**Road traffic accident and factor associated among traumatized patients attending at emergency department of public hospitals in addis ababa, Ethiopia**

**Reviewer 1**

Completed: **2023-01-01 03:09 PM**

The current topic is quite interesting, however, I would like to suggest that the authors should check the typos and other grammatical mistakes.

1. I will recommend the authors present the statistical data mentioned in the background section in form of pie charts or a more presentable way.
2. “Ethiopia is, a country with a low vehicle/population ratio, is considered one of the country worst affected by road traffic injuries. This is mainly due to poor road safety plans and the failure of drivers to abide by the traffic rule (6).” Try to this improve this section.
3. In the methods, please try to provide more details about the hospitals.
4. In the instruments, authors should also cover more specific details about vehicles such as tire conditions and the breaks.
5. In figure 2, please add some bar errors which could show a possible range of the possible incidents.
6. In the discussion section, please add some details about the license age and compare it with the group corresponding to 10-19 years of age.
7. Also, in the discussions section try to make a comparison between personal vehicles and taxis for instance.
8. In the conclusion section, Being Females are protective for RTA than Males, please try to improve this sentence formation.

**Reviewer 2**

Completed: **2022-12-20 08:23 PM**

The topic looks interesting and within the journal’s scope. Major concerns need to be addressed.

1. Please use Theme Fonts of “Times New Roman” for words of  figure 1.
2. Please add the line and title for vertical axis in figure 2. In addition,  use Theme Fonts of “Times New Roman” for words of  figure 2.
3. Please use the same template for figures of 2, 3 and 4.
4. Please clarify table 4 with color similar to table 1
5. Please explain in the text of manuscript about Figures of 2, 3 and 4.
6. The manuscript should be screened for plagiarism.

**ORIGINAL MANUSCRIPT AS RECEIVED FROM THE AUTHOR**

**Received on 20th December 2022**

ROAD TRAFFIC ACCIDENT AND FACTOR ASSOCIATED AMONG TRAUMATIZED PATIENTS ATTENDING AT EMERGENCY DEPARTMENT OF PUBLIC HOSPITALS IN ADDIS ABABA, ETHIOPIA

**Eyob Hailu\*1, Zewedu Shewangizawe2, Abdulnasir Abagero2 Nigatu Nasir2**

**1Health service management, Kotebe metropolitan University Minillik II College of medicine and health science Ethiopia.**

\*Corresponding Author, [**eyobaldtg@gmail.com**](mailto:eyobaldtg@gmail.com)

## Abstract

**Back ground**: Approximately 1.35 million people die and another 20 to 50 million sustain nonfatal injuries as a result of road traffic injuries every year in Africa. Ethiopia is one of the highest rates of road traffic injuries occurring country, the Ethiopian Health Sector Development Program clearly gives more attention to RTA and violence among other non-communicable diseases.

**Objective** To assess the magnitude and factors associated road traffic accident among traumatized patients attending at emergency outpatient departments of public hospitals in Addis Ababa.

**Method** Facility-based cross-sectional study design was employed on a total of 381 samples. All traumatized patients who attend at emergency department of public hospitals in Addis Ababa city was population of the study. Systematic random sampling technique were employed to select study unites. The data was entered and cleaned by Epi-info version 7 and analyzed using SPSS for windows version 23.0 and presented using tables and figures.

**Results** A total of 373 samples were collected in the study and the most of samples were in the 30–40 years of age range. The magnitude of the road traffic accident was 57.1%. Most of the study participant (64.83%) were male and the maximum age was 79 with a mean of age is (+/- 34 years) responders. In adjusted analysis age is between, 20-29 years and 30-39 years (AOR= 3.032 95%CI: 1.5,6) and (AOR= 2.008 95%CI: 1,3.9) occupation (driver) (AOR=5.3 95%CI: 1.8, 15.3) and time light during accident(day) (AOR= 2.1 95%CI: 1.2, 3.5) has significant statistical association with road traffic. Sex being female, (AOR=0.48 95%CI: 0.2, 0.7) and weather condition (Cloudy) AOR= 0.2 95%CI: 0.4, 0.8) has protective effect from road traffic accident.

**Conclusion** Road traffic accident is more prevalence among the most productive and economically active age group. Being Females are 0.48 times higher protective for RTA than Males. Occupation (driver) 5.3 times higher risk to road traffic accident than students, weather condition(cloudy) 0.4 times protective than sunny for RTA and driving at a day time 2.1 times higher risk for RTA than at night. Improve the traffic system and community based awareness creation could decrease the incident of car accident.

