

Road Traffic Accident Related Fatalities in Addis Ababa City, Addis Ababa, Ethiopia: An Analysis of Police Report 2013/14

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Abstract

Background: Increase in access and number of transportations pose a great challenge in the individual's daily activity ranging from minor injury to death. The nation also suffers from lose of productive citizens.

Objectives: To assess the magnitude and factors contributing to the mortality related to Road Traffic Accidents in Addis Ababa, Ethiopia.

Methodology: Data from the Addis Ababa Police Commission; Traffic Police Department. It was collected from the checklist of information by the police officer at the scene. Data entered to SPSS version 16.00. Results were generated from the SPSS and presented to the department of emergency medicine. Dissemination of the result was made available to concerned bodies (Addis Ababa Traffic Police Department, Federal Ministry of Health Ethiopia and Federal Ministry of Transport).

Result: Overall, there were 2372 recorded road traffic accidents in Addis Ababa during 2006 (2013/14). Of these, 382 (16.1%) were fatal. Among all fatalities majority were male 279 (73.03%), Male/Female- 3:1 and pedestrians 321 (84.0%). Fatal accidents were more prevalent on isled roads 262 (60.7%) and involved especially commercial cars. More than half of fatalities 205 (53.8%) occurred due to failure to give a way for pedestrians.

Conclusion: Majority of affected were vulnerable road users and pedestrians. Many victims died at the scene instantaneously. These findings can serve as a basis for health care professionals and policymakers to create preventive measures for traffic accidents.

Keywords: Road Traffic Accident; Mortality; Addis Ababa; Ethiopia

Introduction

Background

Road transportation provides benefits both to nations and to individuals by facilitating the movement of goods and people. It enables increased access to jobs, economic markets, education, recreation and health, which in turn has direct and indirect positive impacts on the health of populations. However, the increase in road transportation, has also placed a considerable burden on people's health - in the form of road traffic injuries, and the health consequences that ensue from a reduction in physical activity.

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 more 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

a 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]. WHO calculated the risk of dying in a road traffic crash by continent and Africa is the leading with the chance of 24.1 followed by eastern Mediterranean (21.3) residing in Europe is being the safest (10.3).

Even though the numbers show the large prevalence rate in RTA in developing countries specifically in Africa (Including Ethiopia) the issue is still under reported and neglected area to be studied and interventions are needed urgently [2,3].

With economic growth, especially in low and middle-income countries, more vehicles are on the roads making daily transportation more complex and dangerous. Road Traffic Injuries (RTIs) constitute a major public health challenge killing thousands of people prematurely every day, representing the leading cause of death for young people. Additionally, it is expected that these numbers will increase by about 65% over the next 20 years. Road traffic injuries have been the leading cause of permanent disability and mortality among those aged 10 to 50 year in developed countries, the same picture is unfolding in developing countries as they undergo what has been termed the "epidemiology of transition". In many developing countries, not only is the incidence of various injuries increasing but also the causative factors are changing from the historical patterns such as falling from trees to injuries due to occupational hazards, interpersonal violence and road traffic injuries, which appear to be the leading cause of traumatic injuries. Young age, high speed, and alcohol are predictors of fatal road traffic accidents.

The issue of road safety has already become critical in Ethiopia- a country with low rate of motorization. The number of people killed and injured as a result of traffic accidents has been steadily increasing and the country is experiencing a tremendous loss of life and property each year as one of the leading countries of the world with worst accident record. Recent studies Abegaz., *et al.* [2] reported an average of 1.2 deaths per every fatal crash on Addis Ababa - Adam/Hawassa main road. Thus, it is important to conduct this research to evaluate the prevalence, trend and the different level of injuries and deaths thereby to standardize our transport policy as well as emergency medical system in Addis Ababa and in the country at large [4].

Therefore, the current study is immensely important to highlight important predictors of mortality in the roads of Addis Ababa as well as to recommend possible road safety mechanisms congruent to the context of the study area. Moreover, it will contribute its own share for policy development as needed, and accordingly, other researchers can use it as a baseline evidence for further studies.

