Trauma in Ethiopia Revisited: A systematic Review

A. Azaj[1], N. Seyoum[2], B. Nega[2]
[1]Department of emergency medicine, School of medicine, AAU
[2]Department of surgery, School of medicine, AAU
Correspondence to: Berhanu Nega, E-mail: b_nega@yahoo.com

Background: ***This is a systematic review on trauma/injury incidents which has tried to examine the variety of socio-demographic, vehicular, environmental, and behavioral factors that are associated with injury and its outcome across different settings.***
Data Sources: Electronic searches for trauma/injuries from peer-reviewed literature and websites from 1960 to August 2013.
Study Selection: 36 studies met the study inclusion criteria.
Data Extraction: A systematic narrative summary was conducted that included study design, methodology, risk factors, and other study variables.
Results: ***A higher proportion of injury was found in economically active age groups of 15-59 years (Range 56.4 %–80%) across all studies. Similarly majority of the articles reported a higher proportion (Mostly 2/3rd) of injuries among male than female patients (range 53.9 %-91.2 %). Even though in all studies injuries were a concern for every population, some studies [12, 13, 15, and, 29] showed a higher incidence among farmers, students and house wife that other occupation. Unintentional injuries were the primary cause for the majority of injury-related reports made with the weighted pool average percentage of 60.7% (range from 44.6 %[11] to 98%[20]). MVIs were the leading cause of injury among lists of unintentional injuries followed by Falls (16%) machine/tools injury (5.9%), burn (5.3%), poisoning (1.0%) and Animal bite (1.3%). Trauma from interpersonal violence (Homicide) is the leading causes of intentional injury (24.4%) reported followed by disproportionately low incidence of Fire arm(5%) and Self-harm injuries(2.1%). Nine of the 36 articles reported percentage distribution of Mortality by Mechanism of injury and the rates of death from MVIs and homicide are generally higher with an average weighted pool percentage of 37.5% and 24.1% respectively.***
Conclusion: ***The review showed injury as a significant cause of morbidity and mortality in Ethiopia. Based on the available data, possible strategies relating to trauma prevention are discussed. Because of the uncertainties about the quality and the absence of some data in certain region of Ethiopia, we recommend a need to more accurately define this burden at a national scale.***

Key words: Trauma, Injury, Accident, Ethiopia

Introduction

Injury have traditionally been defined as physical damage to a person caused by an acute transfer of energy (mechanical, thermal, electrical, chemical, or radiation energy) or by the sudden absence of heat or oxygen. This definition has been broadened to include damage that results in psychological harm, mal-development, or deprivation. [1] Injuries are most commonly categorized with reference to the presumed underlying intent: injuries considered to be unintentional include those caused by road-traffic incidents, falls, drowning, burns, and poisonings, and injuries considered to be intentional include those caused by self harm, interpersonal violence, and war and conflict. [2, 3]

The Global Burden of Disease Study estimates that 10% of global deaths are due to injuries, and that if current trends persist, this burden will greatly increase in the next 20 years [4]. Globally, the lives of over 15 000 people are cut short daily as a result of an injury. About 5.8 million people die each year as a result of injuries. This accounts for 10% of the world's deaths, 32% more than the number of fatalities that result from malaria, tuberculosis, and HIV/AIDS combined. [5] Injuries are a neglected public health problem in developing countries, with over 90% of the world's injury deaths occurring in low-and middle-income countries [6]. The financial demands associated with injuries pose particular difficulties for low-income families contributing to the 'injury poverty trap'. There for reliable

epidemiological information is vital to guide the development of targeted injury prevention policies and strategies [7].

Evidence shows that the complexity and magnitude of injuries in general is increasing. In this regard fragmentation of information and evidence seems evident. Thus, contemporary trauma yielding problems must be understood on the background of the numerous long-term and existent socio-cultural and political systems (violence, assault, gender, age, war and conflict) as well as emergent socio-economic transformations affecting the developing world. Today, a better understanding of causes and magnitudes of trauma is urgent because we assume that they will increase and become more challenging in the developing world like Ethiopia. Policies and interventions aimed at preventing or resolving these challenges are doomed to fail, however, if they are based on erroneous assumptions and incomplete understandings of the problem. This leads to the necessity to rely on empirical evidence and careful analysis while drawing conclusions.

