Addis Ababa University
College of Health Sciences
School of Public Health

Treatment Outcome and Associated Factors of Road Traffic Accident at
Emergency Department of Trauma Treatment Centers of Addis Ababa,
Ethiopia

By: Yodit Mersha W/Hanna

A Thesis submitted to Addis Ababa University, College of Health Sciences
School of Public Health in Partial Fulfillment of the Requirements for
Master Degree in Public Health

Addis Ababa Ethiopia
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DECLARATION

I, the undersigned, declared that this is my original work, it has never been presented in this or any other university, and that all the resources and materials used for the dissertation have been fully acknowledged.

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Approval of the primary advisor

Name of advisor: Ato Sefonias Getachew (MPH, PHD Fellow)

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Name of external examiner

Date: _________/______/______  Signature: ________________________

Name of internal examiner

Date: _________/______/______  Signature: ________________________
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At last but not the least, my gratitude goes to the people who have been instrumental in the successful completion of this study, including my family and friend (Hiwot W/kidan Yeshialem Adafrrie, Firehiwot Amare and Getahun Mengistu) for their relevant advice and close follow up which is helpful for my thesis.
TABLE OF CONTENT

ACKNOWLEDGEMENTS ........................................................................................................ i

TABLE OF CONTENT ............................................................................................................... ii

LIST OF TABLE ....................................................................................................................... iv

LIST OF FIGURE ........................................................................................................................ v

ACRONYMS AND ABBREVIATIONS ....................................................................................... vi

ABSTRACT ................................................................................................................................... vii

1. INTRODUCTION .................................................................................................................. 1
   1.1. Background ..................................................................................................................... 1
   1.2. Statement of the Problem ............................................................................................... 2
   1.3. Significance of the Study ............................................................................................... 4

2. LITERATURE REVIEW .......................................................................................................... 5
   2.1. Outcome of Road Traffic Accident ............................................................................... 5
   2.2. Factors Associated with Death of Road Traffic Accident ............................................. 6
       2.2.1 Scio-demographic characteristics ........................................................................... 6
       2.2.2 Characteristics of RTA victims during admission .................................................... 7
       2.2.3 Clinical Characteristics of RTA victims during admission ....................................... 7
   2.3 Conceptual Framework ..................................................................................................... 9

3. OBJECTIVES ......................................................................................................................... 10
   3.1. General Objective ......................................................................................................... 10
   3.2. Specific Objective ......................................................................................................... 10

4. MATERIALS AND METHODS ............................................................................................ 11
   4.1. Study Area ..................................................................................................................... 11
   4.2. Study Period .................................................................................................................. 11
   4.3. Study Design ................................................................................................................ 12
   4.4 Population ....................................................................................................................... 12
       4.4.1. Source population ................................................................................................. 12
       4.4.2. Study population ................................................................................................. 12
   4.5. Selection Criteria .......................................................................................................... 12
LIST OF TABLE

Table 1: Distribution of sample size across trauma treatment center with their admission period total no of RTA admitted

Table 2: Distribution of demographic characteristics of RTA victims at emergency department of trauma treatment center Addis Ababa, from January 1, 2016 – December 31, 2017

Table 3: Characteristics of RTA victims during admission at ED of trauma treatment centers, Addis Ababa, from January 1, 2016 – December 31, 2017

Table 4: Clinical characteristics at admission at ED of trauma treatment centers Addis Ababa, Ethiopia from January 1, 2016 – December 31, 2017

Table 5: Factors associated with death among RTA victims at emergency department of trauma treatment centers, Addis Ababa, Ethiopia from January 1, 2016 – December 31, 2017
LIST OF FIGURE

Figure 1: Diagrammatic presentation of the conceptual framework developed by reviewing related literatures (10,17,18,24). .........................................................9

Figure 2: Source of referral in RTA victims at Emergency Department of trauma treatment centers, Addis Ababa, Ethiopia from January 1, 2016 – December 31, 2017. .....................................................20

Figure 3: Outcome of RTA victims at Emergency Department of trauma treatment centers, Addis Ababa, Ethiopia from January 1, 2016 – December 31, 2017.........................................................23
**ACRONYMS AND ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAPC</td>
<td>Addis Ababa Police Commission</td>
</tr>
<tr>
<td>ALERT</td>
<td>ALERT African Leprosy and Epilepsy Rehabilitation Training</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>DALY</td>
<td>Disability Adjusted Life Year</td>
</tr>
<tr>
<td>ED</td>
<td>Emergency Department</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive Care Unit</td>
</tr>
<tr>
<td>MEWS</td>
<td>Modified Early Warning Score</td>
</tr>
<tr>
<td>RTA</td>
<td>Road Traffic Accident</td>
</tr>
<tr>
<td>RTC</td>
<td>Road Traffic Crash</td>
</tr>
<tr>
<td>RTI</td>
<td>Road Traffic injury</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Science</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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ABSTRACT

Background: Road Traffic Accident (RTA) is a collision between two or more vehicles, between vehicles and pedestrians, passenger and driver, between vehicles and animals or between vehicles and fixed obstacles. Every year about 1.3 million people die because of RTA. Ethiopia was experienced a tremendous loss of life and property each year as one of the leading countries of the world with death rate of 37.28 per 100,000.

Objective: This study aimed to assess the treatment outcome and associated factors of RTA at emergency department (ED) of trauma treatment centers of Addis Ababa, Ethiopia.

