East and Central African Journal of Surgery Volume 15 Number 2. July/August 2010.

# Pattern of Fatal Injuries in Addis Ababa, Ethiopia: A One-year Audit.

**F. Tsegaye[1], K. Abdella[2], E. Ahmed[3], T. Tadesse[4], K. Bartolomeos[5]**

[1]Addis Ababa City Administration Health Bureau, *Addis Ababa, Ethiopia*
[2]World Health Organization, Addis Ababa, Ethiopia
[3]Addis Ababa University, Medical Faculty,
[4]Menelik II hospital, *Addis Ababa, Ethiopia*
[5]World Health Organization, Geneva-Switzerland
***Correspondence to:*** Elias Ahmed, *E-mail*: ahmedelias11@yahoo.com

**Background:** Injury continues to account for a large number of clients attending emergency department in Addis Ababa. Reliable information on causes of death is essential to the development of health policies for prevention and control. The aim of this atudy was to identify the pattern and common causes of fatal injuries
**Methods:** This is prospective study analyses autopsy data related to fatal injuries handled by Menilik II Hospital between July1, 2006 –June 30, 2007. (Sene 24, 1998 - Sene 23, 1999)
**Results:** A total of 2107 cases were analyzed. The victims were mostly male and the most vulnerable age group was found to be 15-44 years. Accidents versus homicide and accident versus suicide ratio was 1.8:1 and 5:1 respectively. Road traffic accidents were the most frequent causes of accident related death. Main means of homicide was hit by blunt or sharp object or firearm. More than 90% of victims who committed suicide use hanging or poisoning.Ninety percent of deaths occur with in 24 hours of the injury and only 105 (5%) died from the second day on wards. Eighty one percents of this patients had never received any medical care (either pre-hospital or hospital level).
**Conclusion:** Road traffic accidents accounted for most causes of injury related deaths. Significant proportion of patients had no access to emergency medical care. The findings strongly suggest that more aggressive, regulatory, educational, and rapid emergency treatment is necessary to address the large number of injury related death.

## Introduction

According to the 1996 World Health Organization report injury ranks fifth among all causes of death accounting for 5.2% of all mortality worldwide[1]. It is a leading cause of death and disability for people under 45 years in the industrialized world[1,2]. These rates are declining in developed countries [3] but injuries are important and a largely neglected health problem in developing countries[3-8].

One million and two hundred people died as a result of road traffic collisions. This means that on average 3242 people were killed daily on the world's roads. Twenty to fifty million people were injured or disabled in road collisions[9]. Ninety percents of road traffic deaths occurred in low income and middle-income countries, where 5098 million people or 81% of the world's population live[10] and own about 20% of the world's vehicles.

The WHO African Region had the highest mortality rate, with 28.3 deaths per 100 000 population. This was followed closely by the low-income and middle-income countries of the WHO Eastern Mediterranean Region, at 26.4 per 100 000 population. Countries in the WHO Western Pacific Region and the WHO South-East Asia Region accounted for more than half of all road traffic deaths in the world. In Ethiopia, like other developing countries, injuries are common but little attention is being given to this problem[11]. Injuries constitute around a half of all surgical emergencies[12], and were the primary reason for an emergency hospital visit in Addis Ababa during 1999 [13], 27% of emergency

visit and 5% of all hospitalization during 2005/06[14]. It is also the main causes of emergency visit and admission in orthopedics department of black lion hospital[15,16]. Road traffic accidents are the commonest cause of injury in urban areas in Ethiopia with 199 fatalities per 10,000 licensed vehicles per year[17,18].

To our knowledge reliable cause of death statistics were not available in the country which shows the pattern of injury related deaths. Our audit was devised mainly to assess the burden of fatal injuries together with identifying common causes of fatal injuries in Ethiopia. It was specifically designed to determine the profile or pattern of commonly occurring fatal injuries, and medical attention received before their death.

## Patients and Methods

All subsequent dead body presented to Menilik II hospital and confirmed that injury was the cause of the death in one-year period, between July 1, 2006 –June 30, 2007. Menilik II memorial hospital is the only hospital all over the country that providing the autopsy service to confirming the cause of death. Unlike other departments the forensic pathology department records detailed information about the dead body on their registration books by the pathologist for the medico legal reasons. According to the National Road Safety Coordination Office of Ethiopia[19], during the year 2006/7, there were a total of 17,147 car accidents, 9,553 non fatal injuries and 2,517 fatalities. The total number of motor vehicle was 244,252. The population of Ethiopia is 73,918,505 [20].