## Background

World Health Organization (WHO) Road traffic Accident defined as street activity accident/injury as the damage that happened on a way or road open to open activity, brought about in one or more people being murdered or harmed and at slightest one moving vehicle was included. In this way, street activity mischance is collisions between vehicles, between vehicles and people on foot, between vehicles and creatures or between vehicles and settled impediments (1). Road traffic accident are the eighth leading cause of death globally and the leading cause of death for young people aged 15–29 (2).

Universally, around 1.35 million individuals died each year on the streets, and another 20 to 50 million support nonfatal wounds as a result of street activity crashes, among these 85% happened in low- and middle-income countries. This implies more than 3,400 passing claims on an everyday premise as a result of street activity wounds. Undoubtedly, it comes about in a 3% misfortune of the net residential item around the world and up to 5% in low and middle-income nations. African nations had the most noteworthy mortality rate, with 28.3 passings per 100 000 populations. The issue is expanding at a quick rate in African nations due to quick motorization and other factors (2).

In this design effective prevention strategies, there are requirements of discoveries about the magnitude of injury and its associated factors. Considering the expanding commitment of violence, accident and medical emergencies to the burden of disease, the Ethiopian Health Sector Development Program clearly gives more attention to injuries and violence among other non-communicable diseases. To materialize this, the ministry of health has prepared a national multi-sectorial Strategic Plan in coordination with various sectors. Road traffic accident, fire burn, falls and other work-related injuries are priorities in the plan. In any case, there's a scarcity of comprehensive information on the magnitude and pattern of RTA in Ethiopia. Without solid data, health care planner at all levels are incapable to apportion assets so as to realize the most prominent effect in preventing injuries, treating and restoring harmed people (3).

In 2013, about 246,718 people killed as a result of road traffic injuries in Africa. This number was approximately a fifth of the global total number of deaths (4). Also in Africa region road traffic injuries constitute 25% of all injury related deaths. Moreover, road traffic injuries is responsible for almost one in ten deaths of young men (aged 15-29) in the region (5)

Ethiopia is, a country with a low vehicle/population ratio, is considered one of the country worst affected by road traffic injuries*.* This is mainly due to poor road safety plans and the failure of drivers to abide by the traffic rule (6).

Therefore, this research is intended to fill the knowledge gap by providing data on magnitude of accident and associated factors in patients visiting the Emergency Department of Addis Ababa public hospitals, Ethiopia.

## Methods

## Setting and procedures

Facility based cross sectional study was used in the Addis Ababa public hospitals. Thus, study was conducted at one selected general and teaching referral hospitals which serves the country as secondary care and three tertiary referral hospitals which is serves as Tertiary care in Addis Ababa which were trauma designated hospitals. A total of 381 traumatized patient were participated in our study valid response rate of 98%.

## Instruments

The structured questionnaire consisted of four parts:

1) Demographic questionnaire

The demographic questions included sex, age, educational level, Address, marital status, occupation, reason to visit Emergency department and Roll victims at the time of injury

2) Characteristics of the driver and the victims (passenger, pedestrian) at the time of injury

It include over weight of the vehicle, driving with limited speed, willingness to give priority to pedestrians and for car and pedestrians’ movement.

3) Characteristics of road and Vehicle

The characteristics of road and vehicles were measured using type of vehicles you used during accident, types of Road and road character.

4) Environmental factor

It consists weather condition during accident, day of accident and time (Light) during accident

## Statistical analysis

First see the completeness of the data, data entry was performed using Epi Info 7 software. The data entered was checked for their consistency and export the data in to SPSS 23 for analysis. Frequency distributions and cross tabulations was used to describe the variables of the study. First Level of significance was determined using independent variables with 𝑝-value less than or equal to 0.2 at the bivariate level and select the significant variables and by the use of multiple logistic regression models see the significance variable for the dependent variables to control potential confounding variables. Statistical significance was declared if p < 0.05 and 95% CI. Adjusted odd’s ratios was used to identify any association between the dependent and independent variables.

## Results

## Demographic characteristics

From three hundred seventy three (373) injury patients, there were 242(64.8%) males and 131 (35.2%) females. More injured age groups were 30-39 years old group that accounts 109(29.2%) followed by those 20-29 years 105(28.1%). The least injured age group was below 10-19 age groups 77(20.6%) in Table 1.