Methods

Study setting and period

The study was conducted between September 2013 and August 2014 in Addis Ababa City Administration, the capital city of Ethiopia and seat of African Union and United Nations World Economic Commission for Africa. Addis Ababa has a total population of 2,738,248; of whom 1,304,518 are men and 1,433,730 are women.

Study design

Retrospective descriptive, cross-sectional study was employed, of data obtained from the Addis Ababa Police Commission, Police register on all road traffic crashes with fatalities that occurred in Addis Ababa City Administration between September 2013 and August 2014

Data collection

The standardized data collection checklist/from which on work by the Addis Ababa Police Commission, Traffic Police Department and the log book was used as a sole instrument of data collection Data was obtained from the Addis Ababa Traffic Police Department (AATPD).

Variables related to fatal crashes events such as Socio demographic variables, type of road users involved in accident whether pedestrians, driver or passengers, the type vehicles which cause the injury, crash location, crash type, time, day, and month and weather conditions extracted. Crashes types will also be included such as: pedestrian injuries, vehicular tipping or rollover, vehicular collision with bicycle, fixed or mobile object, vehicular head-on/ side impact, rear ended, transverse collision (T-Bone) and others

Data analysis and interpretation

The data obtained was checked and edited manually, then coded and entered into the computer using the Statistical Package for the Social Sciences (SPSS) version 16.00. Frequencies were generated and presented by graphs and pie charts

Ethical clearance

Ethical clearance was obtained from Institutional Review Board of Department of Emergency Medicine, Addis Ababa University and was produced for Addis Ababa Police Commission and their official permission was obtained. Letters was prepared to the local authority of all sub city police departments.

Results

Sociodemographics and drivers profile (Table 1)

Between September 2013 and August 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. The two age groups (Table 1) of drivers perpetrate were from 18 to 30 years with (155, 44.7%) and from 31 - 50 years (144, 41.5%).

The educational status of the drivers was analyzed and among all most of attended senior secondary school and post senior secondary school 45% and 20% respectively (Table 1). The relationship of drivers with the vehicle they were driving is 58.4% of those drivers were recruited mostly being commercial cars; others (either borrowed from a friend or family accounts for 78 (20.4%) and owners involved were 47 (12.3%) the remaining 9% unknown. Of those drivers involved majority of the drivers killed during the crash (42.1% were educated to senior secondary school level; 15 out of 19 drivers had driving license and 7 (36.8%) of them were driving automobile, one public transport with above 45 seats were responsible for the 113 victims and 12 fatalities alone.

	Frequency	Percent
Age category of drivers (years)		
< 18	4	1.2
18 - 30	155	44.7
30 - 50	144	41.5
> 50	44	12.7
Gender		
Male	351	91.9
Female	4	1.0
Unknown	27	27
Educational status of the driver		
Illiterate	3	.8
Primary education	37	9.7
Junior secondary education	55	14.4
Senior secondary education	170	44.5
Post senior secondary school	76	19.9
Unknown	41	10.7
Relationship of the driver with the vehicle		
Owner	47	12.3
Recruited	223	58.4
Other	78	20.4
Unknown	34	8.9
Driving license		
Yes	322	84.3
No	20	5.2
Unknown	37	9.7
Not Applicable	3	.8
Driving experience in years		
Less than one year	31	8.1
1 - 2	23	6.0
2 - 5	84	22.0
5 - 10	86	22.5
Above ten years	99	25.9
Unknown	56	14.7
Not Applicable	3	.8

Table 1: Socio-demographic characteristics of drivers involved in Road Traffic Accident, Addis Ababa, Ethiopia, September 2013 - August 2014.

99 (25.9%) of drivers held responsible for the fatal crash were well experienced who have been driving for more than ten years; followed by those having 5 - 10- and 2 - 5-years accounting 22.5% and 22.0% respectively; there were also 12 people who had no driving experience.