Method: Cross sectional study design, using retrospective data that covers the period of January 1, 2016 – December 31, 2017 at ED of trauma treatment centers, Using single proportion sample size determination formula, a 412 RTA medical records selected by systematic random sampling. A structured pre-tested data abstraction format was used to gather the required data. The collected data analyzed using SPSS version 23. Descriptive statistics used to show the distribution of variables. The associated factors with dependent variable determined by multivariable logistic regression with its corresponding (CI: 95%).

Results: Among 542 admitted RTA victims to ED of trauma treatment centers: 40.4% were discharged with medical advice, 5% died, 0.74% defaulted and the rest 53.6% transfer to surgical department, orthopedic department, ICU and refer to other health facility. RTA victims those admitted to ED of trauma treatment center were found in Addis Ababa, delayed presentation and had comorbid condition: (AOR: 3.470, 95% CI (1.210-9.955), (AOR: 12.932, 95% CI (3.004-55.674) and (AOR : 6.255 95% CI (1.676-23.348) were more likely to die. RTA victims who were not received first aid service (AOR: 4.848, 95% CI (1.430-16.439) significantly associated with death. In addition, injury severities were predictor of death.

Conclusion: The study revealed that RTA is significant public health problem, which cause injury and death among the victims and not receiving first aid, delayed presentation, severity of injury and co-morbid condition were statistically significant factors that influence death of RTA victims. Hence, properly managed severe cases, pre-hospital car availability and readiness is essential to deduce the poor outcome of RTA.

Keywords - road traffic accident, outcome, trauma treatment center, Addis Ababa.
1. INTRODUCTION

1.1. Background

World Health Organization defines road traffic accident (RTA) is a collision between two or more vehicles, between vehicles and pedestrians, between vehicles and fixed obstacles(1).

Worldwide an estimate of 1.3 million peoples were killed in road crashes each year and more than half of all road traffic deaths occur among young adult’s ages 15-44 years. Over 90% of all road fatalities occur in low and middle-income countries, which have less than half of the world's vehicles(2).

Projections show that, between 2000 and 2020, road traffic deaths will decline by 30% in high-income countries but increase substantially in low-income and middle-income countries. Unless appropriate actions taken, road traffic accident are predicted to become the fifth leading cause of death by 2030(1).

The issue of road traffic injury 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 were experiencing a tremendous loss of life and property each year as one of the leading countries of the world with worst accident record (3).

Moreover, the largest proportion of series injury in Ethiopia comes from road traffic accident and become major causes of death in the emergency room among trauma victims(4).

Addis Ababa City Administration is concerned about diminishing the total death rate from the current 13.8/100,000 to 9.6 /100,000 and also hope to decrease by 50 percent by 2023(3).
1.2. Statement of the Problem

Globally, RTA incur permanent disability, through amputation, head injury or spinal cord injury and treated as a major epidemic of non-communicable disease in the present century. This catastrophic loss and injury causes numerous family tragedies and represent a serious economic loss to the community and death of young people(2).

Data from the WHO global burden of disease study in 2002 shows that, those injured severely enough to require attention from a health facility, almost one quarter had traumatic brain injury, one tenth had open wounds and most other injuries accounted by fractured bones(5). On top of this high death in RTA is attributable to the high incidence of RTA victims with moderate to severe injuries (6).

According to WHO study conducted in 2017, about three-quarters (73%) of all road traffic deaths occur among men. In addition, those dying on the world’s roads are “vulnerable road users” pedestrians, cyclists and motorcyclists and account for half of all road traffic deaths around the world (2).

Delay in provision of prompt medical care to the victims of road traffic accidents were identifying as the potential risk factors in the causation or amplification of the aftermaths in the accidents(7). A study done in metro area India indicate time taken for RTA victims to health facility and unavailability of emergency services were significantly associated with death (p= 0.00)(8).

Moreover, a comprehensive analysis of the road safety problem in Ethiopia showed that traffic accident fatalities progressively increase with the growth in populations, despite, limb and head injury were the most common type of injury sustained and significantly influenced mortality (9,10).

The pattern of injuries in Addis Ababa also found 27% of all emergency visits, 5% of all hospitalizations, and 3% of deaths (11).
There for the study, attempt to assess the treatment outcome and associated factors of RTA at emergency department of AaBET and ALERT trauma treatment centers of Addis Ababa, Ethiopia.
1.3. Significance of the Study

Concerning on the treatment outcomes and associated factors of road traffic accident certain research were done in Regional and Addis Ababa emergency department of higher hospitals, especially road traffic accident in trauma treatment center were an under researched area. Cognizant, of this fact the study is able to shed a light on the treatment outcome and associated factors of RTA at emergency department of trauma treatment centers and the study provides the treatment outcome of RTA in the site.

Therefore, the information derived from the study will have imminence contribution to enhance the preparedness of emergency care service practice of RTA, halt premature death and platform for future study.
2. LITERATURE REVIEW

2.1. Outcome of Road Traffic Accident

According to the study done in Spain, 15% of those who survive a road traffic accident were treating in hospitals as in-patients (12). Another study conducted at emergency department of Ahmedabad city, In revealed out of 150 RTA victims 65 (43.33%) were discharged, 10 (6.67%) required urgent operation, admitted to ward and intensive care unit (ICU) account: 57 (38.00%) and 16 (10.67%) respectively. and for two (1.33%) cases the outcome were death (13).