**Table 1: The Demographic Data Variables of traumatized Patients Visited to Addis Ababa public hospitals Jan. 2021**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Personal Characteristics** | **RTA Frequency** | **%** | **Not RTA** | **%** |
| Sex | | |  |  |
| Male | 157 | 73.7 | 85 | 53.1 |
| Female | 56 | 26.3 | 75 | 46.9 |
| Total | 213 | 100 | 160 | 100 |
| Age group |  |  |  |  |
| 10-19 | 41 | 19.2 | 36 | 22.5 |
| 20-29 | 70 | 32.8 | 35 | 21.8 |
| 30-39 | 65 | 30.5 | 44 | 27.5 |
| Above 40 | 37 | 17.3 | 45 | 28.2 |
| Total | 213 | 100 | 160 | 100 |
| Occupation | | |  |  |
| Driver | 55 | 25.8 | 10 | 6 |
| Daily laborer | 20 | 9 | 42 | 26 |
| Employed | 56 | 26.6 | 46 | 28.7 |
| Merchant | 37 | 17.3 | 18 | 11.2 |
| Student | 36 | 17.3 | 36 | 22.3 |
| Other | 9 | 4 | 8 | 5 |
| Total | 213 | 100 | 160 | 100 |
| Education status | | |  |  |
| Illiterate | 11 | 6 | 13 | 8.3 |
| Primary(1-8) | 36 | 16.9 | 29 | 18 |
| Secondary (9-12) | 82 | 38.1 | 44 | 27.5 |
| Diploma and above | 84 | 39 | 74 | 46.2 |
| Total | 213 | 100 | 160 | 100 |
| Marital status |  |  |  |  |
| Married | 148 | 69.4 | 102 | 63.7 |
| Never Married | 65 | 30.6 | 58 | 36.3 |
| Total | 213 | 100 | 160 | 100 |
| **Mean Age** | | 32.7 |  |  |

## Magnitude of road traffic Accident

Among all traumatized patients Road traffic accident is the leading causes of accident which accounts 213(57.1%) from the total trauma patients. Fig. 1

**Fig1: Magnitude of trauma among all traumatized patients Road traffic accident in Addis Ababa, Jan. 2021**

RTA the leading cause of trauma and followed by personal violence which is account 74(19.8%). Trauma caused by other things like cutting by different type of machine and falling of heavy materials on the body is the least cause of accident which is cover 4(1.1%).

**\*\* Personal violence associated with physical abuse**

**\*\* Others include trauma by machine and falling down of heavy material on the body.**

Figure 2; Cause of trauma among all traumatized patients Road traffic accident in Addis Ababa, Jan. 2021

## Role of the Victims at the time of road traffic accident

Most of traumatized patients secondary to road traffic accident were pedestrians which covers 86(40.4%) from the total RTA patients and followed by those driver 59(27.7%). The least traumatized groups were assistant driver which count 15(7%).

## Figure 3; number of traumatized patient aggregated by roll in Addis Ababa, Jan. 2021

## Vehicle type that caused road traffic accident

Among 213 car accidents 43(20.1%) of the cases caused by Automobile (code 2) crashes and followed by 35 (16.4%) due to code3 public taxi (Dolphin, 5L and Abadula) and the least cause due to Lada which cover 11(5.1%) of the trauma.

**Figure 4; number of traumatized patient aggregated by types of car in Addis Ababa, Jan. 2021**

## Factors associated with road traffic accident

As shown in Table 2, bivariate analyses revealed several variables associated with road traffic accident, and multiple regression analyses presented a positive or negative relation. sex (Female) has significant statistical association with road traffic accidents (AOR=0.48 95%CI: 0.2,0.7).The other factors which had a significant statistical association with the development of road traffic accidents were Age between 20 to 29 and 30 to 39 (AOR= 3.032 95%CI: (1.5,6) and (AOR= 2.008 95%CI: 1,3.9). Occupation being driver (AOR=5.3 (95%CI: 1.8, 15.3), Time Light during Accident (Day) (AOR= 2.1 95%CI: 1.2, 3.5), Weather Condition (Cloudy) (AOR= 0.2 95%CI: 0.4,0.8) are also the other significant factors of RTA.

