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Original Article

Investigation of the Leading Causes of Injury and Violence in South-East Iran

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Abstract

Introduction: Injuries and violence are significant causes of death and health problems in all countries; however, they are not equally distributed across the world or within countries. Injuries result from road traffic crashes, falls, drowning, burns, poisoning, and acts of violence against oneself or others, among other causes. The present study aimed to describe the causes, their characteristics, frequencies, types, and outcomes of the injuries reported to the Forensic Medicine Center, Zahedan, Iran.

Methods: This cross-sectional study was conducted in the Forensic Medicine Center, Zahedan, South-East Iran. A total of 1400 intentional and unintentional injuries were systematically extracted from the administrative records between January 1, 2008, and December 31, 2018. The data were analyzed using the Chi-square test and multiple logistic regression models. Furthermore, the Stata statistical software (version 14; StataCorp, USA) was used for all analyses.

Results: In this study, three major causes of injuries included accident, fight, and burn in the order of priority. The overall frequencies of intentional and unintentional injuries among the subjects were 40.3% and 59.7%, respectively. Moreover, death occurred in 45.6% of the cases. Here, the odds of death in unintentional injuries were more than those in intentional ones (P<0.001). Multiple logistic regression modeling showed that increasing age (P=0.001), education level (P<0.001), holiday time (P=0.02), and urban setting (P=0.02) for injury were associated with increased odds of intentional injuries.

Conclusion: According to the results, younger age groups were more likely to be injured, compared to other categories. Therefore, it is necessary to implement any planning and prioritization for the reduction of family injuries and violence in school education by instructing this age group regarding injuries and their health risk consequences. Decision-makers should focus their attention on the issue locally. The implications of this study could be highly influential to identify intervention opportunities and determine local and cultural problematic health issues.

Keywords: Epidemiology, Intentional Self-Injury, Violence

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Introduction

Injuries, either unintentional or intentional, constitute a major public health problem, causing five million deaths and a lot of disabilities worldwide annually (1). People from all economic groups suffer from fatal injuries; however, death rates due to injury tend to be higher in the lower-income groups (2).

Injuries may be categorized in a number of ways, namely intentional (e.g., assault and homicide, self-harm abuse of drugs and alcohol, suicide) and unintentional (e.g., accident, drawing, fall, poisoning) (2,3).

It has been estimated that deaths from injuries will increase from 5.1 million in1990 to 8.4 million in the year 2020. that equals 9.6% of the total global deaths in the year 2010 (4, 5). The nature of injuries and violence varies considerably according to people's age, gender, income level, and place of residence. Almost 95% of the world's injury-related mortality occurs among young people aged between 15 and 44 years, the most economically productive members of the global population. In low- and middle-income countries in the Western Pacific, the leading injury-related causes of death are road traffic injuries, as well as suicide and falls, while in the low- and middle-income countries of the Americas, the leading causes are homicide and road traffic injuries.

The leading causes of fatal injuries in high-income countries are suicide, road traffic injuries, and falls in descending order (6,7).

In addition, the huge emotional toll that injuries and violence can cause can similarly affect considerable economic losses onto victims, their families, and nations as a whole.

These losses arise from the cost of treatment, including rehabilitation, incident investigation, as well as reduced or lost productivity in the form of wages for the sufferers and their family members who are obliged to take time off work to care for the injured (8). To our knowledge, this study is the only study in South-East Iran with a comprehensive and complete look at all intentional and unintentional injuries that aims to report the statistics of each of them. There are also fewer studies reporting death statistics related to suicide and homicide. Furthermore, the results of our study are based on the findings from the forensic medicine center. It is said that the accuracy and precision of the data can be sufficiently assured.

Materials and Methods

This cross-sectional study was conducted at the Forensic Medicine Center, Zahedan, South-East Iran. A total of 1400 intentional and unintentional injuries were systematically extracted from administrative records between January 1, 2008, and December 31, 2018. The study protocol was approved by the Ethics Committee of Zahedan University of Medical Sciences, Zahedan, Iran (IR.ZUMS.REC.8351).