Based on, the study done in Iran, found that from 1520 road traffic admission the outcome of 60 (3.9%) victims were death (6). A tertiary care center, Lucknow, India, also revealed, among 267, admission of road traffic accident victims 35 (13.1%) were died during the course of treatment (14).

Retrospective descriptive data Analysis of road traffic accident at Al-Jalaa hospital - Libya; between; 2001 to 2010 found that; from 21,753 RTA cases 41% of these cases needed to undergo surgery. Overall, 1262 (5.6%) cases were died (15).

A cross-sectional study conducted at ED of Tikur Anbesa specialized hospital concerning on injury characteristics and outcome revealed that in all RTA victims reaching hospital, males outnumbered females by a sex ratio of 2.6:1. From these victims about 7.4% and 92.6% were died and discharged respectively (10).

Another study done at ED of Tikur Anbesa specialized hospital victims admitted to surgical and orthopedic wards account 81 (61.8%) and the remaining injuries 50 (38.16%) were treated and discharged (16).

A cross-sectional study conducted at hospitals Wolaita Zone, SNNPR, showed most of the victims presented to the hospitals within 24 hours. Of all victims reached hospital, 23 (6%)
died, 48 (12.5%) survived with long-term disability on discharge and 313 (81.5%) survived without long-term disability on discharge (17).

Furthermore, a cross sectional study done using retrospective at emergency department of Zewuditu Memorial Hospital: indicate more than half of RTA cases the severity of patients categorized under yellow modified early warning score (MEWS). Related to this outcomes of admission were 68%, 17%, 17% and 1% cases were discharged, hospitalized, referred and died respectively (18).

A study conducted in Dilchora referral hospital, Dire Dawa on treatment outcome of road traffic accident reported that 90.5% victims were manage as conservative while 9.5% of them were managed surgically. About 75.6% of patients were improving without any sequel, 15% were discharging with some disabilities and 9.4% of them were dead of RTA (19).

2.2. Factors Associated with Death of Road Traffic Accident

2.2.1. Socio-demographic characteristics

The WHO reports indicate that age and sex is an important factor which determines the occurrence of the crash and as well as its outcome (2).

A cross sectional study conducted at ED of Tikur Anbesa specialized hospital comprised of 71.7% men and 28.3% women RTA victims, resulting in a male to female ratio of 2.6:1. Death rate was higher Beta value (β = 0.16, p < 0.05) with adult age (10).

According to multivariate analysis in police report from Akaki to Adama road showed that women were more likely to perpetrate fatal road traffic accidents than male (AOR = 4.7; 95% CI: 1.5-15). Other study conducted in north Ghana, being urban residence were predictors of road traffic accident, (AOR: 1.74, 95% CI (1.06-2.08) (20, 21).
2.2.2 Characteristics of RTA victims during admission

Moreover, a study conducted northern Iran time for admission - (P< 0.01, $\chi^2 – 5.99$) also predictor of death, while effects of time to admission was higher in rural region but severity of the accident had more effect on mortality in urban region in comparison with rural ones(6).

The study done in ED of Osmania General Hospital Hyderabad, India showed that time factor (to reach hospital) is very crucial for increase the chance of survival among RTA victims, death rate significantly low among those who reached within 30 minutes in comparison to those who took more time to reach the hospital (22).

2.2.3 Clinical Characteristics of RTA victims during admission

The studies done in northern Iran found that, those road traffic accident victims severely injured were significantly associated with death ($P<0.01 , \chi^2 – 9.19$) (6).

A tertiary care center Lucknow, India, study indicate the proportion of death was significantly higher in those patients who got first aid in 30 minutes to 60 minutes (p-value =0.465) as compared to those patients who got it in less than 30 minutes (p-value =0.006). The time gap between RTA and admission to emergency department death were also significant (p-value =0.001)(14).

Moreover, a 5-year retrospective study done in India, which road traffic related cases of emergency room mortality reviewed severe injuries and delayed presentation, contribute to road traffic crash-related mortality (23).

Moreover, the study done in tertiary health care delivery institute in western Nepal indicated from 360 RTA victims, Those who had chronic diseases were significantly associated with death ($\chi^2=7.31, P<0.01$) (24).
The study done in Tanzania indicate, limb and head injury also the most common type of injury sustained which predisposed RTA victims to prolonged hospitalization and mortality, respectively (25).
2.3 Conceptual Framework

Socio-demographic characteristics
- Age
- Sex
- Residence

Treatment outcome/Death/
of RTA

Characteristics of RTA victims during admission
- Source of referral
- Mode of arrival to the ED
- Time of arrival to ED
- Time between RTA and admission

Clinical Characteristics of RTA victims during admission
- Severity Of injury
- Sit of injury
- Co-morbid condition
- First Aid

Figure 1: Diagrammatic presentation of the conceptual framework developed by reviewing related literatures (10, 17, 18, 24).
3. OBJECTIVES

3.1. General Objective


3.2. Specific Objective

- To assess the treatment outcome of road traffic accident at emergency department of trauma treatment centers, Addis Ababa.

- To identify factors associated with death among road traffic accident victims at emergency department of trauma treatment centers, Addis Ababa.
4. MATERIALS AND METHODS

4.1. Study Area
Addis Ababa is the capital city of Ethiopia. It consists of estimated population of 6.6 million in 2017, as per the 2007 population enumeration, with yearly growth rate of 3.8%. The city has, 527 km², area (26). It has 10 sub-cities and 116 woredas and has different governmental health institution including 14 hospitals and 95 public health centers. In addition to these, 36 private hospitals, 4 non–governmental hospital, 31 NGO’s clinics and more than ,700 private owned clinics were found in the city. From the above health facilities, 8 hospitals including the two trauma treatment centers were under ministry of health.