***Design:*** A prospective descriptive study were the data on injury was extracted from the registration book of the department by using structured question of Fatal Injury Surveillance Data Collection Form prepared by Addis Ababa City Administration Health Bureau. Significant number of variable have been reviewed such as age, gender of the victims and date of death, date of autopsy, place of injury and death, circumstance and manner of death and method of confirming the diagnosis. Causes of death is classified according to International Classification of Diseases 10th Revision (ICD-10)[21] these are unintentional, intentional (violence) and undetermined. Unintentional injuries comprise most of the traffic injuries, fires, falls, poisonings and drowning. On the other hand intentional injuries or violence are classified as homicide and suicide. Cases are classified as undetermined whenever specific causes are unclear. The theoretical index of traffic accidents were calculated which will be used as a base line for future progression and comparison, these are Motorization index (Vehicle /population), Accidentability index (accidents /vehicle), Harmfulness index (Victims /accidents) and Fatality index (Death / victims). Fatality per 10,000vehicle was also used.

***Statistical Analysis****:* The data analysis was performed with the aid of Epi info and SPSS. software. Results were expressed in absolute numbers, percentage and ratio.

## Results

A total of 2985 dead body was seen at the pathology department of Menilik II hospital, during one year period, between July 1, 2006 and June 30, 2007, of which 2,107 (70.4%) were related with injuries. The diagnosis was confirmed by autopsy in 1877 (89.1%) and 230 (10.9%) by reconnaissance. An average of 176 injury related death took place each month (ranging 147-220). Among the victims 1,662 (78.9%) were male and 445 (21.1%) were female giving a male to female ratio of 4:1. The mean age was 31 years (SD ± 16.1). The majority of the patients, 1,439 (68.3%), were within the age groups of 15-44 years (Figure 1). The place of origin of the patients were Addis Ababa in 862 (40.9%), Oromia 614 (29.1%), all other regions represents 315 (15.0%) but the address of 316 (15.0%) were not known (Table 1).

Eight hundred sixty eight (41.2%) of the injuries occurred on the road, followed by home 253 (12.0%) and only 68 (3.2%) occurred at work place but in 374 (17.8%) it was not possible to know the place.

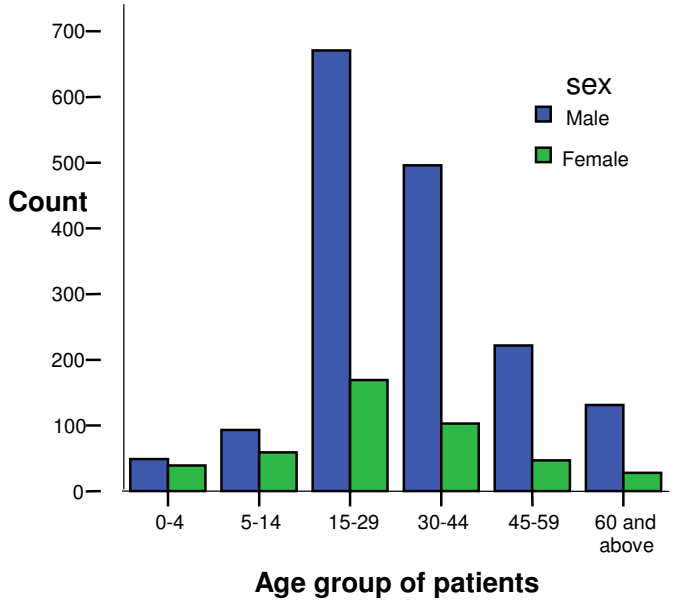


**Figure 1.** Age and Sex distribution of cases

**Table 1.** Address of Origin of the Victims

| Region | Frequency | Percentage |
|---|---|---|
| Addis Ababa | 862 | 40.9 |
| Oromia | 614 | 29.1 |
| SNNP | 167 | 7.9 |
| Amhara | 100 | 4.7 |
| Afar | 16 | 0.8 |
| Tigray | 10 | 0.5 |
| Benishangule | 6 | 0.3 |
| Harari | 5 | 0.2 |
| Somale | 4 | 0.2 |
| Gambela | 4 | 0.2 |
| Diredewa | 3 | 0.1 |
| Unknown | 316 | 15.0 |
| **Total** | **2107** | **100.0** |

Majority 1715 (81.4%) of the victims did not receive post crash care at any level either pre-hospital or hospital/health facility. Eight hundred and sixty seven (41.2%) died either on the road or at home and 364 (17.3%) died in hospital (289 received care and 75 before receiving any care) (Table 2).