**Table 2. Result of Multivariate Analysis for the Selected Behavioral and Environmental**

**Factors Related to RTA January 2021.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factors | | RTA | | COR(95%CI | AOR(95%CI | P-value |
| Yes | No |
| Sex | Female | 56 | 75 | 0.41(0.26,0.6) | 0.48(0.2,0.7) | 0.004\* |
| Male | 157 | 85 | 1 | 1 |  |
| Age group | 10-19 | 41 | 36 | 1.4(0.7,2.5) | 2.158(0.8,5.4) | .104 |
| 20-29 | 70 | 35 | 2.4(1.3,4.4) | 3.032(1.5,6) | .002\* |
| 30-39 | 65 | 44 | 1.8(1.007,3.2) | 2.008(1,3.9) | .043\* |
| Above 40 | 37 | 45 | 1 | 1 |  |
| Educational level | Illiterate | 11 | 13 | 0.745(0.3,1.7) | 1.39(0.4,3.9) | .526 |
| Primary(1-8) | 36 | 29 | 1.094(0.6,1.9) | 1.704(0.8,3.5) | .158 |
| Secondary (9-12) | 82 | 44 | 1.642(1.01,2.6) | 1.732(0.9,3.2) | .083 |
| Diploma and above | 84 | 74 | 1 | 1 |  |
| Occupation | Driver | 55 | 10 | 5.5(2.4,12.4) | 5.3(1.8,15.3) | .002\* |
| Daily laborer | 20 | 42 | .476(0.2,0.9) | .411(0.1,1.1) | .081 |
| Other | 9 | 8 | 1.125(0.3,3.2) | 1.452(0.4,5) | .560 |
| Employed | 56 | 46 | 1.217(0.6,2.2) | 1.665(0.7,3.8) | .238 |
| Merchant | 37 | 18 | 2.056(0.9,4.2) | 2.335(0.8,6.3) | .096 |
| Student | 36 | 36 | 1 | 1 |  |
| Day of trauma | Friday | 23 | 26 | 0.57(0.28,1.1) | .679(0.2,1.5) | .357 |
| Monday | 35 | 23 | 1.03(0.5,2.05) | 1.083(0.4,2.4) | .849 |
| Saturday | 32 | 20 | 1.08(0.5,2.2) | 1.268(0.5,2.9) | .578 |
| Sunday | 25 | 19 | 0.936(0.4,1.9) | 1.156(0.4,2.8) | .750 |
| Thursday | 27 | 20 | 0.9(0.4,1.8) | .793(0.3,1.8) | .587 |
| Tuesday | 25 | 21 | 0.8(0.3,1.6) | .756(0.3,1.7) | .512 |
| Wednesday | 46 | 31 | 1 | 1 |  |
| Time Light during Accident | Day | 135 | 85 | 1.5(1.006,2.3) | 2.1(1.2,3.5) | 0.004\* |
| Night | 78 | 75 | 1 | 1 |  |
| Weather Condition | Cloudy | 167 | 111 | 0.6(0.4,1.04) | 0.4(0.2,0.8) | 0.01\* |
| Sunny | 46 | 47 | 1 | 1 |  |

## Discussion

Socio demographic and Magnitude of RTA

This study has illustrated the magnitude and associated factors responsible for RTA among patients visiting the Emergency Department of Addis Ababa public hospital during the study period. This study has illustrated the magnitude and associated factors responsible for RTA among patients visiting the Emergency Department of Addis Ababa public hospital during the study period. This study shows that RTA is the leading cause of trauma in Addis Ababa which is cover (57.1%) of trauma and followed by personal violence and falling down. A study conducted at the university Gonder hospital in Gonder is supported our findings it shows RTA is at the top with different trend (10) but this finding higher than the study was conducted in Addis Ababa (16) and Arbaminch city, Arbaminch hospital (19) which was 22.8% and 47% respectively. This is maybe due to study design and unit also the presence of high traffic flow in urban area. But most of the studies show that the leading cause of trauma is RTA followed by personal violence and falling down, which is similar to our finding.

This study revealed that RTA exposure was significantly associated with age of between 10-19 years 11(19.2%), 20-29 years 70(32.8%) and 30-39 65(30.5%). This is consistency with the study done Addis Ababa, Ethiopia. (16).The most commonly affected age group, accounting for 41%, was the 20-29 years followed by 30-39 years (18%). This is similar to other studies Tanzania (20). And elsewhere, were young men are reported to be largest consumers of the hospital emergency trauma services between 20-29 years (68%). This age group is active, strong, time for participating independent life out of parental supervision and reproductive which participate in all types of activities all over the world, this why they are exposed to the accidents. It also has implications for the design and implementation of more targeted interventions.

