Original article

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Magnitude of Road Traffic Accidental Related Death among Adult Emergency Visited Patients at ALERT Hospital: A 2 Year Retrospective Review Study (2019-2020)

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ABSTRACT

Background: *In low-income countries, Road Traffic Accident-related death remains high. This describes that Road Traffic Accident is a major public health challenge and the problem is increasing from time to time in resource-limited countries. The most economically active age groups (18-50 years) are at the greatest risk of dying as a result of Road Traffic Accident. This affects economically, social, and political stability of the countries. Therefore, this study aimed to describe the magnitude of Road Traffic Accident-related death among patients who visited the Adult Emergency Department at All Africa Leprosy, Tuberculosis, Rehabilitation, and Training Center Hospital.*

Methodology: *A two-year Hospital based cross-sectional study design was applied from April 1 to May 30, 2021 to review charts of Road Traffic Accident victims who visited ALERT Hospital. A total of 172 Road Traffic Accident patients presented Emergency Department; One hundred fifty-five patient charts were reviewed using the convenience method. Data was collected by using a structured checklist. Descriptive statistics like frequencies, percentage, means, standard division, and proportion were computed for selected variables and analyzed by using SPSS version 21.*

Result*: The magnitude of road traffic accident injury-related death was 27 (17.4 %) [95% CI, 11.0 - 23.9%], of them 12(44.4%) were drivers, 11(40.7%) were pedestrians and 4 (14.9%) were passengers. More than half 93 (60.0%) of the victims were male with a male-to-female ratio of 1.5:1. The majority (50.3%) of victims' age fell between 21-40 years with a mean of 37.8 (SD ±18.2) respectively. Nearly one-third (27.1%) of victims' had more than six family sizes. The commonest occupational statuses of victims were taxi drivers 35(22.6%). Most of the accidents happened off-road 90(58.1%) by collisions with vehicles 80(51.6%). Nearly half (46.5%) of drivers were drinking alcohol while driving. Twenty-three (14.8%) of drivers used appropriate seat belts during driving. Nearly half (46.5%) of the drivers had a driving experience of fewer than three years.*

Conclusion and Recommendation*; Road traffic injury-related mortality rate was high. Results reported in this study suggest the need for immediate and fast action to be taken to save lives that are occurring on the roads. In particular, there is a fast need to introduce road safety interventions to decrease public health hazard that is affecting the lives of economically productive age group.*

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Key words: Death, Road traffic accident, Emergency department, ALERT Hospital, Ethiopia

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1. Introduction

Road Traffic Accident (RTA) is an accident that occurs when vehicles collide with other vehicles, pedestrians, and stationary obstacles. (1) RTA related problem is increasing from time to time in developing countries, related with due to rapid motorization and other factors like weak enforcement of the road traffic laws, ignorance of the pedestrians, negligence of the drivers, bad road infrastructure, poor road network, poor conditions of vehicles, rampant reckless driving, and irregular or non-existent vehicle maintenance. (2)

Road traffic accident affects people throughout their lives, but the biggest impact is predominantly in the productive age group. The consequence of RTA encounters physical disabilities and psychological disorders among young adults. This impact of RTA also extends to affect the respective families and associated communities. (2)

Globally, in both developed and low-income countries, the magnitude of RTA-related death becomes high, due to rapid population growth, industrialization, and an increase in road traffic vehicles. (3) Worldwide, 1.35 million people die each year from RTA, and also more than 20–50 million people are seriously injured or disabled. (4) This means that the mortality rate of RTA-related death was 26.6 per 100,000 populations. (5) Every day, 3,700 people are died globally due to road traffic crashes. More than half of death was from pedestrians, motorcyclists, and cyclists. (6) RTA is estimated to be the 8th leading cause of death globally for age groups, 5-49 years. WHO predicts that RTA will become the 5th common cause of death, in 2030. (7)

African countries also experienced the highest mortality rate from RTA, which is 28.3 deaths per 100,000 populations, and also RTA results in slight injuries, serious injuries, loss of life, and property damage. The prevalence of RTA-related death was different from one country to another, in Egypt (64%), Tunisia (58%), Morocco (51%), Libya (43%), Djibouti (42%), Mauritius (37%), Namibia (36%), and Niger (34%) respectively. (9) A high mortality rate from RTA was reported in Sub-Saharan African countries due to patient overload, poor integration with other health services, limited and inefficient services, poor clinical documentation, and a shortage of necessary medical supplies that challenges delivering high-quality emergency care services. (10)