One thousand and eight hundred and eighty seven (90.2%) victims died on the same day of the injury, 157 (7.4%) died between 2-7$^{th}$ day and 49 (2.3%) after seventh day of injury. The majority 1679 (79.7%) of the autopsy was done on the second days of death (Table 3). A total of 1139 (54.1%) of victims died because of accident, 641 (30.4%) homicide, 234 (11.1%) suicide, and in 93 (4.4%) it was

**Table 2.** Circumstance of Injury and Death

| Character | Number | Percent |
|---|---|---|
| ***Place of injury*** | | |
| Road | 868 | 41.2 |
| Home | 253 | 12.0 |
| Work Place | 68 | 3.2 |
| Recreational place | 6 | 0.3 |
| Others | 538 | 25.5 |
| Unknown | 374 | 17.8 |
| ***Level of care provided*** | | |
| None | 1715 | 81.4 |
| Pre-Hospital Care | 93 | 4.4 |
| Hospital/Health Facility care | 289 | 13.7 |
| Unknown | 10 | 0.5 |
| ***Place of Death*** | | |
| Road | 621 | 29.5 |
| Hospital/ Health facility | 364 | 17.3 |
| Home | 246 | 11.7 |
| Work Place | 53 | 2.5 |
| Recreational place | 7 | 0.3 |
| Others | 520 | 24.7 |
| Unknown | 296 | 14.0 |

Table 3. Time interval between injury, death and autopsy

| Time interval between (days) | Number | Percent |
|---|---|---|
| ***Injury and death*** | | |
| **< 1** | **1887** | **89.6** |
| **1-2** | **91** | **4.3** |
| **3-7** | **66** | **3.1** |
| **> 7** | **49** | **2.3** |
| **Missed** | **14** | **0.7** |
| ***Death and autopsy*** | | |
| **First day** | **122** | **5.8** |
| **Second day** | **1679** | **79.7** |
| **Third day** | **252** | **12.0** |
| **Fourth day and above** | **54** | **2.5** |

not possible to determine the circumstance of death. Of 1139 victims of death due to accident, road traffic accident's accounted for 782 (68.7%), followed by drowning 100 (8.8%). Among 782 road

traffic accidents, 402 (51.4%) occurred on pedestrian, 334 (42.7%) passengers, and 46 (5.9%) drivers. Homicide victims were most likely to die after being hit by blunt object 300 (46.8%), firearm (21.4%) or sharp instrument 103 (16.1%). Hanging was the sole method of suicide in 80.6% (141/175) of male and 76.3% (45/59) of female.

Poisoning suicide was more common in female than male (23.7%, 15/59 versus 9.1%, 16/175). In 93 (4.4%) cases the manner of death couldn't be determined (Table 4). All causes and manner of death were higher in male age group of 15-44 with exception of substance intoxication where 70.4 % (19/27) occurred in female age group of 15 to 29 years.

The Motorization index was 3 per 1000 population, accidentability index for the same year was 70 per 1000 licensed vehicle, harmfulness index 70% and fatality index 21%.. The fatality was 103 per 10,000 licensed vehicles.

**Table 4.** Manner and Cause of Death

| Cause | Manner | | | | Total | Percent |
|---|---|---|---|---|---|---|
| | Accident | Homicide | Suicide | Undetermined | | |
| Motor vehicle crash | 782 | 0 | 0 | 0 | 782 | 37.2 |
| Blunt Object | 21 | 300 | 0 | 47 | 368 | 17.5 |
| Sharp Object | 1 | 103 | 0 | 2 | 106 | 5.0 |
| Hanging | 0 | 1 | 186 | 0 | 187 | 8,9 |
| Firearm | 1 | 136 | 15 | 3 | 155 | 7.4 |
| Drowning | 100 | 2 | 0 | 3 | 105 | 5.0 |
| Strangulation | 0 | 50 | 0 | 0 | 50 | 2.4 |
| Fall | 37 | 1 | 2 | 5 | 45 | 2.1 |
| Electric accident | 36 | 0 | 0 | 0 | 36 | 1.7 |
| Suffocation | 23 | 7 | 0 | 1 | 31 | 1.5 |
| Poisoning | 0 | 0 | 30 | 1 | 31 | 1.5 |
| Intoxication | 23 | 3 | 0 | 3 | 27 | 1.3 |
| Explosive blasts (landmines, bombs) | 1 | 0 | 0 | 21 | 22 | 1.0 |
| Other specific causes | 34 | 40 | 1 | 5 | 80 | 3.8 |
| Missed | 80 | 0 | 0 | 2 | 82 | 3.9 |
| **Total (%)** | **1139 (54.1)** | **641 (30.4)** | **234 (11.1)** | **93 (4.4)** | **2107** | **100** |