Data points that were utilized for comparison included age, gender, date of injury, marital status, level of education, occupational status, season of injury, location of the injury, type of injury (intentional, unintentional), outcome of injury (death, survival), and cause of injury.

Injury mechanisms were grouped into such categories as crash, homicide, burns, suicide, and poisoning. All frequencies for demographic characteristics, injury mechanisms, and outcomes are presented as proportional to total injuries.

A descriptive analysis was performed, and categorical variables were presented as percentages to conduct a between-group comparison. In addition, the associations between the categorical variables and depended variables were assessed using the Chi-square test and logistic regression models.

Hosmer-Lemeshow test was also used to confirm the fit of the final regression model.

Initially, the association between the aforementioned measured variables and injuries was examined by a univariate logistic model. Subsequently, the variables with p-values less than 0.2 were considered significant and included in a multiple logistic regression model.

The statistical Stata software (version 14; Stata Corp, USA) was used for all analyses.

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Results

The results showed that 42.6% of the injuries were recorded in crashes, and a high frequency of events (57.4%) occurred due to other reasons. Moreover, about 40.3% and 59.7% of the injuries were intentional and unintentional, respectively. The abundance of death was estimated at 45.6%, and 54.4% of the injuries led to survival.

The most common intentional injuries were fight (74.3%), followed by homicide (16.1%), and suicide (5.5%) (Figure. 1). Among unintentional injuries, crashes (71.3%), followed by burns (14.2%) were the most frequent causes of unintentional injury (Figure. 2).