In Ethiopia, studies on trauma incidents have been conducted over several years [9-43]. These studies have identified a variety of socio-demographic, vehicular, environmental, and behavioral factors that are associated with it. However, there has been to date no peer-reviewed, systematic review on trauma/injury incidents examining the consistency of these factors across different settings. The aim of this systematic review is to (i) describe the epidemiology of all injuries and to explore their differences by socio-demographic characteristics (ii) identify common modifiable risk factors for injuries across different settings and localities, (iii) identify specific risk factors that have been reported for particular settings or localities, and (iv) recommend potential counter measures for reducing the frequency and severity of such events.

Methods

Data Sources: Electronic databases from MEDLINE (Pub Med and Ovoid) were searched for English language publications on trauma/ injuries in the Ethiopian population for the period of 1960- August 2013. Additional searches were also conducted using Google Scholar for unpublished studies, conference presentations, and reports. Secondary searches of reference lists were also conducted manually for potential relevant articles.

Search Terms: The broad search term used was “Trauma in Ethiopia” and in subsequent additional searches included the keywords like “injuries”, “ Intentional injuries”, “Unintentional injuries” , “Motor vehicle injuries”, “Burn injuries” , “Homicide injuries”, :Burn”, and “Poisoning” .

Identification of Literature: This review considered articles which mentioned trauma or injuries of any type without restriction on age, sex, cause, and place or study design. Titles and abstracts were read to identify papers for inclusion by two reviewers. Full-text articles, reviews, and reports were then obtained to extract relevant study factors. Then assessment of eligibility of studies and extraction of data from study reports were made. Abstracts without full text or opinion pieces were excluded.

Data Extraction and Synthesis: Data on key variables such as study design, methodology, socio-demographic charter, risk factors, morbidity, mortality and other relevant variables for different types of injuries were extracted using a standardized data extraction form. All studies identified were either descriptive or longitudinal case serious analysis . In such studies, where no comparators were reported the number of cases and proportion of total cases with a given risk factor or characteristic were extracted. Then, systematic narrative summary of each of these studies was outlined.

Meta-analysis was not appropriate due to the variability in methods and measures between the studies; however identified studies were grouped in terms of common domains relating to socio-demographic, cause of injury, type of injury, environmental factors, behavioral factors, disability and fatality rate.

Results

We found thirty six articles that met the inclusion criteria within five decades of time period. Of the 36 studies identified, 18 investigated the magnitude and pattern of injuries within hospitalized patients, two studied pattern of injury in the community, three looked in to the possible risk factors for injury, two did mortality audit following trauma, three looked burn patients and eight of them assessed poisoning. Studies were predominantly conducted in Addis Ababa, Jimma and Gondar university hospitals. The majority of studies (17 of the 36 studies) were hospital based retrospective descriptive type, while the rest nine were prospective descriptive hospital based studies, six community based cross sectional studies, two cohort and two case serious analysis . All of the studies appeared in peer-reviewed literature.