AaBET and ALERT hospitals were a trauma treatment center that gives trauma managements at highest-level. Mainly serve patients who came from Addis Ababa and neighborhood regions. They work 24 hours a day, 7 days a week, with a capacity of 290 and 185 beds respectively. Both hospitals have more than 634 and 272 health workers, including health professional, administrative staff and supportive staffs. Trauma Treatment Center have access to specialist and nursing care including emergency medicine, trauma surgery, critical care, neurosurgery, orthopedic surgery, anesthesiology and radiology, as well as highly sophisticated surgical and diagnostic equipment. It has different departments like, OPD, ICU, adult orthopedic ward, pediatrics orthopedic ward, burn unit and physiotherapy. In emergency department treatment, also provide by general practitioners and nurse on duty; after admission; filling a triage sheet that include socio-demographic and inset information. The condition of a patient evaluate by triage score that coded by color. In addition, there are two emergency units in the hospitals: one designated for pediatrics aged < 14 years and the other for adults’ aged ≥ 15 years. (Source: hospitals human resource)

4.2. Study Period
A two years, (January 1, 2016 – December 31, 2017) registered data was used. The data collection conducted from, January 2018 up to March 2018.
4.3. Study Design

Cross-sectional study using retrospective data was conducting at emergency department of AaBET and ALERT trauma treatment centers.

4.4 Population

4.4.1. Source population

All medical records of RTA victims admitted at emergency department of AaBET and ALERT trauma treatment centers.

4.4.2. Study population

All medical records of RTA victims admitted at emergency department of Trauma Treatment Centers: since January 1, 2016 – December 31, 2017.

4.5. Selection Criteria

4.5.1. Inclusion criteria

All RTA victims admitted from January 1, 2016 – December 31, 2017 at ED of AaBET and ALERT trauma treatment centers were included in the study based on the sample size.

4.5.2. Exclusion criteria

Those RTA victims death happened during arrival were excluding from the study.

4.6. Sample Size and Sampling Technique

4.6.1. Sample size

Sample size is calculated using single proportion formula:

\[
n = \frac{Z_{\alpha/2}^2 \cdot P \cdot (1-P)}{d^2}
\]

Where: 
- \( n \) = Sample size
- \( Z \) = is the standard normal value at the level of confidence, 95% confidence level
d= Desired degree of error
To determine the sample size, using the following assumptions:
- From the existing evidence an averages of RTA admitted victims with discharged outcome were taken 94%, p= 0.94(17).
- The Z statistics value =95% (1.96) confidence interval
- In order to maximize level of precession of my study the possible minimum margin of error(d) was used 2

Hence, \[ n = \frac{(1.96)^2 \times 0.94(1-0.94)}{(0.02)^2} \]
\[ n = \frac{3.8416 \times 0.94 \times 0.06}{0.0004} \]
\[ n = \frac{0.21666624}{0.0004} \]
\[ n = 542 \]

4.6.2. Sampling Technique

Using systematic random sampling, first, the total sample size (542) divided proportionally to each hospital. Secondly, all RTA victims registered from January 1, 2016 – December 31, 2017 at emergency department of trauma treatment centers was list based on the sequence of their card number. Study units were selected through proportional allocation to size of each hospital by calculating the interval from the sampling frame, N and sample size n (k=N/n) interval, (k=18) is similar for each hospital. The first number to start with selected randomly.
Table 1: Distribution of sample size across trauma treatment center with their admission period total no of RTA admitted

<table>
<thead>
<tr>
<th>Period</th>
<th>Total No of RTI admitted</th>
<th>No of sample selected</th>
<th>Total no of Sample Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AaBET</td>
<td>ALERT</td>
<td>AaBET</td>
</tr>
<tr>
<td>2016</td>
<td>2519</td>
<td>1292</td>
<td>137</td>
</tr>
<tr>
<td>2017</td>
<td>3101</td>
<td>3078</td>
<td>168</td>
</tr>
<tr>
<td>Total</td>
<td>5620</td>
<td>4370</td>
<td>305</td>
</tr>
</tbody>
</table>

4.7. Study Variables

4.7.1. Dependent variable

Treatment outcome of road traffic accident / death /

4.7.2. Independent variable

Socio demographic characteristics:-
- Age
- Sex
- Residence

Characteristics of RTA victims during admission to ED:-
Source of referral
- Mode of arrival to the ED
- Time of arrival to ED
- Time between RTA and admission

Clinical characteristics at admission:-
- First Aid
- Severity of injury
- Sit of injury
- Co-morbid condition
4.8. Data Collection

4.8.1. Data collection instrument

The data abstraction format was developed in reference to objective of the study, ED registration book, medical records and other standardized tools injury surveillance guideline document of WHO developed in 2001 and base line previous study (10,17,18,25). The data abstraction format had been prepared in English language (annex1).

4.8.2. Data collection process

The data for the study was review from routinely registered client medical record and ED registration book. The data was collected by trained clinical nurses using a data abstraction format according to the inclusion criteria, the format contain question regarding; socio-demographic, characteristics of RTA victims during admission to ED, clinical characteristics at admission, treatment outcome.