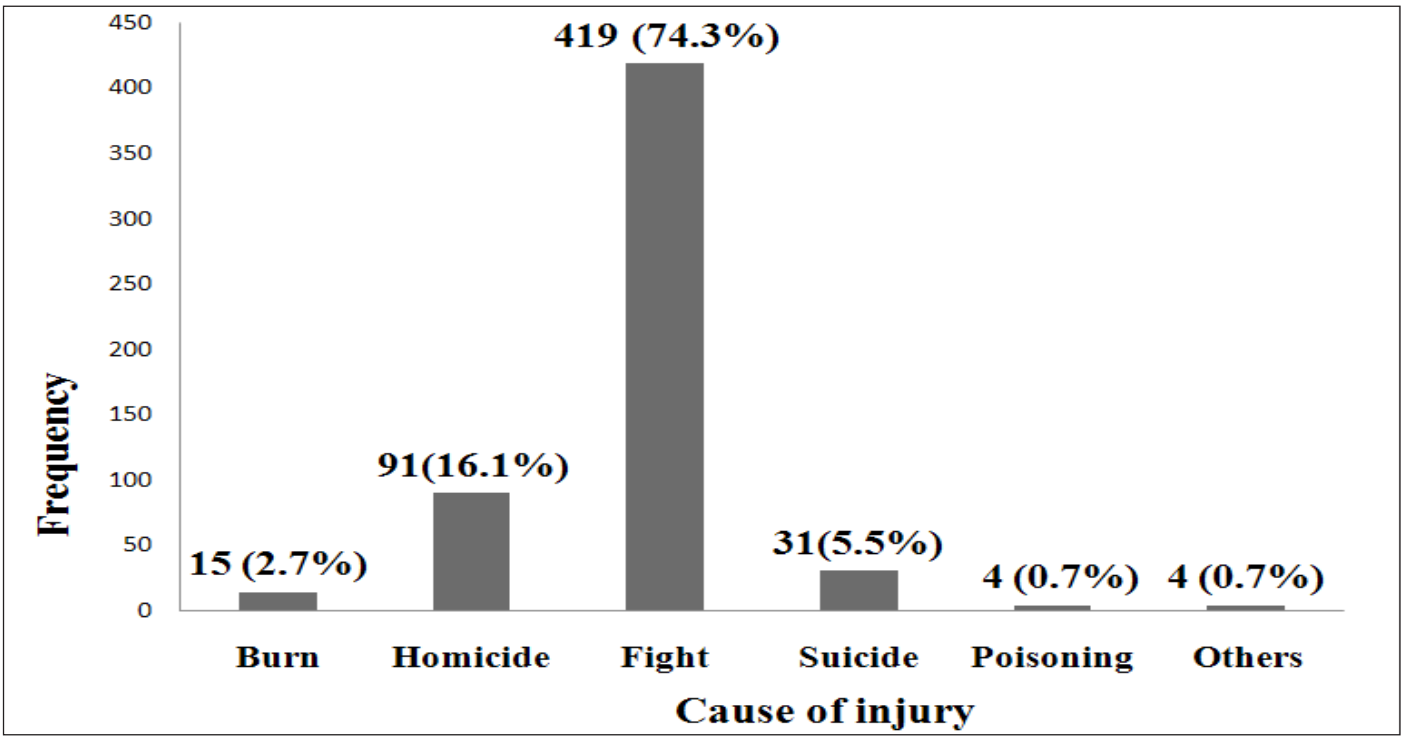


Figure 1. Causes of Intentional Injuries Reported to Zahedan Forensic Medicine Center

