1.5578E-134	There is association with RTA
How long have you been driving?	527.375743	720.486907	5.5672E-114	There is association with RTA
How many hours do you spend driving?	755.389028	979.527132	2.0462E-163	There is association with RTA

## 4. Discussion

Our study showed almost all mini bus taxi drivers were males (99%). The mean age of the respondents was 29.9 years. Similar study conducted among taxi drivers in Addis Ababa showed that all participants were male with mean age of 33.74 [23] and another study conducted on commercial intercity drivers in Nigeria showed all participants were male with an average age of 45.9 [34].

The study focused specifically on mini bus taxi drivers, which revealed that more than half of them (56.1%) had been involved in RTA in the past. This is similar with the findings of the study conducted in Addis Ababa which proved that 53.3% of the study participants have been involved in RTA in the past. Whereas it is slightly higher when compared with the results of the similar study assessed in Nigeria, which revealed 32.2% of the research participants have been involved in RTA [23, 34]. Another study done on prevalence of RTA among taxi drivers in Mekelle affirmed that only around one quarter (26.4%) of them had been involved in an RTA [40]. This is similar to the researches conducted in Vietnam and South Africa [39, 40].

Majority of the research participants (45.1%) in this study have high school educational background, and the remaining respondents were having 3.6% no formal education, 11.9% basic education, 22.5% elementary school and 16.9% higher education level. This have close similarity with the findings of the studies conducted in Addis Ababa which included 220 (55%) secondary school and 58 (14.5%) primary school [40], and Mekelle involved 139 (19.5%) and 409 (57.4%) primary and secondary school levels respectively [40]. Whereas research done in Nigeria reported 26 (11.4%) had no formal education, and 81 (35.4%), 102 (44.5%) and 8 (3.5%) had primary, secondary and post-secondary educational level respectively [34]. In the current research's result most of the respondents were having secondary school level which is close similar with the research findings of Nigeria but the percentage of non-formal education is less than that of Nigeria which indicates our taxi drivers' literacy level is better.

From the actual number of mini-bus taxi drivers who were involved in RTA the educational background shows in this study, 198 (41.4%) high school, 142 (29.7%) elementary school and 24 (5.6%) of the respondents were higher education level. In a similar previous study done in Addis Ababa, 55.5% and 40.5% were in high school and elementary school respectively involved in RTA [23]. Even though, we can see our number is less than the compared study, those population (high school and elementary) taxi drivers have attributed for the majority of RTA cases.

This study identified an association between speedy driving and RTA in which 188 (34.7%) revealed the actual cause of RTA. Similar to this study, speedy driving was associated with RTA in China [41], Oman [42], Iran [43] and Nepal [44]. However, it was not associated with RTA in Vietnam [45] and Australia [46].

A study in Kenya revealed that over loading, over speeding of matatus (minibus taxi) and buses are major factors that contribute to higher accident risks or to more serious accidents [24]. Our result can be supported by 352 (41.7%) of our participant ranked over speeding as the number one cause of RTA. As the study indicated in Kenya that overloading contributes to higher RTA prevalence; we found also 638 (76%) add extra passengers (overload). A similar study done in Kenya suggests 68 respondents (22.9%) reported over-loading. This shows our mini bus taxi drivers have higher rate of adding extra passengers than Kenyan matatus (minibus taxi) drivers. In this study, out of 638 respondents, 629 (98.6%) their reason was "to get money". Majority of our participants (233, 27.7%) income is between 500 – 1500 ETB which might have relation with respondents reason of "getting money". Out of all the participants, 616 (73.3%) think adding extra passengers (overloading) has no relation with RTA. From this we can conclude economic status of the taxi drivers and awareness issues may affect whether speedy driving and overloading is a perceived or actual cause of road traffic crash in various countries and contexts.

In this research 254 (53.1%), 198 (41.4%) and 26 (5.4%) serviced their cars every >5000 KM, every 5000 KM and every 3000 KM respectively. A study done in Addis Ababa reported 32.81% and 17.85% serviced >10 years and 5-10 years [47]. Despite the difference between the units measurement of duration and time gap, this can support our result that the longer the time the car servicing the higher the risk of RTA.