## Discussion

Even though trauma related deaths are only the "tips of the iceberg" of trauma, there are several reasons why it made sense to track them as a way to address the problem, mainly because of their seriousness than about non-fatal injuries. Reliable information on causes of death is essential to development of health policies for prevention and control of injury. Menilik II hospital is the only hospital where autopsy service is provided, therefore the autopsy data from this hospital can represent a community and a substantial insight can be made into the commonly occurring fatal injuries, circumstance and also provide useful information on mortality in the community, and help to establish priorities in the provision of services and preventive measures.

We found that 70.4% of all deaths were due to injury. Most of injury related deaths either intentional or unintentional occurred in most economically productive age group, so one can imagine the economic impacts of such death. Seventy percents of the patients were either from Addis Ababa or

Oromia region. This is probably related to the distance, as the hospital is in Addis Ababa and near to the Oromia region (the biggest region in the country).

The Autopsy is done mainly on physical examination of the deceased body and remnants which makes the diagnosis of poisoning suicide, as a sole and concomitant cause of death, to depend solely on circumstance of death and physical witnessing (seeing and smelling) of potentially dangerous chemicals and/or materials. Such examination may lead to apparently low detecting rate of poisoning. There are no written protocols on the type and extent of autopsy examination to be done according to the body / remnant presented, body sample and body fluid preservation and examination and content and style of autopsy result reporting. Majority of the injuries occurred on the road and only very few occur at work place. Road traffic accident was the leading (37%) causes of fatal injury, similar with the study in US [22] but different from the study in India where intentional self harm was the leading cause [23-25]. Road traffic fatalities affect pedestrian and vehicle occupants almost equally unlike other low energy injuries were majority were pedestrian [14-17]. This finding is in conformity with the pattern of road users involved in road traffic crashes. Pedestrians account for 53% of all road users crashed by vehicles in Ethiopia in 2007[19]. A large number of deaths (41%) were intentional (homicide 30% and suicide 11%). It needs a different study design and approach to understand the underlying causes of interpersonal conflicts and motives for suicides.

Ninety percent of the victims died within 24 hours of the injury and 7 % within 2nd-7th day of post injury. It is very sad that 81% of the victims died without receiving any post crash care either pre hospital or hospital level and the patients died on the sites of accident or while they are on the process of transfer to hospitals or on arrival and while awaiting services at emergency department. As it was shown on other studies[26] there are other factors, other than severity of trauma, that determine survival such as effective emergency medical system and triage, prompt and correct diagnosis, adequate medical treatment and care. If there were proper pre-hospital care, ambulance service and rapidly acting hospital emergency service, most of these patients could have been saved.

The fatality per 10,000 licensed vehicles for the year was 103, previously it was 199 which seems the fatality decrease but this may not be the case, probably due to increasing the number of vehicles.
According to the traffic police report there were 2515 road traffic fatal injuries but only 782 (31%) were brought to Menilik II hospital, this shows that there is a need of coordinated national injury surveillance which coordinates and combines data from different sources.

## Recommendations

We recommend:

1. Details about injury related deaths from multiple sources and moving our understanding beyond an appreciation of only the gross contour of the problem.
2. Study the apparent motives behind suicide and reasons for homicide
3. Specific and multi-disciplinary intervention methods are necessary to tackle multiple causes of injuries and deaths.
4. In the mean time establishing proper emergency service (pre-hospital and hospital) are urgently required to reduce the number of death from injury.
5. The autopsy service and interpretation of the evidences should be supported with toxicology laboratory and histo-pathology examination and decrease its dependence on the circumstances of death solely.
6. Protocols on Type and extent of autopsy examination, Content and style of reporting and Record keeping should be put into practice and strongly followed.