4.8.3. Data collectors

Four data collectors and twosupervisors were involved in the data collection process from AaBET and ALERT ED of trauma treatment center, their educational level is clinical nurse for data collector and BSC nurse for supervisor. Training was give on data collection techniques and instruments.

4.9. Data Analysis

The collected data was analyzed using SPSS version 23. Frequency distribution, percentage calculation, means and standard division used to describe the variable. By using odds ratios with its corresponding 95% CI and p-value the association between individual variable and outcome variable were determined by binary logistic regression, those variables found to have p-value $<0.25$ taken to multivariable logistic regression Variables having p-values $<0.05$ in the multiple logistic regression models considered as significantly associated with the dependent variable.
4.10. Data Quality Control

To ensure the data quality, pretest conducted on 5% of the total sample. Any error found during the process of pre-test was correction and modification had made into the final version of the data abstraction format. Finally, the data cleaning were doing by running frequency and sorting by SPSS version 23.

4.11. Dissemination of Research Finding

The study result will be present to Addis Ababa University, College of health sciences, school of public health and the document will disseminated to all responsible bodies including each trauma treatment centers, ministry of health and police commission. Additionally, the finding will publish in peer reviewed scientific journals.

4.12. Operational Definition

- **Road traffic Accident**: is a collision between two or more vehicles, between vehicles and pedestrians, between vehicles and animals or between vehicles and fixed obstacles. (1).
- **Modified early warning score (MEWS)**: a simple triage tool used by emergency medical services, to quickly assess a person’s risk of death(27).
- **Green color coding**: mild pain level, keep in waiting area with frequent re-triage(27).
- **Yellow color coding**: moderate pain level keep in waiting area with frequent re-triage(27).
- **Orange color coding**: sever pain level and urgent priority taken (27).
- **Red color coding**: injury take immediate priority(27).
- **First aid**: is the immediate treatment or care given to a person suffering from an injury from RTA until more advanced care is provided (28).
- **Co-morbidity**: additional medical problem with RTA (29).
- **Vulnerable road users**: more or most likely to expose to the chance of being attack or harmed by RTA(30).
**Pedestrian:** a person involved in an accident that was not at the time of the accident riding or on any mechanically or electrically powered device (30).

**Passenger:** is any occupant of a transport vehicle other than the driver (30).

**Driver:** a person who drive a vehicle, a wheel or other part in a mechanism that receives power (30).

**Road traffic death:** death due to traffic accident were immediately or within 30 days after the accident (30).

### 4.13. Ethical Consideration

Before starting data collection and preliminary study, ethical clearance was obtain from Addis Ababa University College of health science school of public health ethical review committee. In addition to this permission obtained from each Trauma Treatment Centers, Addis Ababa. To ensure confidentiality, name and other identifiers of patients, physicians and other health care members who made the recommendation was not recorded on the data abstraction format.
5. RESULTS

5.1. Socio-Demographic Characteristics

From 542 RTA victims admitted to trauma treatment centers 373 (68.9 %) were male, with M: F ratio of 2.2: 0.5. The patients’ ages ranged from 1 to 85 years with the mean and standard deviations of 31.21 and ±15 years respectively. About 283 (52.22 %) of RTA victims were found out of Addis Ababa.

Table 2: Distribution of demographic characteristics of RTA victims at emergency department of trauma treatment center Addis Ababa, from January 1, 2016 – December 31, 2017

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt;15</td>
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<td>7.5</td>
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<td></td>
<td>15-30</td>
<td>294</td>
<td>54.4</td>
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<tr>
<td></td>
<td>31-50</td>
<td>145</td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td>&gt;50</td>
<td>62</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>542</td>
<td>100.0</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>373</td>
<td>68.9</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>169</td>
<td>31.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>542</td>
<td>100.0</td>
</tr>
<tr>
<td>Residence</td>
<td>Addis ababa</td>
<td>259</td>
<td>47.8</td>
</tr>
<tr>
<td></td>
<td>Out of Addis Ababa</td>
<td>283</td>
<td>52.2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>542</td>
<td>100.0</td>
</tr>
</tbody>
</table>
5.2. Characteristics of RTA victims during admission to ED

Table 3: Characteristics of RTA victims during admission at ED of trauma treatment centers, Addis Ababa, from January 1, 2016 – December 31, 2017

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode of arrival</td>
<td>Ambulance</td>
<td>132</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>Taxi</td>
<td>157</td>
<td>29.1</td>
</tr>
<tr>
<td></td>
<td>Privet Car</td>
<td>138</td>
<td>25.4</td>
</tr>
<tr>
<td></td>
<td>Other /carries ,walking /</td>
<td>61</td>
<td>11.2</td>
</tr>
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<td></td>
<td>Unknown</td>
<td>54</td>
<td>10</td>
</tr>
<tr>
<td>Time of arrival to ED</td>
<td>00:00-00:60</td>
<td>51</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>00:60-12:00</td>
<td>293</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>12:00-18:00</td>
<td>176</td>
<td>32.4</td>
</tr>
<tr>
<td></td>
<td>18:00-24:00</td>
<td>9</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>13</td>
<td>2.4</td>
</tr>
<tr>
<td>Time gap between the injury and ED admission</td>
<td>&lt;24hr</td>
<td>260</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>1-3 days</td>
<td>114</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>4-7 days</td>
<td>92</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>&gt;1week</td>
<td>43</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>33</td>
<td>6</td>
</tr>
</tbody>
</table>
In 157 (29.1%) admitted RTA victims the mode of arrival was taxi followed by private car 138 (25.4%) and ambulance putted at the third level it accounted 132 (24.3%) while 61(11.2%) use other means of transportation.