Large number of fatal accidents happened by commercial cars 262 (68.53%) like 12 seat capacity taxi, trucks Midi buses including city HIGER buses; the second group 19.1% of drivers were having automobile. Of these fatal crashes 7 automobile, a single public bus, 3 mini-buses and 4 other vehicles (e.g. roller compacter, excavators, Figure 1).

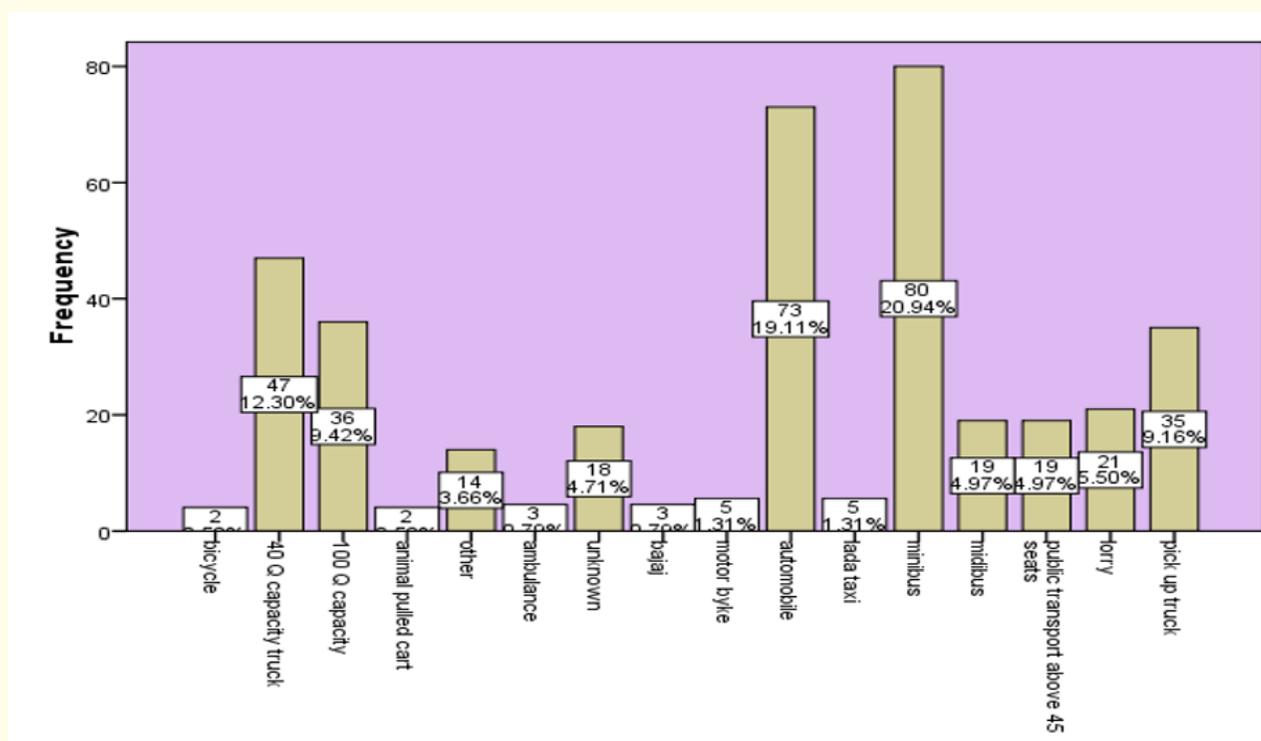


Figure 1: Types of Motor Vehicles involved in Road Traffic Accident, Addis Ababa, Ethiopia, September 2013 - August 2014.

Regarding vehicular defects 78.3% of vehicles had no vehicular defects detected and 21.2% of cars' status was unknown; there were only one tire and brake defect each.

Circumstance of the accident (Table 2 and 3)

Kolfe Keranyo and Yeka sub city had 53 (13.9%) fatal accidents each followed by Nefas Slik lafto with 52 (13.6%) fatal crashes (Figure 2). The average number of fatalities per year on the road type by lane was 232 (60.7%) fatality crashes followed by 113 (29.6%) on the double lane roads.