In this study most of traumatized patients secondary to road traffic accident were pedestrians which covers 87(56%) from the total RTA patients and followed by those driver 60(16%) which is consistence to the study done in Addis Ababa (21). This is also supported by research the World health report 2008. However, the contradictory with the study from Arbaminch hospital (19) that the passengers were more traumatized groups. This is likely to the presence of high density of population in the city which are not used car and shortage of road. Second most common of traumatized patients were drivers this may be due to the reason which is most of them are owners and the risky behavior of the occupation.

Automobiles owned vehicles used for family transport or business oriented vehicles had important role as a cause of accident in this study. City taxi (including Ladas and minibuses), buses, Bajaj’s, Motor cycle, FSR and Isuzu were the vehicle types mainly involved as accident causing vehicles however ambulances,”Garies” which are classified under other type of vehicles in this study were also not free of causing the accidents. According to the findings of the current study different types of vehicles involved in road traffic accidents among which the majority, 41(19.2%), were due to Automobiles followed by code 3 public taxi( 5L,abadula,dolphin..) 35(16.4%), Minibus 28(13.14%), Bus(public bus and long distance traveler bus) 20(9%) , Motor cycle 18(8.4%), Isuzu, Sino truck 14(6%), Bajaj 12(5.6%), Ladas 11(5.1%) however 17(8%%) victims were injured by other type of vehicle(“Gari”,Ambulance) this finding were contradicted with the finding of the study conducted in Arbaminch hospital (19) which motorcycle 45(40%) is the leading type of vehicles to cause collusion which is similar to the with study of medico-legal autopsies of RTAs in south India in which heavy motor vehicles (35.2%) were most common offending agents in road traffic accidents(22). This may be due to motorcycle were commonly used at Arbaminch city and India.

**Factor associated with road traffic accident**

A binary logistic regression was done to identify the association between road traffic accidents injuries and independent variables. In the bi-variety analysis Khat and Alcohol consumption, educational level, Marital status, occupation, days of trauma, sex, Age, time (light) of accident, and Weather condition were identified to be factors significantly (p<0.2) associated with road traffic accidents. However, the final outcome of the multiple logistic regression analysis was sex (Female), Weather condition (cloudy) and time of accident (night) has protective effect and weather condition, Age group (reproductive age) and occupation being driver and daily laborer were statistically significant variables.

In adjusted analysis sex (Female) has significant statistical association with road traffic accidents (AOR=0.48 95%CI: 0.2, 0.7). Being Females are 0.48 times higher protective for RTA than Males. This is also supported by research done at Black lion specialized Referral Hospital in the multivariate analysis, characteristics that were significantly associated with injury of assault include patient sex. It was found that odds of injury of assault to be increased for male {(P= 0.037, AOR, 2.528, 95%CI (1.058-6.037)} (38). Similarly research conducted in Arbaminch hospital also supported the finding sex is a significance variable [COR=18.16 (7.83-42.13)] (19). The higher susceptibility of males to injuries is recognized to be due to the nature of work exposing, majority of males have a tendency move on urban streets or increase the participation in high risk activities among male individuals.

The other factors which had a significant statistical association with the development of road traffic accidents were time light during accident (Day) (AOR= 2.1 95%CI: 1.2, 3.5). The finding is supported by the research conducted in Black lion hospital (3) the majority 156 (67.9 %) of road traffic accidents occurred during the day time. It is happening due to there is a high traffic flow at the day time in urban areas.

In adjusted analysis occupation being driver 5.3 times higher risk for RTA than students (AOR=5.3 (95%CI: 1.8, 15.3). This result similar with the study conducted in Tiruneshe Beijing hospital Addis Ababa (23). This may be due to the risky behavior of the occupation.

## Conclusion

RTA is the highest cause of trauma. Of the total 373 traumatized patients males were more victims than females. Automobile is the primary cause of RTA. Pedestrians were the most exposed group followed by driver. Being Females are protective for RTA than Males. Occupation (driver) risk to road traffic accident than students, weather condition(cloudy) protective than sunny for RTA and driving at a day time risk for RTA than at night.