Time between RTA and admission: about 260(48%) victims arrive at ED of trauma treatment center less than 24hr after injury and in 114(21%) ,92 (17 %),43 (8%),33 (6%) of the victims taken 1-3 days,4-7 days and beyond week and unknown arrival respectively. In addition 293 (54%) RTA victims reached to ED of trauma treatment center in 00:60-12:00 am and nine (1.7 %) of RTA victims time of arrival were 18:00-24:00.

**Figure 2:** Source of referral in RTA victims at Emergency Department of trauma treatment centers, Addis Ababa, Ethiopia from January 1, 2016 – December 31, 2017.

In 29.10% RTA victims the source of referral were health center and 20.20 % and 9.1 % victims were self-referrals and from other source of referrals (private clinics, police) respectively. (Figure 2)
5.4. Clinical characteristics of RTA victims at admission

**Table 4**: Clinical characteristics at admission at ED of trauma treatment centers Addis Ababa, Ethiopia from January 1, 2016 – December 31, 2017.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Aid</td>
<td>Yes</td>
<td>335</td>
<td>61.8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>155</td>
<td>28.6</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>52</td>
<td>9.6</td>
</tr>
<tr>
<td>Injury severity</td>
<td>Green color coding</td>
<td>123</td>
<td>22.6</td>
</tr>
<tr>
<td></td>
<td>Yellow color coding</td>
<td>246</td>
<td>45.3</td>
</tr>
<tr>
<td></td>
<td>Orange color coding</td>
<td>79</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>Red color coding</td>
<td>51</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>43</td>
<td>8.0</td>
</tr>
<tr>
<td>Site of injury</td>
<td>Head injury</td>
<td>144</td>
<td>26.5</td>
</tr>
<tr>
<td></td>
<td>Upper extremity</td>
<td>86</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td>Chest injury</td>
<td>38</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>Abdominal injury</td>
<td>14</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Pelvic injury</td>
<td>20</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>Lower extremity injury</td>
<td>211</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Other /multiple organ injury</td>
<td>29</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>injury, spinal cord injury/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-morbid condition</td>
<td>Yes</td>
<td>30</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>512</td>
<td>94.4</td>
</tr>
</tbody>
</table>
Among 542 RTA victims admitted to ED of trauma treatment center frequently injured body region were lower extremity 211 (39 %) and head 144 (26.5%). For the remaining RTA victims, the injury involves the upper extremity, chest, pelvic, abdomen, other: 86 (15.8%), 38 (7.1%), 20 (3.6%), 14 (2.6%) and 29 (5.4 %) of the victims correspondingly.

When we look on the level of severity 123 (22.6%) mild, 246 (45.3%) moderate, 79 (14.6%) severe pain level were had and 51 (9.5 %) victims classified as needing immediate intervention. Were as335 (61.8%) RTA victims were receiving first- aid and 155 (28.6%) RTA victims did not receive the service in the present study, in addition 30(5.6%) of RTA, victims admitted to ED had co-morbid condition.

5.5 Treatment outcomes of road traffic accident victims at ED

Out of 542 RTA victims about 219 (40.4 %) were discharged with medical advice and 27 (5 %) were died during the course of the treatment. The remaining 256 (47 %) transferred to other department, 36 (6.6 %) referred to other health facility and four (0.74%) were defaulters. Among 256 (47 %) victims transferred to other department, 146 (26.9 %) were admitted to surgical department, 93(17.2%) and 17 (3.16%) admitted to orthopedic department and ICU respectively.
Figure 3: Outcome of RTA victims at Emergency Department of trauma treatment centers, Addis Ababa, Ethiopia from January 1, 2016 – December 31, 2017

5.6 Factors associated with RTA related death

Using binary logistic regression - socio demographic characteristics, circumstances at the time of RTA, characteristics of victims during admission and clinical characteristics with the dependent variable analyzed individually. Those variables found to have p-values of <0.25 in the bivariate analysis; residence, the time gap between RTA and admission, first aid, co-morbid condition and injury severity taken to multivariable logistic regression model. Variables having p-value < 0.05 at 95% CI in the multivariate logistic regression model considered statistically significant.
Table 5: Factors associated with death among RTA victims at emergency department of trauma treatment centers, Addis Ababa, Ethiopia from January 1, 2016 – December 31, 2017.