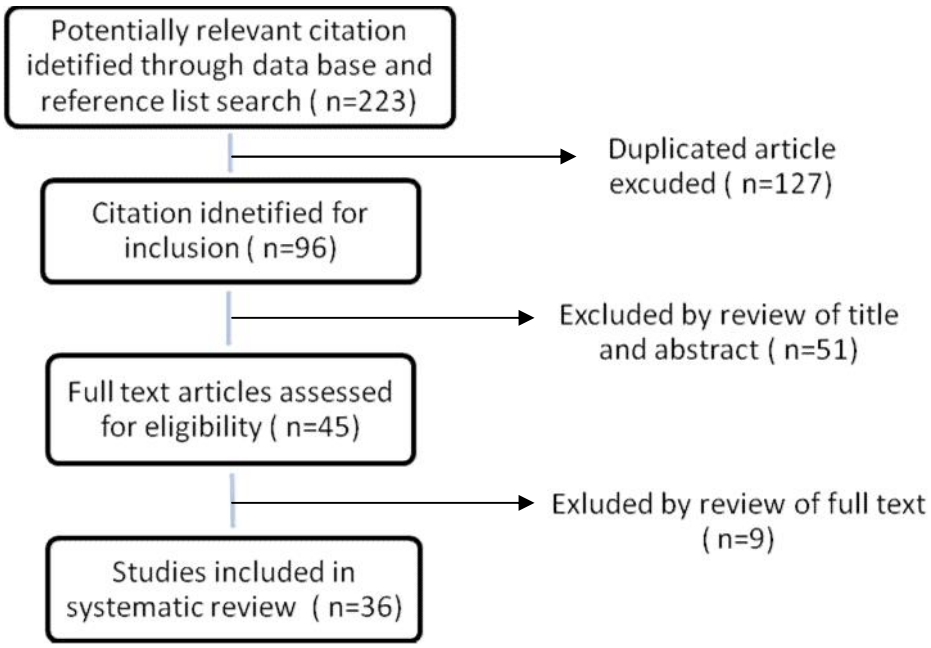

Figure 1. Flow chart of the selection process for studies included in the systematic review.

Socio-demographic pattern

Age - Seven of the 36 studies reported on injuries in children aged up to 15 years[16, 17, 25, 26, 27, 28,30, twenty studies examined injuries in all age group[9,10,11,12,13,15, 18, 19,20,22, 23, 24, 29, 31,32,34,40,41,42,43 eight studies[14,21, 33, 35,36,37, 38,39 reported only on adult population and one study [44] used data mining technology to assess road traffic accident severity analysis. Of the 20 studies where whole age groups were included, a higher proportion of injury was found in economically active age groups of 15-59 years (Range 56.4 %–80%). Similar kind of trend but with lesser extent of sex difference (M:F ➔ 1.5-1) was also noted in injuries due to burn and poisoning.

Sex - Twenty-four studies amongst the 36 studies investigated showed sex differences. Majority of them (19 of 24 studies) reported a higher proportion (Mostly 2/3rd) of injuries among male than female patients (range 53.9 %-91.2%). Those studies that showed slight predominance of females were studies which investigate poisoning alone[31,32, 33]. Three studies[9,13,25]] analyzed the sex differences among different age groups. Unlike adult population, they found no marked sex difference in younger age groups.

Ethnicity, religion, occupation - Of the 36 studies identified in the review, 16 studies investigated ethnicity, religion and/ or occupation as factors associated with trauma [12,13,14,15,17,22,23,24,26,29,30,31,32,33,41,43]. Even though in all studies injuries were a concern for every population, some studies [12, 13, 15, 29] showed a higher incidence among farmers, students and house wife that other occupation. Area of residency (urban vs rural) as a factor for trauma was primarily related to the study area. Studies done in all primarily general hospitals and some regional referral hospital [12, 13,15,31] had higher prevalence among rural population, while those studies done in central referral hospitals showed either an equivalent or higher proportion of urban people being affected by trauma [14, 22, 23, 24, 26, 29, 41,43]. Majority of patients who had injury due to poisoning, (91.5%[32], 89.6%[33]) are from Urban area. Some qualitative findings highlight the consequences of injuries not only for the occupation and area of residency but also for the social and economic status of the entire household. A study done in accidents of childhood by Fisseha T[25] showed majority of trauma victim children, especially those with burn (81.1%) were seen among low income families.

Mechanism of injury

Unintentional Injuries

Seventeen of the thirty six studies (Table 1) have investigated the cause of injury. Accordingly, Unintentional injuries were the primary cause for the majority of injury-related reports made [9,10,12,13,14,18,19,20,22,23,24,25,26,43]. The weighted pool average percentage of unintentional injury for those 17 articles was 60.7% (range from 44.6 %[11] to 98%[20]). MVIs were the leading cause of injury among lists of unintentional injuries (Table 2). It accounted for a weighted pool average of 30.3%. The highest incidence of MVIs was recorded by Zuriash M[14] (49.1%) and the lowest was reported by Kifle W[13] (2.5%). Unlike the rest of the articles who did a hospital based assessment, Kifle W[13] did a community based survey indicating the significantly low incidence (2.5%) of MVIs at a rural and semi urban community. Falls (16%) is the next common cause of unintentional injury reported, followed by machine/tools injury (5.9%), burn (5.3%), poisoning (1.0%) and Animal bite (1.3%) in descending order (Table 2).