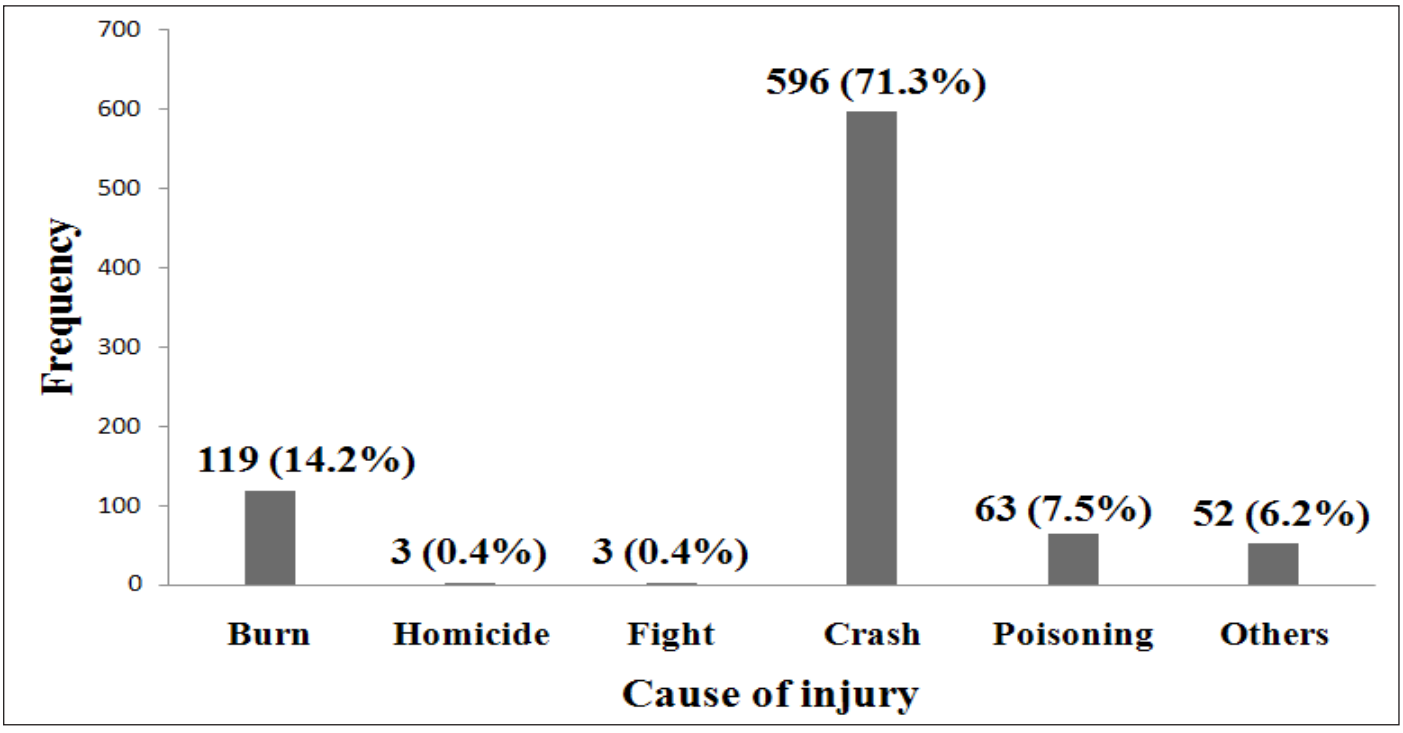


Figure 2. Causes of Unintentional Injuries Reported to Zahedan Forensic Medicine Center
Others: Fall, Domestic Violence, Electrocution, Occupational Injury

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In this study, individuals aged 15-29 years sustained more injuries (38.7%), compared to the age groups over 60 (4.9%) years. The percentage of crashes in males was slightly higher than that in females (44% vs. 29.9%). Furthermore, the females typically experienced more suicide (3.6%) than males (1.7%).

This study found that individuals with secondary education level and illiterate ones accounted for 9.3% and 12.7 % of the burn cases, respectively. The most common mechanism of unintentional injuries was a crash that was responsible for 42.6% of the deaths, whereas fight caused 14.3%, and burning accounted for under 20.2% of the deaths (Table 1).

Table1. Distribution of causes of injury according to demographic characteristics and injury setting

Variable	Cause of injury	Poisoning N(%)	Crash N(%)	Suicide N(%)	Fight N(%)	Homicide N(%)	Burn N(%)	Other	P-Value
Age	0-14	2(1.4)	94(68.1)	4(2.9)	12(8.7)	4(2.9)	16(11.6)	6(4.3)	0.001
	15-29	18(3.3)	224(41.3)	17(3.1)	151(27.9)	45(8.3)	70(12.9)	17(3.1)	
	30-44	26(5.7)	162(35.4)	10(2.2)	177(38.7)	35(7.7)	29(6.3)	18(3.9)	
	45-59	17(8.8)	74(38.1)	0	74(38.1)	7(3.6)	13(6.7)	9(4.6)	
	>60	4(5.8)	42(60.9)	0	8(11.6)	3(4.3)	6(8.7)	6(8.7)	
Gender	Male	53(5.3)	444(44)	17(1.7)	307(30.4)	83(8.2)	57(5.6)	48(4.8)	0.001
	Female	14(3.6)	152(39.9)	14(3.6)	115(29.4)	11(2.8)	77(19.7)	8(2)	
Education level	Illiterate	43(6.1)	332(47)	14(2)	147(20.8)	52(7.4)	90(12.7)	29(4.1)	0.001
	Secondary	18(4.5)	153(38.3)	11(2.8)	141(35.3)	25(6.3)	37(9.3)	15(3.8)	
	University Degree	6(2.1)	110(37.8)	6(2.1)	133(45.7)	17(5.8)	7(2.4)	12(4.1)	
Marital status	Married	39(4.7)	322(38.6)	13(1.6)	286(43.3)	62(7.4)	74(8.9)	38(4.6)	0.001
	Single	28(5.1)	264(47.9)	18(3.3)	135(24.5)	32(5.8)	56(10.2)	18(3.3)	
Occupational status	Unemployed	35(4.4)	343(42.9)	20(2.5)	238(29.8)	47(9.5)	95(11.9)	21(2.6)	0.001
	Laborer	15(7.2)	80(38.3)	3(1.4)	49(23.4)	22(10.5)	13(6.2)	27(12.9)	
	Government job	1(2.2)	21(46.7)	0	14(31.3)	4(8.9)	2(4.4)	3(6.7)	
	Self-Employed	16(4.6)	152(43.9)	8(2.3)	121(35)	21(6.1)	23(6.6)	5(1.4)	
Location	Urban	58(4.5)	539(41.8)	29(2.2)	401(31.1)	90(7)	121(9.4)	51(4)	0.05
	Rural	9(8.1)	57(51.4)	2(1.8)	21(18.9)	4(3.6)	13(11.7)	5(4.5)	
Time of injury occurrence	Ordinary	63(4.9)	551(43.3)	25(2)	374(29.4)	88(6.9)	119(9.3)	53(4.2)	0.06
	Holiday	4(3.2)	44(34.9)	6(4.8)	48(38.1)	6(4.8)	15(11.9)	3(2.4)	
Season	Spring	9(3.1)	124(42.9)	3(1)	111(38.4)	14(4.8)	15(5.2)	13(4.5)	0.001
	Summer	19(5)	162(42.5)	7(1.8)	116(30.4)	25(6.6)	32(8.4)	20(5.2)	
	Fall	10(3)	154(46.5)	8(2.4)	94(28.4)	22(6.6)	34(10.3)	9(2.7)	
	Winter	29(7.3)	156(39.1)	13(3.3)	101(25.3)	33(8.3)	53(13.3)	14(3.5)	
Type of injury	Intentional	4(0.7)	0	31(5.5)	419(74.3)	91(16.1)	15(2.7)	4(0.7)	0.001
	Unintentional	63(7.5)	596(71.3)	0	3(0.4)	3(0.4)	119(14.2)	52(6.2)	
Outcome	Survival	0	323(42.6)	0	418(54.9)	2(0.3)	5(0.7)	12(1.6)	0.001
	Death	67(10.5)	273(42.6)	31(4.9)	4(0.6)	91(14.3)	129(20.2)	44(6.9)	