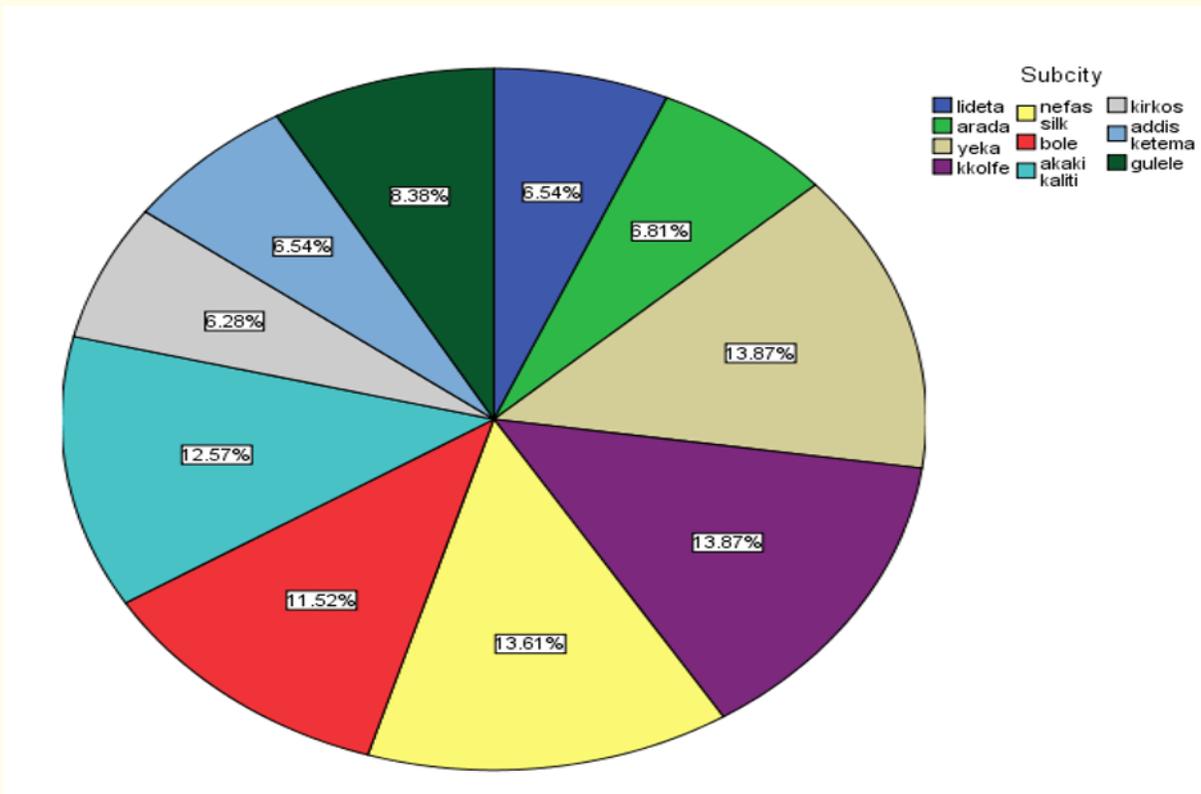


Figure 2: Distribution of fatal road traffic accidents by sub city, Addis Ababa, Ethiopia, September 2013 - August 2014.

Regarding the vehicle movement prior to the accident Almost eighty percent of the accident happened while the vehicle responsible for the happening was heading straight and 39 (10.2%) crashed while entering or leaving the junction from/to auxiliary roads 321 (84.0%) of deaths were among victims due to car versus pedestrians and 19 (4.9%) fatalities were due to vehicular collisions between two or more cars like rear, head on, and/or T- bone side collisions and rollover accounting for 3.9% (15) each; followed by 8 fatal crashes were due to vehicle collision with fixed object like concrete fences, tree, electric pole, etc. (Table 3).