Seven of the 36 studies [9, 11, 25, 26, 29, 30,31]have investigated the different causes of burn. Almost all burn injury reported was caused by thermal injury. Less than 3% of burn was caused by either electrical or chemical injury. So far, there was no report of radiation injury identified (Table 1).

Table 1. Percentage Distribution of Burn Injuries by Cause in Different Studies

Author	Total No.	Cause of burn					Mortality
		Thermal	Electrical	Chemical	Radiant	Unspecified	
Berhanu N.[9]	84	72(85.7)	7(8.3)	5(6)	0(0)	0(0)	10(11.9)
Mensur O.[11]	95	90(94.7)	3(3.2)	2(2.1)	0(0)	0(0)	NA
Fisseha T.[25]	135	135(100)	0(0)	0(0)	0(0)	0(0)	15(11.1)
Gedlu E.[26]	49	47(95.9)	2(4.1)	0(0)	0(0)	0(0)	14(28.6)
Tesfaye M.[29]	121	109(90)	6(5.0)	3(2.5)	0(0)	3(2.5)	14(11.6)
Ephrem D.[30]	347	345(99.4)	1(0.3)	1(0.3)	0(0)	0(0)	40(11.5)
P. Courtright [31]	271	271(100)	0(0)	0(0)	0(0)	0(0)	NA
Weighted pool (%)	1102	1069(97.0)	19(1.7)	11(1.0)	0(0)	3(0.3)	

Data are frequencies; Values in parenthesis are percentages,
NA- indicate that data is not available

Table 2. Percentage distribution by Mechanism of injury seen in different studies

Author	Total No.	Unintentional Injury							Intentional Injury				Other (%)	Mortality (%)
		MVI (%)	Burn (%)	Fall (%)	Poison (%)	Drown (%)	Animal Bite (%)	Machine injury (%)	Total	Homicide (%)	Fire-arm (%)	Self – harm (%)	Total (%)	
Berhanu N.[9]	1277	32.6	6.6	6.9	1.1	0.7	3.4	0.0	51.3	24.1	11.7	8.3	44.1	4.6	23.3
Mulat T.[10]	3822	41.3	3.9	20.7	0.0	0.0	0.0	0.0	65.9	31	2.6	0.0	33.6	0.5	1.47
Mensur O.[11]	1982	14.6	4.8	18.6	0.0	0.0	6.5	0.0	44.6	48.5	0.0	0.0	48.5	6.9	1.5
Kifle W.[12]	1102	30.3	3.5	9.3	0.0	0.0	0.0	13	56.1	40.4	0.0	0.0	40.4	3.5	7.5
Kifle W.[13]	3909	2.5	5.4	20.9	1.9	0.0	7.1	33.5	71.3	17.6	0.0	0.0	17.6	11.0	NA
Zuriyash M.[14]	328	49.1	0.0	14.9	0.0	0.0	0.0	0.0	64.0	18.0	0.0	0.0	18.0	18.0¥	18.3
B.Ayana [15]	386	NA	NA	NA	NA	NA	NA	NA	NA	95.7	4.3	0.0	100	0(0)	1.6
Alemu MH.[18€]	120	46.7	5.0	0.0	0.0	1.6	0.8	0.8	54.9	28.3	4.2	10.9	43.5	1.6	100€
Tufa G.[19€]	90	37.9	2.2	3.3	1.1	3.3	0.0	0.0	47.8	36.7	11.1	4.4	52.2	0.0	100€
Munayazewal D.[20]	1487	43.0	0.0	35	0.0	0.0	0.0	20	98	0.0	2.0	0.0	2.0	0.0	NR
Elias A. [22]	507	41.6	0.0	38.5	0.0	0.0	0.0	3.4	83.5	5.5	5.1	0.0	10.6	5.9	2.2
Ahmed E.[23]	7151	39.1	0.0	35.1	0.0	0.0	0.0	4.7	78.9	10.4	3.7	0.0	14.1	7.0	NA
Lambisso W.[24]	3687	47.0	0.0	17.8	0.0	0.0	0.0	18	82.8	5.0	6.3	0.0	11.3	6.2	NA
Fisseha T.[25]	343	27.1	39.4	18.9	4.0	0.0	0.0	0.0	89.4	0.0	0.0	0.0	0.0	10.6¥	9.3
Gedlu E.[26]	313	14.4	15.6	21.7	6.4	0.0	0.0	0.0	58.1	7.0	25.6	0.0	25.6	9.3	14.4
A.Wolde[41]	40,752	11.1	3.2	12.4	1.0	0.1	4.1	NA	31.9	22.1	1.1	1.4	24.5	43.6	4.2
F.Tsegaye[43€]	2107	37.2	1.7	1.7	2.2	4.7	NA	6.5	54.1	24	6.5	11.1	41.5	4.4	100
Weighted pool (%)	69363	30.3	5.3	16.0	1.0	0.6	1.3	5.9	60.7	24.4	5.0	2.1	31.0	6.1	10.8