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Bivariate logistic regression modeling showed that the factors, such as higher education levels (P=0.001), being married (P=0.001), having holiday time (P=0.02), and living in the cities (P=0.001) were associated with increased odds of intentional injuries

Moreover, the present study assessed the effects of independently associated risk factors for injuries using multiple logistic regression. Age, education level, time of occurrence, and location were significantly associated with injuries. The odds of intentional injuries in the age groups of 30-44 and 45-59 years were more than the age group of 14 years old as the reference group (OR=4.09; 95% CI: 2.4-6.9) and (OR=3.02; 95% CI: 1.8-5.3) (P=0.001).

In addition, university-graduated individuals (OR=2.66; 95% CI: 2.5-3.5) were more likely to have an intentional injury, compared to the illiterate group.

The chances of intentional injuries during holidays were 1.5 times higher than working days (OR=1.53; 95% CI: 1.04-2.2).

Additionally, injuries occurring in an urban setting versus a rural setting were also significantly associated with intentional injuries with an odds ratio of 1.7 (95% CI: 1.08-2.6) as shown in (Table 2).

In the second part of the analysis, the effects of the aforementioned variables with death as an outcome of injury were evaluated. The bivariate logistic regression model showed a significant association between death and risk factors including age, education level, occupational status, season, location of the injury, as well as time and type of injury (P<0.05).

In multiple logistic regression model, it was observed that the odds of death in an individual with a secondary level of education (OR: 0.75; 95% CI: 0.34-0.92) and university graduates (OR: 0.42; 95% CI: 0.31-0.85) were lower than those in the illiterate ones. Similarly, there was a significant relationship between holiday times and death occurrences; therefore, the chance of death in holiday time was (OR: 1.54; 95% CI: 1-2.3) higher than that in ordinary times.

In addition, the odds of death in unintentional injuries was (OR=3.91; 95% CI: 3.06-4.9) more than that in intentional cases.

It is worth mentioning that there was a statistically significant relationship between occupational status and death; accordingly, the chance of death among employed people was higher than those in other categories, and in winter, it was more than that in the other seasons.

The analysis of injury location revealed that death occurrence in urban areas was fewer than that in the rural districts (OR=0.46; 95% CI: 0.29-0.72) (Table 3).