# 8. Recommendation

1. According to this study, most accidents occur on curved road, which can be minimize if Addis Ababa city transport authority give attention on make out speed controls, traffic signs, traffic lights, and assign several traffic police during the day on this types of roads.
2. The cause of injury by road traffic accident was high in young age group so it should include in health education to teach the society to prevent RTA injury and raising public awareness to the consequence of injury.
3. According to this study, most accidents occur on pedestrians, and the main cause is pedestrian crossings on wrong way. Therefore, Pedestrians should be educated about traffic laws, the dangers consequence of car accidents, and other health education, and pedestrians should be prosecuted if they do not use “Zebra” during crossing. Addis Ababa Roads Authority should also identify areas where there are no “Zebra” and make it must be exist.
4. Addis Ababa city transport authority give attention to automobiles drivers because our finding shows that the primary cause of RTA were Automobile.
5. Government should equip law enforcement agents involved in regulating and monitoring road users to ensure and enforce safe driving and safe crossing. Road networks in the state and country entirely should be repaired, properly maintained, widened and fully equipped with road signs to assist drivers. Driver’s license should be issued only to qualified people. Citizens should change their attitudes positively, stop reckless driving, obey traffic codes, stop alcohol or drug intoxication.
6. For the researcher further study should be done on the same topic to improve the traffic system of the city.

## Abbreviations

AOR-Adjusted Odds Ratio, ARM-Annual Review Meeting, CI-Confidence Interval, ED-Emergency Department, EOPD-Emergency outpatient department ICU-Intensive Care Unit, LMIC -Low- Middle-Income Country, OR-Odds Ratio, PI-Principal Investigator, RTA-Road Traffic Accident, RTC-Road traffic collision, U.S.A-United States of America, WHO-World Health Organization

## Declarations

**Ethics approval and consent to participate**

The study was approved by the Ethical Committee of Kotebe Metropolitan university Minillik II health science college. All participants signed the informed consent before answered the questionnaire.

**Consent for publication**

All authors have agreed with the content and approved the submission of the manuscript.

# **Acknowledgment**

First of all, I would like to express my deepest gratitude to my advisor Mr. Zewdu Shewangizawe for his continuous guidance, support, and constructive input in my work, and then I would like to express my heartfelt gratitude and appreciation for my advisor Mr. Nigatu Nassir and also my mentor Mr. Abdulnasir Abagero for their Kind and constrictive comments. We thank all trauma patients who participated in our study.

## References

1. Peden M. et al., e., *The world report on road traffic injury prevention.*,World Health Organization: Geneva, 2004.
2. World Health Organization, "Global status report on road safety: supporting a decade of Action WHO Libr Cat Data Glob,2013.
3. Seid M, Azazh A, Enquselassie F, Yisma E. Injury characteristics and outcome of road traffic accident among victims at Adult Emergency Department of Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia: a prospective hospital based study,2015.
4. World Health Organization, Global Status Report on Road Safety, 340, 2015
5. Fesseha Hailu.The neglected health problem in Amhara National Regional State, Ethiopia,12873-019-0238-1, 2014.
6. United Nations Economic Commission for Africa, Case Study : Road Safety in Ethiopia Final Report,2009.
7. Abrahim Hassen. Risky driving behaviors for road traffic accident among drivers in