¥ - Include all other unspecified groups in to other category including aspiration foreign body,
€ - Assessment was made only on fatal injury,
NA- indicates that data is not available

Table 2. Percentage distribution by Mechanism of injury seen in different studies

Seven of the 36 articles [9, 25, 26, 32, 33, 34, 35] looked the possible cause of poisoning. The weighted pool percentage showed that Organophosphate (47.2%) were the leading cause reported. The other reported causes of poisoning were sodium hypochlorite (bleaching agents) 12.9%, Drugs (10%), Herbicide (6.2%), Hydrocarbons (2.9%), Alcohol (2.9%), carbon monoxide (1.4%), and in 14.8% the cause was not identified. (Table 5)

Four articles [9, 32, 33, and 34,] have looked the motive (intention) behind poisoning. Majority got poisoned for self harm (range 72%[32]-96.6%[33]) and the rest by accident (range 3.4%-28%). Even though the reported Accidental poisoning among hospitalized patients are small, community based surveys showed the existence of its danger. Kaunamoorthi [37] looked the knowledge, attitude and practice towards safe use of pesticide in members of peasant association of Ethiopia and found out that most surveyed farmer sprayed pesticides without any personal protective equipment. The majority of participants also reported using empty pesticide containers for drinking and food storage. Besides, 20% of farmers applied pesticides by sweeping with plant leaves in a hazardous manner. Other than the usual causes of poisoning; Yalemsew[38] investigated lead poisoning among automotive garage workers in Jimma town and reported that they are in danger of impending lead toxicity with a range of 11.73-36.52µg/dl.

Intentional Injuries

Intentional injury was reported as a leading cause of injury in only one article [11]. Mensure O. et-al [11] reported 48.5% of trauma victims presenting to twelve health institution of Gondar administrative zone was caused by inter personal assault. Trauma from interpersonal violence (Homicide) is the leading causes of intentional injury (24.4%) reported in nearly all articles (Table 2). The incidence of Fire arm and Self-harm injuries were disproportionately low. The weighted average pool of the 17 articles showed that only 5% and 2.1% of injuries were caused by Fire-arm and Self-harm respectively. Three articles [9, 11, and 15] looked in to the materials used for homicide. The widely

applied materials are blunt objects (stick, stones, hand fist) followed by sharp objects (knife, spear, machete) and fire-arm.

Risk factors for injury

Location of incident

Six articles identified MVIs primarily on the basis of the incident. Studies done in Addis Ababa showed pedestrians are the primary victims (93%[10], 88%[23], > 80%[24],), while those articles done in Gondar and Jimma showed occupant are equally or more affected. (Table 4)

A study done by L.D.Howe, [16] in four different countries (Ethiopia, Peru, Vietnam and India) on Injury occurrence with a cohorts of 2000 children of age 6–17 months at enrolment found out that occurrence of child injury was high in all countries. Caregiver depression was found to be a consistent risk factor for all types of injury measured (burns, serious falls, broken bones and near-fatal injury) across all countries. Other risk factors also showed consistent associations, including long-term child health problems, region of residence (urban Vs rural) and the regular care of the child by a non-household member.