Even though Ethiopia is a country with a low rate of motorization, several people get injured and died as a result of RTA and the country was experiencing a tremendous loss of life and property each year. This makes Ethiopia, one of the worst countries in the world with RTA-related death. In Ethiopia, the largest proportion of series injuries comes from RTA and become the major cause of death in the emergency room among trauma victims. (11)

Like other countries, the prevalence of RTA-related death was high in Ethiopia, which means the mortality rate was 37.7 persons per 100,000 population. (12) To alleviate and reduce the death from RTA a different number of strategies were implemented, which include safety awareness programs, improving the visibility of road use, and road safety rules like speed limit; seat belt law; helmet law; drink-driving law; mobile phone use while driving law; and child restraint law; However till high mortality rate related with RTA in our country. (13) In general, different studies were conducted in our country concerning RTA injuries, which emphasize more on the magnitude of Road Traffic injuries rather than RTA-related death. Therefore, it is difficult to conclude the magnitude of RTA-related death

due to the limited number of studies of death outcomes from RTA in the specific study area. Therefore, this study aimed to assess the magnitude of RTA-related death at ALERT Hospital.

2. Methodology

Study area and period

This study was conducted in ALERT Hospital from April 1 to May 30, 2021. ALERT Hospital is a Specialized Tertiary Hospital, which has three hundred eighty beds and is located in Addis Ababa, Ethiopia. It serves especially in Trauma and Emergency, Critical Care, Dermatology, Plastic and reconstructive surgery, and Orthopedics. The Adult Emergency Department had thirty beds and approximately an average of seven RTA patients per month visited ALERT Hospital. Adult Emergency Department was staffed by five Emergency Specialist Physicians and forty Nurses. (14)

Study design

A hospital-based cross-sectional study was conducted from April 1 to May 30, 2021 on RTA patients who visited ALERT Hospital, to assess RTA-related death.

Source of population

All Emergency patients who visited ALERT Hospital from January 1, 2019 to December 30, 2020 was considered as a source of population.

Study population

All RTA patients presented ALERT Hospital from January 1, 2019 to December 30, 2020 was the study population.

Inclusion & exclusion criteria

This study included all RTA patients, who visited the Adult ED from January 1, 2019 to December 30, 2020 whereas incomplete charts (>25% missing important variables), hospital arrival death, not well diagnosed for RTA, and absence of patient charts from shelf placement were excluded.

Sample size determination and sampling frame

In this study convenience sampling method was applied because RTA patients who visited ALERT hospital from January 1, 2019 to December 30, 2020 were limited in number. All 155 RTA victim charts, which fulfilled inclusion criteria during the study period were reviewed.

Data collection and procedure method

Data was collected after study tools were adopted from different studies with few modifications. Three BSc Nurse was recruited for data collection. Half-day short training was given for data collectors by the principal investigators. The data collection sheet includes Socio-demographic characteristics, Driver related factors, Vehicle related factors, and road traffic accident conditions. Raw data were obtained from secondary data sources from HMIS reports, HMIS registration books, Medical registration charts, Clinical care notes, and the hospital death certificate.

Data processing and analysis

After assuring the data quality, all responses to the survey questionnaires were coded on pre-arranged coding sheets by the principal investigator to minimize errors. Data were analyzed using Statistical Package for Social Studies (SPSS) version 21. Description of simple frequency, percentage, mean, standard deviation, proportion, and rate of the given data on each variable was computed.

Operational definition

Alcohol drink: Is intake of alcoholic beverage, any fermented liquor, such as wine,

beer, or distilled spirits, that contains ethyl alcohol, or ethanol, as an intoxicating agent.