<table>
<thead>
<tr>
<th>variable</th>
<th>Category</th>
<th>Outcome (246)</th>
<th>COR 95%CI</th>
<th>AOR 95%CI</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Alive during Discharge</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No (%)</td>
<td>Death No (%)</td>
<td></td>
</tr>
<tr>
<td>Residence</td>
<td>Addis Ababa</td>
<td>99(40.2)</td>
<td>19(7.7)</td>
<td>2.879(1.209-6.857)</td>
</tr>
<tr>
<td></td>
<td>Out of Addis Ababa</td>
<td>120(48.7)</td>
<td>8(3.23)</td>
<td>1</td>
</tr>
<tr>
<td>The time gap between RTI and admission at ED</td>
<td>&lt;24hr</td>
<td>92(37.4)</td>
<td>5(2)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1-3 days</td>
<td>52(21.1)</td>
<td>5(2)</td>
<td>1.769(.489-6.398)</td>
</tr>
<tr>
<td></td>
<td>4-7 days</td>
<td>42(17)</td>
<td>7(2.8)</td>
<td>3.067(.920-10.225)</td>
</tr>
<tr>
<td></td>
<td>&gt;1week</td>
<td>14(5.7)</td>
<td>8(3.5)</td>
<td>10.514(3.010-36.730)</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>19(7.7)</td>
<td>2(0.8)</td>
<td>1.937(.349-10.736)</td>
</tr>
<tr>
<td>First Aid</td>
<td>Yes</td>
<td>109(44.3)</td>
<td>5(2)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>90(36.6)</td>
<td>17(6.9)</td>
<td>4.118(1.462-11.597)</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>20(8.13)</td>
<td>5(2)</td>
<td>5.450(1.444-20.568)</td>
</tr>
<tr>
<td>Injury severity</td>
<td>Green and Yellow color coding</td>
<td>150(60.9)</td>
<td>11(4.5)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Orange color coding</td>
<td>25(10.2)</td>
<td>5(2)</td>
<td>2.727(.873-8.517)</td>
</tr>
<tr>
<td></td>
<td>Red color coding</td>
<td>15(6)</td>
<td>7(2.8)</td>
<td>6.364(2.148-18.854)</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>29(7)</td>
<td>4(1.6)</td>
<td>1.881(.560-6.317)</td>
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<tr>
<td>Co-morbid condition</td>
<td>Yes</td>
<td>8(3.3)</td>
<td>5(2)</td>
<td>7.536 (2.387-23.789)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>211(85.7)</td>
<td>22(8.9)</td>
<td>1</td>
</tr>
</tbody>
</table>
6. Discussion

The study revealed that the treatment outcome of 5% RTA victims those admitted to ED of trauma treatment centers were death. As compared the outcomes with other study done at hospitals Wolaita Zone, SNNPR 6%(17) almost the finding is align. Higher death outcome also observed in this study as compared to the studies in Zewuditu memorial hospital (1%)(17), Ahmedabad city, India (1.33%) (12) and (3.9%) in Iran (6). Since the studies set up was trauma treatment center and many victims were link from other health facility, due to this patient over load and life-treating cases may lead for higher deaths. However, it is lower than report from previse study conducted in Dilchora referral hospital, Dire Dawa (9.4%) (19), (7.4%),Tikur Anbesa specialized hospital (10) and (13.1%) at tertiary care center, Lucknow, India(14). It might be in the study area trauma management were given at the highest levels.

The study result showed that there is no significant association between sex, age, source of referral, mode of arrival, time of arrival and site of injury with emergency department treatment outcome /death/ of RTA victims.

Road traffic accident victims those live in Addis Ababa, were 3 times more likely to died, (AOR=3.470:95% CI: 1.210-9.955), than RTA victims came to the ED of trauma treatment center from out of Addis Ababa. This result in line with the studies done in North Ghana, death rate were 2 times increased from those came from rural area (AOR: 1.74, 95% CI (1.06-2.08) (21). While, another study done on risk factors of road traffic accidents associated mortality in northern Iran also indicate. Effects of time to admission was higher in rural region but severity of the accident had more effect on mortality in urban region in comparison with rural ones (6). This might be justifying the fact that in urban area due to rapid motorization, recklessness-driving behavior and over loading of patients in trauma treatment center were increases the severity of the injury and poor outcome of RTA victims.

RTA victims those, had co-morbid conditions, were 6.3 times more likely to die than RTA victims who had not co-morbid conditions (AOR: 6.255 95% CI (1.676-23.348). Previous
study done in tertiary health care delivery institute in western Nepal (24) also support the finding as co-morbid conditions ($\chi^2=7.31; P<0.01$) was significantly associated with high death rate. A co-morbid condition by itself suppresses the immunity and hinder recovery might be lead to death.

According to the study RTA victims who had not received first aid (AOR=4.848:95% CI: 1.430-16.439) and those had unknown status concerning first aid (AOR=5.246 95% CI 1.057-26.041) were more likely to die in which the odds of death increased by five times respectively. A tertiary care center Lucknow, India ; study indicate the proportion of death was significantly higher in those patients who got first aid in 30 minutes to 60 minutes (p-value =0.465) as compared to those patients who got it in less than 30 minutes (p-value =0.006) (14). This might be justify, not reserving first aid were decreased the chance of survival by complicated the case.

In the study, 48.9% of victims visited the ED within 24 hour after RTA. Whereas 7.5% of cases admitted to the emergency department after one week of RTA this victims were12.9 times more likely to die than those come early,(AOR: 95% CI,12.932(3.004-55.674) . Different study conducted in India support this finding ,death rate significantly low among who reach early at ED and delayed presentation also contribute to road traffic crash related death (22,23).Moreover, the study done in Iran found that time for admission also (p<0.01, $x^2$-5.99), predictor of death (6). Late arrival to ED after RTA were by delay treatment and exacerbate complication, may lead for death. So; this indicate timing of admission to ED is crucial in saving the life of the victims there for an effort should made to increase the infrastructure including availability and accessibility of health facility and aware the community about the importance of early treatment.