Majority of fatal accidents happened near to work place and residential provinces 130 (34.0%) and 107 (28.0%) respectively (Table 3). The reason for those fatal accidents is attributed to 205 (53.8%) failure to give way for pedestrians and 102 (26.8%) reckless driving behavior.

On weekends there were more fatalities than on weekdays with Saturday having the highest incidence (72 fatalities, 18.8%), followed by Sunday (70 fatalities, 18.4%). The month with the highest incidence of crashes was July with 42 fatalities (11.0%).

Most fatal crashes occurred between 18:00 and midnight (129, 33.8%), followed by 06:00 until midday (106, 27.7%) and midday to 18:00. Among the five climate modalities (Table 2) mentioned (good whether/clear skies), rainy, foggy/cloudy, hot and cold), good whether/clear skies were present for most of the fatal crashes (306, 80.1%), followed by cold weather (62, 16.2%).

Variable	Frequency	Percent
Whether condition		
Good whether/clear sky	306	80.1
Foggy/cloudy	4	1.0
Rainy	9	2.4
Hot	1	.3
Cold	62	16.2
Lighting		
Day time	203	53.1
Sunset	21	5.5
Sun rise	6	1.6
Night with road side light	113	29.6
Night without road side light	39	10.2
Time the Accident occurred		
00:00 - 00:60	42	11.0
00:60 - 12:00	106	27.7
12:00 - 18:00	105	27.5
18:00 - 24:00	129	33.8
Roads condition in relation with whether condition		
Dry	362	94.8
Wet	20	5.2
Road type by lane		
Single lane	31	8.1
Double lane	113	29.6
Isled	232	60.7
Continuous line	6	1.6
Roads junction where the accident happened		
Y two lines coming to join	13	3.4
T single road joining transverse	63	16.5
O Isled	29	7.6
+ Cross over	20	5.2
Others	257	67.3

Table 2: Environmental, Seasonal and Geographical factors in Road Traffic Accidents, Addis Ababa, Ethiopia, September 2013 - August 2014.

Victims' profile (Table 3 and Table 4)

Types of collisions (Table 3)

Place where the accident happened		
Around school	25	6.5
Around factory	8	2.1
Near religious institutions	28	7.3
Market place	40	10.5
Recreational areas	37	9.7
Around hospitals	7	1.8
Residential province	107	28.0
Around work place	130	34.0
Types of collision		
Vehicular collision	19	4.9
Rollover	15	3.9
Auto pedestrian	321	84.0
Fall from vehicle	15	3.9
Collision with non-moving/parked car or fixed object	11	2.9
Unknown	1	.3
Movement of the vehicle just before the accident		
Entering to/leaving the junction	39	10.2
Turning to the right/left/U shape	21	5.5
Running fast to pass another vehicle	9	2.4
Heading straight	305	79.8
Other	8	2.1
Reason for the accident		
Drink/drugged driving	2	.6
Excessive speed	28	7.3
Bypassing traffic police order/light	3	.9
Mechanical defect	1	.3
Failure to give way for pedestrians	205	53.8
Unknown	9	2.4
Reckless driving behavior	102	26.8
Driving out of his/her lane	31	8.1

Table 3: Place and characteristics of Road Traffic Accident, Addis Ababa, Ethiopia, September 2013 - August 2014.

The most common type of crash was auto-pedestrian collision accounting 321 (85%) collisions, likely due to the population density, lack of awareness and negligence of both drivers and pedestrians and unavailability of pedestrians walking side for pedestrian followed by rollover and fall from vehicle each accounting fifteen (3.9%). And 91.1% of total vulnerable specifically pedestrians died instantaneously; the rest 8.9% died after some sort of medical intervention from day one up to six months.

Most of these pedestrians doesn't use pedestrian crossings illustrated by 186 (48.7%) of pedestrian fatalities happened while those pedestrians were crossing the road other than the zebra cross allowed for pedestrians including jumping over the isle or the road having metallic or concrete barrier. Only 4.7% of pedestrians involved used zebra cross while crossing the road 18 (4.7%) vulnerable pedestrians were killed while they were outside of the main road or pedestrian's sidewalk.