Road traffic accident: an accident that occurs when vehicles collide with other vehicles, pedestrians, and stationary obstacles. (1)

Road traffic fatality: a death occurring within 30 days of a road traffic crash. (1)

Vulnerable road users: - Road users most at risk in traffic, such as pedestrians, public transport passengers, cyclists, children, aged people, and disabled people are also included in this category. (1)

Severe injury: According to Kampala Trauma Score II, a score of 6 or less was considered severe while KTS of 7 and 8 as Moderate [15]. However, for this study, any RTA related injury with a KTS II score of 8 or less is named as a severe injury. (Table 1)

Non-severe injury: According to Kampala Trauma Score II; KTS II of 9 and 10 were considered as mild.(15)

Table 1: Kampala Trauma Score (KTS II) description (15)

S.N	Parameter	KTS II description	Score
A	Age: (in Years)	Age: 5-55	1
		Age; <5 or 55	0
B	Systolic Blood Pressure on admission	More than 89 mm Hg	2
		Between 89-50mm Hg	1
		Equal or below 49mm Hg	0
C	Respiratory rate on admission	0-29/minute	2
		>30/minutes	1
		< 9/minutes	0
D	Neurological status	Alert	3
		Responds to verbal stimuli	2
		Responds to painful stimuli	1
		Unresponsive	0
E	Score for serious injuries	None	2
		One injury	1
		More than one injury	0
KTS II Total		A+B+C+D+E	

Non-severe injury: - According to Kampala Trauma Score II; KTS II of 9 and 10 were considered as mild [15].

3. Results

One hundred seventy-two RTA patients visited the ED of ALERT Hospital from January 1, 2019 to December 30, 2020, of which one hundred fifty-five (90.1%) of the study participants' charts were reviewed that were available during the data collection time. From total RTA victim charts, 9.9% of patient charts were removed from analysis due to; 7(41.2%) patient charts being absent from the shelf, 3(17.6%) arrival death, 5(29.4%) incomplete charts, and 2(11.8%) charts were not well diagnosed for RTA. The magnitude of road traffic accident injury-related death was 27 (17.4 %) with 95% CI, (11.0 - 23.9%), of them 12(44.4%) were drivers, 11(40.7%) were pedestrians, and 4 (14.9%) were passengers in the study area. This section presents the profile of respondents, road traffic accident conditions and their outcomes, driver's characteristics, and vehicles condition with RTA-related death.

Socio-demographic characteristics of respondents

More than half (66.5%) ED presented RTA patients came from Addis Ababa town. Out of 155 RTA cases who visited the Adult Emergency Department, 93 (60.0%) were male with a male-to-female ratio of 1.5:1. The victims' age ranged from 18-94 years with a mean (±SD) of 37.8 (±18.2) respectively. The majority (50.3%) of victims' age fell between 21-40 years and followed by ages greater than forty, which account for 53(34.8%). Nearly half (48.4%) of RTA patients were single in marital status. Regarding the respondents' educational status, about 56(36.1%) of the victims had University or college certificates and followed by 52(33.5%) of them reached secondary school. Nearly one-third (27.1%) of RTA victims had more than six family sizes (Table 2).

Table 2: Socio-demographic characteristics prevalence of Road traffic accidental related death in the Emergency Department of ALERT Hospital, Addis Ababa, 2019-2020 (N=155)

Variables	Responses	N (%)
Residents of RTA patients	From Addis Ababa	103(66.5)
	Out of Addis Ababa	52(33.5)
Sex	Male	93(60.0)
	Female	62(40.0)
Age(years)	<20	24(15.5)
	21-40	78(50.3)
	>41	53(34.2)
Marital Status	Single	75(48.4)
	Married	54(34.8)
	Others	26(16.8)
Family size	< 5	113(72.9)
	> 6	42(27.1)
Level of education	Read and write	24(15.5)
	Primary school	23(14.8)
	Secondary school	52(33.5)
	University or college	56(36.1)

N stands for frequency whereas % for percentage **Others** includes separated, divorced, and widow

The commonest occupational statuses of RTA patients who visited ED at ALERT hospital were taxi drivers 35(22.6%) and followed by governmental employees 32(20.6%) (Figure 1).