RTA victims who were severe pain level and victims with immediate intervention need injury were 5.7 (AOR=5.690; 95% CI (1.318-24.565) and 6.3 (AOR=6.303; 95 % CI (1.720-23.093) times more likely to die. The finding was similar with the study done in Iran, those RTA victims severely injured were 9.19 times more likely to die ($P<0.01, \chi^2 – 9.19$) (6). A 5-year retrospective study done in India , also stated that severity of injuries causes road traffic
death(23). This might be justifying because of physiological, anatomical and psychological trauma that caused by RTA lead for unsatisfactory response for treatment modality.
7. Conclusion and Recommendation

7.1 Conclusion

Deaths in the study were almost similar; with most of the researches referred but some studies found that death rates low compared with this finding. The study revealed among hundred RTA victims five deaths was happen. Co-morbid condition, delayed presentation to emergency department, residence, severity of injury, not received first aid service were statistically significant factors increases death of RTA victims.
7.2 Recommendation

Based on the above finding the following recommendations are forward for the concerned bodies:

- For AaBET and ALERT trauma treatment center health care provider and health facilities management.
  - The health care providers should give emphasis for those RTA victims’ with co-morbid condition and sever injury.

- For Addis Ababa health bureau and federal ministry of health.
  - Focusing on the availability and accessibility of pre-hospital care service.

- For stakeholders.
  - By working in different media and community mobilization combat RTA.

- For researcher.
  - As this, a hospital based secondary data analysis; further studies will need to identify factors for treatment outcome of RTA.
8. Strength of the study

This study is able to over view the associated factors of death among RTA victims at emergency department of trauma treatment centers by retrieving secondary data in our setting where such information was scarce.

9. Limitations of the study

First, the study did not assess the outcome and associated factors of those RTA victims admitted to other department /surgical department, orthopedic department, ICU etc.../. Secondly, due to incomplete nature of secondary data variable like characteristics of crash, length of stay at emergency department which might be contribute on death were not addressed in this study.
Reference


8. Ananthnarayan Chandrasekaran; Aditya J Nanavati Sandhya Prabhakar Aditya J Nanavati Subramaniam, identify factors in the pre-hospital setting that may influence mortality rates.


ANNEX I
Data Abstraction Format

<table>
<thead>
<tr>
<th>No</th>
<th>Questions</th>
<th>Choice</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
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<td>1.1</td>
<td>Age</td>
<td>-----------------------</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Gender</td>
<td>1.Male</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.Female</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.Unknown</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>Residence</td>
<td>1.Addis Ababa</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.Out of Addis Ababa</td>
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<tr>
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**Part 1 - socio–demographic characteristics**

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<th>No</th>
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<tr>
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<td>Time of arrival to ED</td>
<td>1.00:00-00:06</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.06:60-12:00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.12:00-18:00</td>
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</tr>
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<td></td>
<td></td>
<td>4.18:00-24:00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.Unknown</td>
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</tr>
<tr>
<td>2.2</td>
<td>Mode of arrival</td>
<td>1.Ambulance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.Taxi</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.Privet Car</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.Other /carrying, walking/</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.Unknnon</td>
<td></td>
</tr>
</tbody>
</table>

**Part 2 – Characteristics of RTA victims during admission**
### 2.3 First aid

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>2.</td>
<td>No</td>
</tr>
<tr>
<td>3.</td>
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</tr>
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</table>

### 2.4 Source of referral

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Addis Ababa government hospital</td>
</tr>
<tr>
<td>2.</td>
<td>Regional hospital</td>
</tr>
<tr>
<td>3.</td>
<td>Privet hospital</td>
</tr>
<tr>
<td>4.</td>
<td>Health center</td>
</tr>
<tr>
<td>5.</td>
<td>Self</td>
</tr>
<tr>
<td>6.</td>
<td>Other /privet clinics , police/</td>
</tr>
<tr>
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</table>

### 3. Clinical characteristics of RTA victims at admission

#### 3.1 Co-morbid condition

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<tr>
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</thead>
<tbody>
<tr>
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<tr>
<td>2.</td>
<td>No</td>
</tr>
<tr>
<td>3.</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

#### 3.2 First aid

<p>| | |</p>
<table>
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<tr>
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<th></th>
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</thead>
<tbody>
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</tr>
<tr>
<td>2.</td>
<td>No</td>
</tr>
<tr>
<td>3.</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

#### 3.3 The severity of a patient's condition (MEWS)

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<th></th>
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</thead>
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<tr>
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<tr>
<td>2.</td>
<td>Yellow color coding</td>
</tr>
<tr>
<td>3.</td>
<td>Orang color coding</td>
</tr>
<tr>
<td>4.</td>
<td>Red color coding</td>
</tr>
<tr>
<td>5.</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
| 3.4 | Injury sit | 1. Head injury  
|     |           | 2. Upper extremity  
|     |           | 3. Chest injury  
|     |           | 4. Abdominal injury  
|     |           | 5. Pelvic injury  
|     |           | 6. Lower extremity injury  
|     |           | 7. Other/multiple organ injury, spinal cord injury  
|     |           | 8. Unknown  

<table>
<thead>
<tr>
<th>4. Treatment Outcome Of ED Admission</th>
</tr>
</thead>
</table>
| 4.1 Outcome of ED admission | 1. Discharged with medical advice  
|                               | 2. Admitted to surgical department  
|                               | 3. Admitted to orthopedic department  
|                               | 4. Admitted critical care unit/ICU  
|                               | 5. Referred to another health facility  
|                               | 6. Death  
|                               | 7. Deafaulter  
|                               | 8. Unknown  

Checked by supervisor; Name----------------------------------------, Signature -------------------