## Acknowledgement

The cooperation of the health bureau of Addis Ababa city administration is greatly appreciated. Special thanks go to all staffs of Menillik II hospital in pathology department and those involved in data collection.

## References


1. Maciaux M, Romer CJ. Accidents in children adolecent and young adults. Major public heaith problem. Wld Hlth Stat Quart 1986;39:227-31
2. Zwi A. The public burden of injury in developing countries: a critical review of literature. Trop. Dis. Bull. 1993; 90:5-45.
3. Nordberg E. Injuries in Africa: a review. East Afr. Med. J. 1994; 71(6):339-45.
4. Hunpono-Wusu, O.O. Disorders which shorten life among Nigerians. Trop. Geogr. Med. 1976; 28:343.
5. Omondi- Odhiamho, van Ginneken, J.K. and Voorhoeve, Am. Mortality by cuase of death in a rural area of Machakos District. Kenya. In 1975-78. J. Biosoc. Sci. 1990;22:63
6. World Health Organization. Investing in health research and development: Report of Ad-Hoc committee on health research relating to future intervention options. Geneva, 1996.
7. Smith G.S, Barrs P. Unintentional injuries in developing country. The epidemiology of neglected problem. Epidemiol. Rev. 1991;13:228-66
8. Forjouh S.N Gyebi-Ofosu E. Injury surveillance: should it be concern to developing countries? J. pub. Hlth. pol, Autumn 1993; 355-9.
9. Peden M et al. World report on road traffic injury prevention. Geneva, World Health Organization, 2004
10. World population prospects: the 2002 revision. Volume 1: Comprehensive tables New York, United Nations, 2003
11. Larson PC and Dessie T. Unintentional and intentional injuries, In Helmut Klos and Zein Ahmed: Ecology of health and disease in Ethiopia. Westview press, 1993;473-82
12. Mensur O. Yizaw K. Sisay A. Magnitude and pattern of injuries in North Gonder administrative zone, northeast Ethiopia, Ethiop. Med. J. 2003; 41:213 – 220.
13. Health and health related indicators, By Ministry of Health, Addis Ababa, Ethiopia 2000.
14. A. Wolde, K. Abdella, E. Ahmed, F. Tsegaye1, O. A. Babaniyi, O. Kobusingye, K. Bartolomeos. Pattern of Injuries in Addis Ababa, Ethiopia: A One-year Descriptive Study. East and Central Afr. J. Surg. 2008; 13(2); 14-22.
15. Elias Ahmed, Tezera Chaka. Orthopedic emergencies and major limb trauma in Tikur Anbessa Hospital, Addis Ababa. East and Central Afr. J. Surg. 2005;10(2): 43-50
16. Elias Ahmed, Tezera Chaka. The Pattern of orthopedic admissions in Tikur Anbessa Hospital, Addis Ababa. Ethiop. Med. J. 2005;43:85 – 91
17. Mulate Taye, Tadios Muni. Trauma registry in Tikur Anbessa Hospital, Addis Ababa, Ethiopia. Ethiop Med J, 2003; 41: 221-226.
18. G. Jacobs and A. Aeron-Thomas (TRL Limited). African road safety review, final report. US Department of Transportation/ Federal Highway Administration. PR/INT/659/2000.
19. National Road Safety Coordination Office of Ethiopia, reports of 1999 EC with regard to RTI.
20. Central Statistics Agency of Ethiopia, 2008
21. World Health Organization. International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Version for 2003. http://www3.who.int/icd/vol1htm2003/fricd.htm.
22. Vyrostek SB, Annest JL, Ryan GW, Surveillance for ftal and non fatal injuries- United states, 2001. MMWR Surveill Summ. 2004. 3; 53(7):1-57.
23. M Cardona et.al.The burden of fatal and non-fatal injury in rural India. Injury Prevention 2008;14:232–237

24. Bose A, Konradsen F, John J, et al. Mortality rate and years of life lost from unintentional injury and suicide in South India. Trop Med Int Health 2006; 11:1553–6.
25. Gajalakshmi V, Peto R. Suicide rates in rural Tamil Nadu, South India: verbal autopsy of 39,000 deaths in 1997–98. Int J Epidemiol 2007; 36:203–7.
26. Nicolic S. Micic J, Mihailovic Z. Correlation between survival time and severity of injuries in fatal injuries in traffic accident. Srp Arh Celok Lek. 2001; 129(11-12).