Mekele city, Northern Ethiopia, 2011

1. Sherafati F, Rad EH, Afkar A, Gholampoor-Sigaroodi R, Sirusbakht S. Risk factors of roadtraffic accidents associated mortality in northern iran; a single center experience utilizingoaxaca blinder decomposition, 2017.
2. Bewket T, Tiruneh B, Assefa D, and Berhanu B, "Incidence of Road Traffic Injury and Associated Factors among Patients Visiting the Emergency Department of Tikur Anbessa Specialized Teaching Hospital, Addis Ababa, Ethiopia , 2014.
3. Tadesse S. Pattern of Injury and Associated Variables as Seen in the Emergency Department at Tikur Anbessa Specialized Referral Hospital, Addis Ababa, Ethiopia."East African Medical Journal 46, 2014.
4. Ethiopan Road Safety, *National Road Safety Coordination Office of Ethiopia*: Addis Ababa.2008
5. Admassie D, Yirga T, and Wamisho BL, *Adult limb fractures in Tikur Anbessa Hospital caused by road traffic injuries: half year plain radiographic pattern.* Ethiop J Health Dev 2010. **24**: p. 61-63.
6. World Health Organization, GLOBAL STATUS REPORT: Time for action. WHO LibrCat Data Glob, 2009.
7. Fekede A., Demeke A. and GT. Magnitude of, trends in, and associated factors of roadtraffic collision in central Ethiopia.1471-2458-**14-1072, 2014.**
8. Deases health indicator survey, 2012.
9. Abegaz T, Gebremedhin S Magnitude of road traffic accident related injuries and fatalities in Ethiopia. 2019.0202240
10. Mishra B, Sinha ND, Sukhla S, Sinha A; Epidemiological study of road traffic accidentcases from Western Nepal. Indian journal of community medicine: 35(1):115, 2010
11. World Health Organization, "injury survillance guide line".2001.
12. Misker, “Magnitude and Factors Associated with Road Traffic Accident among Traumatized Patients in Arba Minch General hospital”,2017.
13. R Boniface, W Kiloloma and L Museru conceived Factors associated with road traffic injuries in Tanzania, 2016
14. Abrahalign M, Road safety challenges in addis ababa, particularly road users and traffic regulations.2008
15. Kanchan T, et al., *Analysis of fatal road traffic accidents in a coastal township of South India.* Journal of Forensic and Legal Medicine, **19**(8): p. 448-451, 2012.
16. Rediet Fikru Gebresenbet, Anteneh Dirar Aliyu; Injury severity level and associated factors among road traffic accident victims attending emergency department of *Tiruneh Beijing Hospital, Addis Ababa, Ethiopia: 2019.*
17. Saad AH, Al Gadhi SA, Mufti RK, Malick DF. Estimating the Total Number of Vehicles Active on the Road in Saudi Arabia. *Journal of King Abdul Aziz University Engineering Science.*2002;14:3–28.
18. Kehinde L, "Trauma at a Nigerian teaching hospital: pattern and documentation of presentation." Afr Health Sci **6**, 2006
19. World Health Organization, "Global status report on road safety .Supporting a decade of action. Geneva:2002.
20. Ansari S, Akhdar F, Mandoorah M, Moutaery K. Causes and effects of road traffic accidents in Saudi Arabia. *Public Health.*2000;114:37–39.
21. Saudi Gazette. *Traffic accidents: their heavy costs. Editorial. [Updated 2013 Sept 2]* Riyadh (KSA): Saudi Gazette; 2013
22. Forjuoh S, "A review of successful transport and home injury interventions to guide developing countries." **43, 1996**.
23. Abreham A, Awetachewe B, Tewolde W, “Magnitude and determinants of road traffic accidents in Northern Ethiopia” 2015.
24. Atubi, A. O. "Road Traffic Accident Variations in Lagos State, Nigeria: A Synopsis of Variance Spectra."vol **4**. 2010World Health Organization, Global Status Report on Road Safety, 340, 2015
25. STEPS. Ethiopia STEPS survey 2015; road traffic accident fact sheet. WHO. 2015
26. Demisse M; "risk factors associated with serious and fatal road traffic accidents in manzini city, swaziland.15**15**(1):10.2017
27. Bereket Duko, Fikru Tadesse and Zewdie Oltaye Patterns of road traffic injury and potential consequences among patients visiting Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia 13104-019-4192-5 2019.
28. Yideg Munana, An Assessment on the Impact of Road Traffic Accidents on Human Security in Gedeo Zone,Ethiopia, 2015.
29. Dobranskyte-Niskota A, " Indicators to assess sustainability of transport activities. European Comission, *2007.*
30. Khan MA, Agarwal PK, Chaki S Strategies for safety evaluation of road intersection to have sustainable development. Journal of Advanced Research in Automotive Technology and Transportation System2017;**2**:65–77.
31. Davis A, Acqueline Y, Moses A, Dominic A, Victoria,S, Nicolas O, “The burden of road traffic crashes, injuries and deaths in Africa”, 2016.
32. Annual Report. Abuja: Federal Road Safety Corps; 2014.

## Balogun JA, Abereoje OK. Pattern of road traffic accident cases in a Nigerian university teaching hospital between 1987 and 1990.

1. A. Teferi, B. Yemane, W. Alemayehu, A. Abebe “Effectiveness of an improved road safety policy in Ethiopia: an interrupted time-series study” 2014.