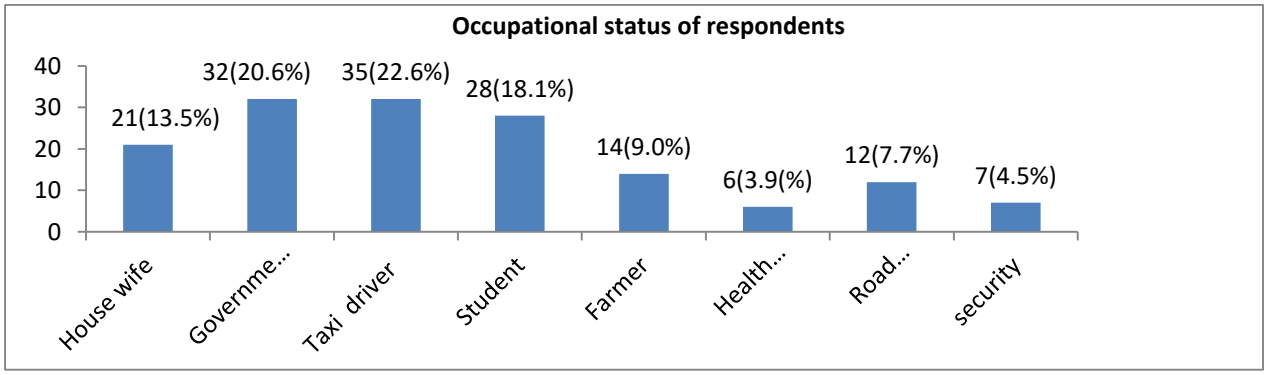

Figure 1:- Occupational status of the RTA patients at ALERT Hospital ED, AA, 2019-2020 (N=155)

Road Traffic Accident Conditions and Its Outcomes

Commonly, the accident happened off-road 90(58.1%) whereas on asphalt roads about 65(41.9%) respectively. Many of the collisions were with vehicles 80(51.6%) and followed by human pedestrians, which scored 53(34.2). The majority 103(66.5%) of the injury occurred in summer weather conditions. Drinking alcohol and using chat chew during driving accounted 72(46.5%) and 16(10.5%) respectively (Table 3).

Table 3: Road traffic accident conditions in the ED of ALERT Hospital, AA, 2019-2020 (N=155)

Variables	Response	N (%)
Over speed driving	Yes	29(18.7)
	No	126(81.3)
Alcohol drinking while driving	Yes	72(46.5)
	No	83(53.5)
Pedestrian carelessness	Yes	31(20.0)
	No	124(80.0)
Chat chewing during drive	Yes	16(10.5)
	No	139(89.7)
Failure to follow the right-hand rule	Yes	50(32.3)
	No	105(67.7)
Failure to give way to pedestrian	Yes	34(21.9)
	No	121(78.1)
Phone use while driving	Yes	28(18.1)
	No	127(81.9)
Type of collision	With human pedestrian	53(34.2)
	With other vehicle	80(51.6)
	With obstacle	21(13.5)
	With animal	1(0.6)
Who was injured due to RTA	Passengers	55(35.5)
	Pedestrian	61(39.4)
	Driver	39(25.1)
Who was death due to RTA	Passengers	4(14.9)
	Pedestrian	11(40.7)
	Driver	12(44.4)
Type of road	Asphalt	65(41.9)
	Non Asphalt	90(58.1)
Weather condition	Winter	52(33.5)
	Summer	103(66.5)

RTA is the leading consequence of the accident conditions constituting 49(31.6%) of seriously injured people who require intensive surgical management followed by 79(51.0%) minor injury people (Figure 2).