Temporal Characteristics

Of the 36 studies, only two [9, 13] investigated temporal characteristics in month. Both studies reported that peak incidents period during the month of June to August and became least in March to May.

Table 3: Percentage distribution of victims involved in MVIs as seen in six different studies

Author	Pedestrian	Occupant	Motor cycle rider	Pedal cyclist	Unspecified¥	Total
Berhanu N.[9]	139(33.4)	211(50.7)	14(3.4)	16(3.8)	36(8.7)	416(100)
Mulat T.[10]	1457(93)	NA	NA	NA	110(7)	1567(100)
Mensur O.[11]	104(35.9)	172(59.3)	NA	NA	14(4.8)	290(100)
Ahmed E.[23]	2458(88)	335(12)	0(0)	0(0)	0(0)	2793(100)
Lambisso W.[24]	1462(80)	NA	NA	NA	365(20)	1827(100)
F.Tsegaye[43]	402(51.4)	380(48.6)	0(0)	0(0)	0(0)	782(100)
Weighted pool (%)	6022(75.5)				525(6.8)	7675(100)

Data are frequencies; Values in parenthesis are percentages,
NA- indicate that data is not available or full
¥ - Include all others in to unspecified category

Morbidity and Mortality

Hospital admission rate among those presented with injury at the OPD was assessed by seven articles [10, 11, 12, 13, 14, 15, 23]. The admission rate range between 5.2%[13] and 37.7%[14] and those admitted patients have stayed for an average of 10-14 days [14, 29] (range 1- 283 days). Eight out of the 36 [11, 12, 13, 15 20, 23, 25, 26] articles investigated the outcome of injury. The incidence of minor injury varies between 4.2%[23] and 79.1%[12]. Studies done with in community [13] outside health institution shows higher incidence of minor injuries like bruise, laceration, spray etc. Studies done in higher hospitals[, 23, 25, 26] shows higher incidence of major trauma. Among major trauma outcomes, majority seek medical advice for management of fractures followed by head injury and internal organ injury [11, 12,15,20,23,25] (Table 4). Nine out of 36 articles [9, 10, 18, 19 22, 25, 26 41, 43] reported percentage distribution of Mortality by Mechanism of injury. The rates of death from MVIs and homicide are generally higher with an average weighted pool percentage of 37.5% and 24.1% respectively. (Table 6)

Table 4. Percentage distribution by Morbidity by extent of injury

Author	Total No.	Major injury							Minor Injury
		Fracture	Dislocation	Head injury	Internal organ injury	Amputa -tion	Others¥	Total	
Mensur O.[11]	1982	356 (18)	NA	102(5.1)	77(3.9)	NA	115(5.8)	650(32.8)	1332(67.2)
Kifle W.[12]	1102	454(41.2)	56(5.1)	NA	95(9.0)	NA	NA	230(20.9)	872(79.1)
Kifle W.[13]	364	24(6.6)	NA	NA	22(6.0)	NA	67(18.4)	113(31.0)	251(68.9)
B.Ayana [15]	386	257(66.6)	9(3.3)	20(5.2)	14(3.6)	NA	0(0)	300(77.7)	86(22.3)
Munayazewal.[20]	1487	1044(83)	52(4)	NA	NA	68(6)	17(1)	1181(79.4)	306(20.6)
Ahmed E.[23]	7317	6181(84.5)	360(4.9)	NA	NA	197(2.7)	272(3.8)	4071(56.9)	307(4.2)
Fisseha T.[25]	343	103(30	NA	134(39)	NA	NA	NA	NA	NA
Gedlu E.[26]	313	79(25.2)	0(0)	69(22.0)	21(6.7)	22(7.0)	9(2.9)	200(63.9)	113

Data are frequencies; Values in parenthesis are percentages,
NA- indicate that data is not available
¥ - Include all other unspecified groups in to other category including amputation