Three hundred twelve (65.3%) of the RTA are caused by mini-bus taxi drivers who were previously taxi assistant.

In another study done in Addis Ababa, 27.8% of RTA was caused by previous taxi assistant [47]. This shows previously taxi assistant turned mini-bus taxi drivers have caused more RTA in this study.

The driving experience of the mini-bus taxi drivers who were actually involved in RTA, was 184 (38.8%), 214 (44.8%) and 40 (8.4%) encountered by 1-2 year, 3-10 year, and >10 year respectively. If compared to another study done in Addis Ababa, 27.8%, 22.4% and 27.8% are caused by 1-2 year, 5-10 year and >10 year driving experience [47]. So this shows that RTA is higher which indicates the lesser the experience the more risk of RTA in this study.

In this study, from a total of 478 mini-bus taxi drivers who

were involved in RTA, 222 (46.4%) and 224 (46.9%) spend driving 7-10 hours and > 10 hours respectively. A study done in Kenya, 18 (6.0%) reported too long distance driving causing fatigue as predisposing factors [24]. This show that both studies support long hours driving predisposes are directly related to RTA.

One hundred ninety (39.7%) of the cars in RTA had no defect errors while 130 (27.2%) and 74 (15.5%) account for brake and tire mechanical problems respectively. The study in Kenya had 175 (59.6%) reported un-roadworthy vehicles in which 88 (27.9%) reported failure of breaking systems, 37 (12.5%) reported tire or wheel burst [24]. These results suggest majority of our RTA's were caused without mechanical problems in comparison to the Kenyan study.

In the current study 228 (43.0%), 190 (33.8%), and 290 (54.3%) of the RTA were caused in asphalt with good road condition, on a wide and straight road, and on a dry state of the road respectively. 98 (17.4%), 214 (40.7%) and 178 (33.3%) RTA occurred on wide and sloppy road, asphalt with poor condition and wet state of the road respectively. While in the Kenyan study, 59.6% attributed to human error and 58 (19.5%) attributed it to defective roads [24]. These both studies are suggesting that most of the RTA are occurring despite good road conditions. Despite these results, most of our participants (714, 85.0%) believe those poor road infrastructures (defective road) are the causes of RTA which suggests a further research work to be done on this issue.

A time period where the RTA most occurred in this study was 299 (54.3%) of the RTA occurred at day time while 98 (18.8%), 96 (18.4%) and 38 (7.3%) of the RTA occurred at night with the road lights on, at night with road lights off and at night without road lights respectively. A similar study done in Tanzania, suggests that there are more injured casualties on Mondays and Fridays during a day time with 24.3% and 23.9% than any other days of a week. On the other side there were more fatal casualties during the night/dark time on Sundays, the percentage risk of dying when involved in an accident on Sunday night is 42.9% [48]. From this we can see that most RTA occurred in day time in Addis Ababa than in Tanzania might be due to substance abuse, poor driving skills and lack of traffic law enforcement.

In this study, from the RTA that injured pedestrians, 64 (35.4%) and 36 (19.9%) were pedestrian crossing outside zebra cross and pedestrian walking on the side of the road respectively. Similarly a study done in Kenya, 89 (30%) reported careless road users [24]. From this we can see that careless road using is more in Addis Ababa than in Kenya.

Previous studies in the USA have indicated that alcohol and other CNS stimulants are highly related with RTA [49], which is more consistent with the findings of this study. This study showed, 181 (37.9%) of the RTA while the driver was under the influence, in which majority (136, 51.9%) of them were drunk driving and 82 (45.3%) of them was in a medium state of intoxication with 52 (38.0%) were in a high level of intoxication. In the Kenyan study, 41 respondents (13.8%) reported driving while drunk [24]. And in a similar study in Mekelle, 2/3 (75%) of the drivers report of driving 3 hours

after drinking alcohol [40]. These results showed Mekelle has a higher rate of drunk driving than Addis Ababa, but in general Ethiopia has a higher rate of RTA occurring due to alcohol intoxication in comparison to Kenya.