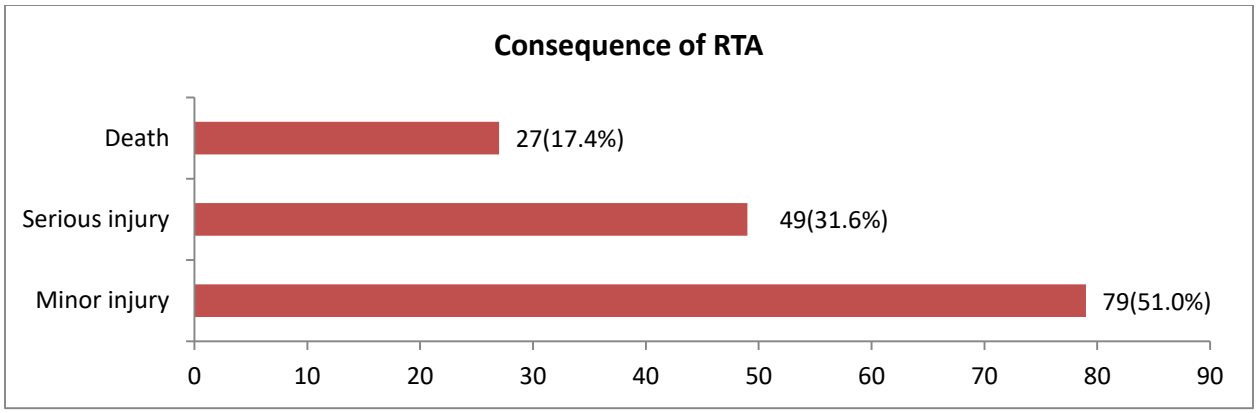

Figure 2:- Consequence of the RTA outcomes of ALERT Hospital ED, AA, 2019-2020 (N=155)

Fifty-three (34.2%) of the accidents occurred at commercial centers, and nearly half 46 (29.7%) accidents occurred at Churches and Mosques respectively (Figure 3).

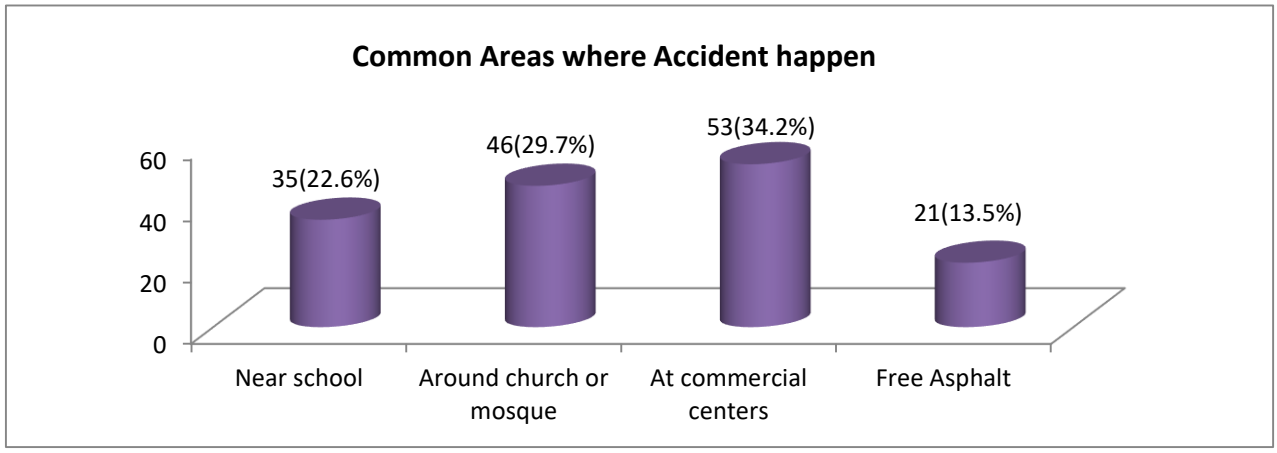

Figure 3:- Common Areas of RTA occurred of ALERT hospital visit patients, AA, 2019-2020 (N=155)

Forty- eight (31.0%) of RTA occurred at two junction streets, while 46(29.7%) at three junction streets respectively (Figure 4).