A total of 321 pedestrian fatalities occurred likely due to lack of knowledge of road use by pedestrians and drivers; population growth and urban development. Those aged between 18 and 30 were more affected 126 (33.2%) then next being those between 30- and 50-years age third are those above 50 years but those of under 18 years old are list affected (9%).

The Mean and Median age of pedestrians' dead during the accident were 38.78 and 35 respectively (Table 4). Near three quarter 279 (73.0%) of pedestrians involved in the accident were male and pedestrians accounting 94.5% 361 in number were healthy in their gross physical evaluation.

Variable	Frequency	Percent
Age category (years)		
< 18	34	9.0
18 - 30	126	33.2
30 - 50	114	30.1
> 50	105	27.7
Gender		
Male	279	75.2
Female	92	24.8
Victims occupation		
Student	30	8.0
Government employee/servant	92	24.5
Farmer	4	1.1
Unknown	89	23.7
Jobless	30	8.0
Daily laborer	41	10.9
Private	16	4.3
Others	71	18.9
Drivers	2	.5
Victims previous gross physical/health status		
Healthy	361	96.3
Disabled	1	.3
Deaf/mute	13	3.5
Victims movement just prior to the accident		
Crossing the road other than zebra cross	186	49.33
Crossing the road on zebra cross	18	4.7
Walking on the side/walk of pedestrians	78	20.7
Outside the sidewalk and/or the main road	18	4.7
Occupant	50	13.1
Unknown	27	7.0
Time of death		
Instant/at the scene or in route to hospital	346	91.1
Later/Died after medical intervention	34	8.9

Table 4: Victims' socio - demographic characteristics in Road Traffic Accident, Addis Ababa, Ethiopia, September 2013 - August 2014.

Civil servants were more vulnerable for fatal accidents of total 382 fatal crashes comprising 92 (24.1%) but significant number of victims 89 (23.3%) occupational status was not known; pedestrians with occupations other than the above mentioned (those working on the road side selling stuffs,...) account for 18.6% 30 (7.9%) were daily laborers and students.

Discussion

This study emphasized on mortalities related to road traffic accidents and contributing factors in Addis Ababa, Ethiopia. A total of 382 fatal crashes occurred in Addis Ababa in the year 2006 (2013/14) among those 382 perpetrators majority 91.9% were men and aged 18 - 30 and 30 - 50 years old 44.7% and 41.5% respectively. Even though studies show under reporting in sub-Saharan Africa including Ethiopia [2,3].

In agreement with this study a study from china most of victims were among vulnerable road users predominantly pedestrians and inversely in developed countries like USA, majority of fatalities are among drivers 62% [5,6]. Some crashes had more than one fatality; therefore, the total number of victims was 662 and 411 were deceased. Fatalities were predominantly male (279, 73.03%), which is the same with Greece- 85.26%, relatively higher than those in India - 64.8%, Brazil - 75.9% with an average of 34 deaths/month. But a study by Qirjako., *et al.* found the reverse female were more responsible [7-10]. Abegaz., *et al.* showed more than half of victims were among occupants, in the contrary, the crash type was vehicular collision attributed to 40.6% which might be explained by the study setting was on one of the busiest highways in Ethiopia with relatively low density of pedestrians.

Fatalities by age group were distributed nearly similar; 18 to 30 years 126 (30.1%), 31 to 50 years 114 (29.8%) and those above 50 years old accounted for 105 (27.7%) but those of under 18 years old are least affected (9%). In the contrary, a mortality survey studied in India revealed younger aged victims found to be 64.8% [8]. The Mean and Median age of victims were 38.78 and 35 respectively. 361 (94.5%) were healthy in their gross physical evaluation. Government employees were more vulnerable for fatal accidents comprising 92 (24.5%) but Seid., *et al.* showed daily laborers 95 (41.3%) and students 28 (12.2%) were more involved [11].