Discussion

This systematic review tried to provide a current assessment of trauma and its impact in the Ethiopian society. We have used peer-reviewed published articles in the last five decades. This review highlights considerable variability in the reporting of injuries and its risk factors. A review of this topic is further complicated by the lack of a standard definition of trauma, limited reporting of trauma in many places of the country, and the variability of case inclusion and exclusion criteria used in the identified studies. Forming a universal system of data collection is vital to define the nature and extent of the problem, to indentify risk factors, and to set priorities for intervention. To this effect a simplified data recording and injury severity scoring system is essential in all health institutions. The KTS (kample trauma score) is a simplified one page injury severity scoring system as well as registering system. It considers important parameters like age, SBP (systolic blood pressure), respiratory rate, neurological status and number of serious injuries, hence we advise KTS be used for sorting disposition of patients admission and referral to higher facilities in health all institutions.
All but six of the 36 studies were conducted in only three teaching hospital of Ethiopia (Addis Ababa university, Jimma university and Gondar university) representing a limited part of the health system information in the country.

Table 5: Percentage distribution of poisoning agents seen in different studies

Author	Total No.	Type of poisoning								Mortality
		Sodium-hypochlorite	Hydro-Carbon	Organo-phosphate	Herbicide	Alcohol	CO €	Drug	Others	
Berhanu N.[9]	97	0(0)	9(9.3)	78(80.4)	0(0)	0(0)	0(0)	7(7.2)	3(3.1)	7(7.2)
Fisseha T.[25]	14	0(0)	0(0)	1(7)	0(0)	0(0)	0(0)	0(0)	13(93)	2(14.3)
Gedlu E.[26]	20	0(0)	0(0)	9(45)	3(15)	0(0)	0(0)	0(0)	8(40)¥	0(0)
Teferra A.[32]	82	4(4.8)	1(1.2)	34(41.5)	14(17)	10(12.2)	1(1.2)	8(9.8)	4(4.8)	2(2.4)
Dessalew M.[33]	116	50(43.1)	0(0)	25(21.6)	0(0)	2(1.7)	0(0)	17(14.6)	22(19)	10(8.6)
Mekonnen A.[34]	85	0(0)	2(2.6)	50(58.8)	6(7)	0(0)	5(5.8)	10(11.7)	12(14.1)	18(21.2)
Aklilu A.[35]	3	0(0)	0(0)	0(0)	3	0(0)	0(0)	0(0)	0(0)	2
Weighted pool (%)	417	54(12.9)	12(2.9)	197(47.2)	26(6.2)	12(2.9)	6(1.4)	42(10)	62(14.8)	41(9.8)

Data are frequencies; Values in parenthesis are percentages,
¥ - include alcohol, drugs and other types of poison together,
€-Carbon monoxide

Table 6. Percentage distribution of Mortality by Mechanism of injury as seen in different studies

Author	Mortality	Unintentional Injury								Intentional Injury				Others
		MVIs	Burn	Fall	Poison	Drown	Animal Bite	other	Total	Homicide	Fire-arm	Self – harm	Total	
Berhanu N.[9]	298(23.3)	109(36.6)	10(3.3)	8(2.7)	2(0.7)	2(0.7)	3(1)	0(0)	134(45)	89(29.8)	53(17.8)	19(6.4)	161(54)	3(1)
Mulat T.[10]	56(1.47)	37(66)	4(7.1)	2(3.6)	0(0)	0(0)	0(0)	0(0)	43(76.8)	6(10.4)	7(12.5)	0(0)	13(23.2)	0(0)
Alemu H.[18 €]	120(100)	56(46.7)	6(5.0)	0(0)	0(0)	2(1.6)	1(0.8)	0(0)	65(54.2)	34(28.3)	5(4.2)	13(10.8)	52(43.3)	3(2.5)
Tufa G.[19 €]	90(100)	34(37.9)	2(2.2)	3(3.3)	1(1.1)	3(3.3)	0(0)	0(0)	43(47.8)	33(36.7)	10(11.1)	4(4.4)	47(52.2)	0(0)
Elias A. [22]	11(2.2)	5(1%)	0(0)	3(0.6)	0(0)	0(0)	0(0)	0(0)	8(1.6)	0(0)	0(0)	0(0)	0(0)	3(0.6)
Fisseha T.[25]	32(9.3)	8(2.3)	15(4.4)	2(0.6)	2(0.6)	0(0)	0(0)	0(0)	27(7.9)	0(0)	0(0)	0(0)	0(0)	5(1.5)
Gedlu E.[26]	45(14.4)	0(0)	14(4.5)	15(4.8)	0(0)	0(0)	0(0)	0(0)	29(9.3)	3(1.0)	7(2.2)	0(0)	10(3.2)	6(1.9)[¥]
A.Wolde[41]	29(4.2)	15(2.2)	0(0)	1(0.1)	0(0)	0(0)	0(0)	0(0)	16(2.3)	3(0.4)	0(0)	0(0)	3(0.4)	8(1.1)
F.Tsegaye[43€]	2107(100)	782(37.2)	36(1.7)	37(1.7)	46(2.2)	100(4.7)	0(0)	138(6.5)	1139(54.1)	505(30.4)	136(6.5)	234(11.1)	875(45.7)	93(4.4)
Weighted pool (%)	2788	1046(37.5)	87(3.1)	71(2.5)	51(1.8)	107(3.8)	4(0.14)	138(4.9)	1504(53.9)	673(24.1)	218(7.8)	270(9.7)	1161(41.6)	121(4.3)