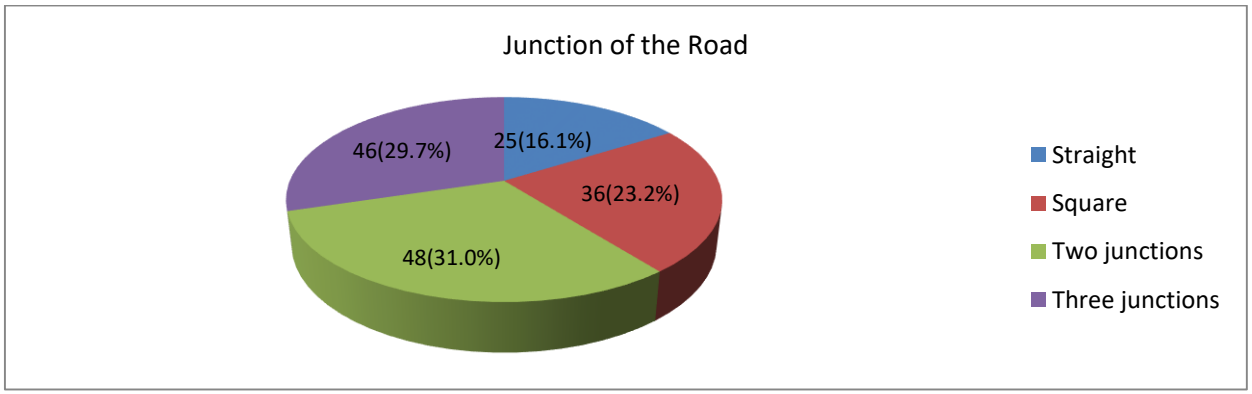

Figure 4:- Types of road junction RTA occurred of ALERT hospital visit patients, AA, 2019-2020 (N=155)

Driver's characteristics

More than ninety-four percent (146) of RTA injured patients have trained in first aid provision care. A large part of 150(96.8%) RTA victims' had no life insurance. A small number 23(14.8%) of drivers used appropriate seat belts during driving even though the majority 132(85.2) of them didn't use a seat belt. Nearly half (46.5%) of the drivers had a driving experience of fewer than three years (Table 4).

Table 4:- Drivers characteristics' in the Emergency Department of ALERT Hospital, Addis Ababa, Ethiopia, 2019-2020 (N=155)

Variables	Responses	N (%)
Trained first aid training	Yes	9(5.8)
	No	146(94.2)
Life insurance	Yes	5(3.2)
	No	150(96.8)
Use seat belt	Yes	23(14.8)
	No	132(85.2)
History of chew chat	Yes	43(27.7)
	No	112(72.3)
Driving experience	< 3 years	72(46.5)
	>3 years	83(53.5)

Vehicles Condition

Four-wheeled vehicles were attributed to most 20(12.9%) of RTA-related death in this study followed by three-wheeled vehicles 13(8.4%) respectively. Fifteen (9.7%) of the vehicles had mechanical problems during the accident occurred. Brake was found to be the commonest mechanical problem 5(33.3%) of road traffic accidental death followed by tire 4(26.7%), and lighting problems 4(26.7%) respectively (Table 5).

Table 5:- Vehicles conditions of RTA victims presented ED of ALERT Hospital, Addis Ababa, 2019-2020, (N=155)

Variables	Response	N (%)
Type of vehicle	Three wheeled	13(8.4)
	Four-wheeled	20(12.9)
	Not complete data	122(78.7)
Mechanical problem on car	Yes	15(9.7)
	No	140(90.3)
Common types of mechanical problem	Brake	5(33.3)
	Steer	2(13.3)
	Tire	4(26.7)
	Lighting	4(26.7)

4. Discussion

This study revealed that the prevalence of road traffic accident-related deaths was 27(17.4%) with a 95% CI, (11.0 - 23.9%). This study finding is lower than the study conducted in India and Mekele. (16-17) And also the high magnitude of RTA – related death scored in Egypt, Tunisia, Morocco, Libya, Djibouti, Mauritius, Namibia, Niger, and University of Gondar Comprehensive Teaching and Referral Hospital (9,18) respectively. This difference could be due to the study setting, the study time, sample size, emergency service quality and also currently Ethiopia government emphasize and establish different number of strategies implemented to alleviate and reduce RTA-related death, which

include safety awareness program, improving the visibility of road use, and road safety rules like speed limit; seat belt law; helmet law; drink-driving law; mobile phone use while driving law; and child restraint law, and road traffic law and rule implementation. (13) On the other hand, the finding in this paper was higher than a study conducted in Dilchora referral hospital, Dire Dawa, Tikur Anbesa specialized hospital, Wolaita Zone, SNNPR, Al-Jalaa Hospital- Libya, Adama general hospital, Iran, Ahmedabad City, India, and Zewditu memorial hospital. (19-26) This discrepancy may be due to the studies set up might be well equipped for trauma treatment, many RTA victims were linked from another health facility, low patient overload of ED patients, and fewer life-treating cases presented to ED. In addition, the result of this study was in line with a study conducted at Jimma University Medical Center, Adama town, and Lucknow, India. (27-29)