This study revealed that 226 (47.3%) of the injuries were minor and 166 (34.7%) had no injuries at all. On the other hand, 86 (18.0%) had major injuries. In comparison to Kenya, out of 30 RTA victims, 27 (90%) had serious injuries, while 3 (10%) had mild injuries [24]. With this result we might speculate that we have lesser rate of major injuries (serious injuries).

Six hundred ninety six (82.9%) of our participants believe that RTA can be caused by poor road traffic management and licensing system. Six hundred ten (72.6%) rate traffic police officers are not committed to their duties. 633 (75.4%) believe that traffic laws are nor appropriately enforced for which 169 (26.7%) reasoned that there is bribing of traffic officers. Three hundred fifty two (41.9%) responded that they didn't get awareness about RTA from traffic bureau. Majority of the respondents (244, 29%) and 198 (23.6%), got source of knowledge and experience about road safety rules from school and myself respectively. According to interviews done with accident victims in Tanzania (Kibaha district), all mentioned some weaknesses in traffic regulation enforcement in Kibaha district by the traffic police. To be specific, corruption, irresponsibility and poor management of traffic police force as an authorized body to govern, control and implement traffic safety measures as per required countries regulations, were identified as a problem [48].

Among the risk factors associated to the prolonging traffic accidents in Kibaha district, it was mentioned that, the performance of the traffic police, as an agency that is supposed to enforce road traffic regulations in Kibaha district, is not so much efficient and sufficient. It was mentioned that, the traffic Police give priority to corruption and tips other than following the traffic laws and regulations, one of the accident victims (a female aged between 40 to 45) emphasized that, "It is clearly observed, the police in most cases tend to negotiate openly with the drivers as an alternative means to avoid paying the penalty or fine or being prosecuted by demanding drivers to pay some amount of money to them which is less compared to the penalty or fine required" [48]. In both studies there were significant problems regarding the law enforcement and traffic police ethical issues. And further in this study the licensing system and creating awareness had a direct impact on the RTA.

## 5. Conclusion

We concluded there is a high rate of RTA by mini-bus taxi drivers in Addis Ababa city. And most of the accidents were on good road condition with a good weather in the day time and without mechanical defect on the car. This shows that despite in a good driving conditions RTA are occurring. And this led us to suggest there is a behavioral and awareness problems among the drivers that might be attributed to economic status, substance use and awareness creation

problem from traffic bureaus. Ethical issues among the traffic police officers (bribery, nepotism, negligence) and licensing system problems are among the risk factors mentioned for the cause of RTA.

Pedestrians with carless road using behavior have a direct impact on causing RTA. And driving long hours can attribute to fatigue on the driver and eventually contribute to the risk of occurrence on RTA. Generally the less the driving experience, the lower the educational status, the more driving hours, the higher duration for car service and taxi assistants who turned into mini-bus taxi driver showed their direct relationship with RTA in this study.

## 6. Recommendation

This study could significantly offer baseline information for further nationwide researches, and will be much helpful for the minibus taxi drivers in Addis Ababa, to take ultimate and crucial preventative measures regarding RTA. The provision of tailored messages to all members of the community regarding knowledge and practices of road safety measures like avoiding risky driving behaviors and following road traffic laws. We advise the Ministry of Transport to consider ethical issues regarding traffic police officers and the way driver licenses are given. Finally, regular awareness creation programs among the minibus taxi drivers and society as a whole is recommended.

## 7. Limitation of the study

We had difficulty with the SPSS program in the process of analyzing our data. The other problem we had was getting information about the total number of minibus taxi in each of the zones from transport authority.

## Abbreviations

E. C: Ethiopian Calendar; ECA: Environmental Consultant Association; ETB: Ethiopian Birr; G. C: Gregorian calendar; ID: Identification Document; LMICs: Low and Middle Income Countries; RTA: Road Traffic Accident; UN: United Nations; USD: United States Dollar; WHO: World Health Organization.

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