The educational status of the drivers was analyzed and among all most of attended senior secondary school and post senior secondary school account 45% and 20% respectively. The relationship of drivers with the vehicle is 58.4% of those drivers were recruited; others (either borrowed from a friend or family) 78 (20.4%) and owners 47 (12.3%). 99 (25.9%) of drivers held responsible for the fatal crash drove for more than ten years; 5 - 10 years and 2 - 5 years accounting 22.5% and 22.0% respectively. Which is in the contrary to a study conducted earlier in Addis Ababa [12]. Like a study in Benin City, Nigeria, Large number of fatal accidents happened by commercial cars 262 (68.53%) like 12 seat capacity taxi, trucks Midi buses; the second group 19.1% of drivers were having automobile [13].

Regarding vehicular defects 78.3% of vehicles had no vehicular defects detected and 21.2% of cars' status was unknown. Similarly, Issam Barrimah., *et al.* reported almost ninety percent of vehicles involved were in a good condition [14].

On weekends there were more fatalities than on weekdays with Saturday having the highest incidence (72, 18.8%) and Sunday (70, 18.4%). The month with the highest incidence of crashes was July (42, 11.0%). This study revealed that most fatal crashes occurred between evening/18:00 and midnight (129, 33.8%), followed by 06:00 until midday (106, 27.7%) and midday to 18:00. which is like a study conducted in hospital-based analysis and on the field. With respect to weather conditions, among the five climate modalities mentioned (good whether/clear skies), rainy, foggy/cloudy, hot and cold), good whether/clear skies were present for most of the fatal crashes (306, 80.1%), followed by cold weather (62, 16.2%).

232 (60.7%) fatality crashes happened on isled roads which is the road is divided by concrete isle followed by 113 (29.6%) on double lane roads. The same is true in one of brazil's high way Thika district of Kenya [9,15].

Kolfe - keranyo, yeka and nefas - silk - lafto sub city were the places 158 (41.4%) of fatal accidents occurred similar to a study result by Seid., *et al.* Almost 80% (305) of the accident happened while the vehicle responsible was heading straight on the straight and flat road surface; 39(10.2%) accidents occurred while the vehicle was entering to/leaving the junction.

84.0% of deaths were among pedestrians due to auto pedestrians; 91.1% of total vulnerable specifically pedestrians died instantaneously; the rest 8.9% died after some sort of medical intervention. And among those 186 (48.7%) fatalities occurred while those pedestrians were crossing the road other than the zebra cross. Only 4.7% of pedestrian's involved used zebra cross likely due to pedestrians' carelessness and/or knowledge deficit regarding road safety the population density, lack of awareness and negligence of both drivers and pedestrians and limited availability of pedestrians walking side for pedestrian.

The reasons for those fatal accidents in Addis Ababa are generally attributed to human error specifically failure to give way for pedestrians and reckless driving behaviors of drivers 205 (53.8%) and 102 (26.8%) respectively. A study conducted in Mekele strengthens this finding [16].

Conclusion

Majority of affected were vulnerable road users among which pedestrians were predominant. They were affected while crossing the road outside the zebra cross and responsible parties were driving commercial cars. And vast majority of victims died at the scene instantaneously which needs policy on pedestrian safety and education on behavioral change. These findings can serve as a basis for health care professionals and policymakers to create preventive measures for traffic accidents.

What is already known on this topic?

- Road traffic accidents (RTA) are a major public health problem worldwide
- Road traffic accidents (RTA) are a number one cause for death among young adults.
- Men are more affected more than females.

What this study adds?

- Predictors of mortality due to Road Traffic Accidents occurring in the roads of Addis Ababa.
- Policy recommendations to stakeholders are twofold. Policymakers should create regulations for using roads both for motor vehicles and pedestrians. Better options of awareness creation through media coverages should be at most important. This is quite important as in Ethiopia, passengers on commercial vehicles and pedestrians are more vulnerable. Health institutions on the second hand should be well equipped to manage those victims of road traffic accident. This should be done forming trained human power in terms of emergency trauma care.

Conflict of Interest

No conflict of interest.

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