Concerning the age of road traffic victim majority 50.3% of them were within in productive age group (21-40 years). This is in line with the findings of Kenya. (30). And also study conducted in TASH was supporting our study; the majority of them were within the age group of 21-30 years. (31) Other findings also indicated that this age group was the most affected in Ethiopia. (32-33) The different studies showed that RTA is frequently affecting the financially fruitful age group; this might be results serious burden of public issues. The reason for the young age group's predominance in road traffic accidents might be due to their large involvement in occupationally high-risk activities and their massive movement from place to place for business activities. In addition, young adults are more likely involved in risky behaviors like traffic rule violations, reckless driving and alcohol use.

The finding of this paper also showed that severe injury requiring intensive surgical management was 31.6%, whereas minor injury was 51.0%. This is in line with the findings of Kenya, Tanzania, TASTH, and Turinesh Beijing Hospital (31, 34-36) and also reported results from Yirgalem General Hospital, Southern Ethiopia minor injury and severe injury respective. (37) However, a study in Jimma University Medical Center high number of severe injuries and less mild injuries (27) reported. The discrepancy might be due to Jimma University Medical Center serving a larger population from rural residences that comes to the hospital after a long-distance journey, this indicated that injury without immediate care increases the severity index on patients.

The finding of this work argues that most prevalence of RTA-related death occurred among drivers, followed by pedestrians, and passengers (38), and also the finding of this paper showed that drivers, pedestrians, and passengers were the most victims of RTA-related death. This may be explained by the fact that the road environment in Ethiopia is known to be relatively unsafe and uncomfortable compared to that of higher-income countries and the country has a mix of road users. Thus, it can increase the fatality and the severity of injury to drivers, pedestrians, and passengers that necessitate admission to the ED of ALERT hospital.

This study showed that nearly half of the drivers drank alcohol while driving. Alcohol use has been identified as one of the most important risk factors in the causation and severity of road traffic crashes. The consumption of alcohol, even in small doses, increases the risk of being involved in a road crash for all road users, whether motorists or pedestrians. This is because alcohol interferes with road users' skills

by impairing cognition, vision, and reaction time. It also increases the likelihood of adopting other risky forms of behavior, such as speeding and not using safety equipment such as seatbelts and helmets. (38) Unlikely other results showed that in Tanzania, Kenya, and Ethiopia. (30, 35, 39) This is due to a lack of good mechanisms for measuring blood alcohol content levels and breathing analyzers for drivers during driving.

Limitations

This was a hospital-based study involving one public hospital only; it may not reflect what is happening in other hospitals, public health centers, and other health facilities.

As the data were collected retrospectively by reviewing the medical records or charts at the hospital; some information like the time of accident occurred, time of hospital arrival, length of hospital stay, access to pre-hospital services, mode of transport to the hospital, source refer and monthly income of victims was difficult to access.

5. Conclusion and Recommendation

In conclusion, RTA-related death is a major public health problem in Ethiopia. The magnitude of RTA- related death remains high in the study area. Urgent road traffic accident preventive and intervention measures should be taken to be reducing mortality among RTA victims. The government body especially, the transport minister and federal traffic police better provide awareness creation on traffic rules and laws for drivers, pedestrians, and passengers. Furthermore, the government better create a mechanism to control alcohol drinking by measuring blood alcohol content levels and breathing analyzers for all drivers and also traffic law enforcement strictly recommended.

Abbreviation

ALERT: Africa Leprosy, Tuberculosis, Rehabilitation, and Training Center
ED: Emergency Department
HMIS: Health Service Management System
RTA: Road Traffic Accident
SPSS: Statistical Package for Social Studies
TASTH: Tikur Anbessa Specialized Teaching Hospital
WHO: World Health Organization

Author Contributions

BT, MK, and GJ conceived the study and were also involved in the study design, reviewed the article, analysis, report writing, and drafted the manuscript. They have reviewed and approved the submission of the manuscript.

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Conflict of Interest

The authors declare that they have no competing interest

Data Availability

The datasets used and/or analyzed during the current study are available and could be accessed upon the prior request to and permission from the researcher.

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