Data are frequencies; Values in parenthesis are percentages,
NA- indicate that data is not available
¥ - Include all other unspecified groups in to other category including aspiration foreign body,
€ - Assessment was made only on fatal injury

Although there are some consistent features identified across many of the studies, it is difficult to generalize study findings beyond the study populations , for example like there were no studies identified for regions in majority of South and Eastern part of Ethiopia where incidence and factors responsible for trauma are likely to differ from existing areas of studies done..

Most articles are dominated by descriptive studies (32 of 36 studies) describing a range of socio-demographic, mechanism and magnitude of trauma. It there for lack a controlled epidemiological studies which validate risk factors assessment. Only four population-based aggregate cross sectional studies were identified. However population based studies with comparable groups more reliably inform policy and prevention approaches, as such studies enable estimates of relative and attributable risk and test whether distributions of risk factors (particularly socio-demographic factors, mechanism of injury , housing characteristics, vehicle types and driver character , etc) are similar or different.
The most commonly identified causes for trauma across all studies were MVIs, Homicide and fall accidents. However, it is not clear from the published literature as to the underline identified risk factors for them. There for risk factors assessment especially for MVIs and homicide requires further investigation. The most consistent risk factors identified across all studies in this review were age group 15-59 years, male gender , and being a pedestrian who live in big city like Addis Ababa. The higher frequency of Injury involving male as compared to female reported could be due to differences in gender related activity of our society.

Even though very few articles reviewed here tried to investigate the relation between injury and income, studies done elsewhere showed > 90% of deaths result from injury that occur in low- and middle-income countries.[3-5] Injury death rates are higher in poorer countries in all regions of the world than in higher income countries. Even within countries, injuries show strong social class gradients. This means that people from poorer economic backgrounds have higher rates of death from injury than wealthier people. Despite this proven fact, attention to protect these vulnerable groups through policy of injury and violence prevention and control program still remains low. This is particularly alarming given that many injuries and much violence can be prevented. Based on sound scientific evidences there are broad range of strategies that have been shown to be effective at reducing injuries and violence, and these strategies need to be more widely implemented and adopted by local

community. Some of these scientifically proven measures which are helpful for primary prevention of injuries were developed by WHO and other authors too. [1-8, 31]

This review has tried to show how much injury is a significant cause of morbidity and mortality in Ethiopia. Given the uncertainties about the quality of some data on injuries, there remains a need to more accurately define this burden. Yet, there is no doubt that injuries are already a major health issue in Ethiopia and require the same attention as that afforded to HIV–AIDS, malaria, and tuberculosis. With the current fast Increase in economic development of Ethiopia, which will be accompanied by increasing levels of motorization, almost ensures that the projected increases in the burden of injury will be realized. These increases can be mitigated only if the evidence-based strategies for prevention and management that have been developed by WHO and other authors are adopted and if innovative and cost-effective approaches continue to be identified. To achieve the latter, we must ensure that the medical and public health communities become "injury-literate.

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