Table 2. Risk factors associated with intentional injury in a multiple logistic regression model

		B	P-value	OR (95%CI)
Age	0-14			reference
	15-29	1.29	0.001	3.36(2.09-6.3)
	30-44	1.41	0.001	4.09(2.4-6.9)
	45-59	1.1	0.001	3.02(1.8-5.3)
	>60	0.18	0.071	(0.55-2.6)1.19
Education level	Illiterate			reference
	Secondary school	0.59	0.001	1.80(1.4-2.3)
	University degree	0.98	0.001	2.66(2.5-3.5)
Location	Rural			reference
	Urban	0.53	0.02	1.70(1.08-2.6)
Time of injury occurrence	Ordinary			reference
	Holiday	0.42	0.02	(1.04-2.2)1.53

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Table 3. Risk factors associated with death (outcome of injury) in a multiple logistic regression model

Variable		B	P-Value	OR (95% CI)
Education level	Illiterate			reference
	Secondary	-0.28	0.003	0.75(0.34-0.92)
	University degree	-0.86	0.001	0.42 (0.31-0.85)
Occupational status	Unemployed			reference
	Laborer	0.601	0.003	1.82(1.3-2.5)
	Government job	0.683	0.001	1.97(1.9-3.9)
	Self-Employed	0.254	0.06	1.28(0.97-1.7)
Location	Rural			reference
	Urban	-0.765	0.001	0.46(0.29-0.72)
Time of occurrence injury	Ordinary			reference
	Holiday	0.437	0.04	1.54(1-2.3)
Season	Winter			reference
	Spring	-0.33	0.02	0.71(0.85-0.99)
	Summer	-0.299	0.03	0.74(0.56-0.98)
	Fall	-0.372	0.001	0.68(0.5-0.92)
Type of injury	Intentional			reference
	Unintentional	1.364	0.001	3.91(3.06-4.9)

Discussion

This study was undertaken to determine some risk factors related to the type and cause of injury, describe the epidemiology of these events, and discover the outcome of the injuries applying the principles of prevention and intervention as much as possible. In this study, three major injuries were identified as accidents, fights, and burns in order of frequency. The comparative analyses indicated differences between the intentional and unintentional types of injuries. These differences, regardless of leading to death or not, depend on three main risk factors, including the sufferers' educational level, the location of injuries, and the time of occurrence. The results also showed that the intentional injuries to people with university education were higher than those to illiterate people. However, the chance of death was lower among highly educated people. Another finding was that the highest odds of intentional injuries were observed during holidays and in urban settings. On the other hand, the highest abundance of reported death was observed during working days and in rural areas. Additionally, in the current study, the overall frequency of intentional injuries has amounted to 40.3%, which is much higher than the percentage of occurrence in Ethiopia amounting to 23.6% of the cases (9). This frequency of occurrence, in contrast, was lower than what was observed in India (48.7%) (10). Furthermore, the frequency of unintentional injuries was 59.7%, which was lower than those found in the studies conducted by Norton (69%) and Wolde (76.4%) (9, 11). The main reasons for the inconsistencies could be due to different cultural factors and related lifestyles. This study found that the majority of injuries in South-East Iran were due to road traffic accidents. The next most common causes of injuries were fights and burnings. The findings of the current study also demonstrated that crashes were the most common cause of injuries. This is compatible with the results of similar studies conducted in other parts of iran (12-15) and across the world (16-20).

The estimated overall frequency of crashes in the present study was 42.6%, which is higher

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than what was found in Qom, Saudi Arabia, and Ethiopia (9, 21-22). However, the frequency was lower than that of Cameron and other provinces of Iran, including Tehran (46%), Mazandaran (50%), and Gilan (82.7%) (16,13, 15, 23).

Previous studies have shown that improper overtaking, speeding, vehicle defects, and unauthorized vehicles on freeways are also causative factors that increase the road traffic crash severity (24). In particular, according to the reports of the World Health Organization (WHO), crashes are currently considered to be the most common mechanism of injuries generally happening at the age group of 20-29 (1). The findings of this study are in line with the WHO's report (1), and the results of a study performed in Hamadan, North-West of Iran. Additionally, there was some evidence that a high proportion of crashes had actually occurred among the males, which was consistent with the findings of previous similar studies (25-28).

Few studies have reported an association between gender and risk of death (29-30). These studies demonstrated that the odds ratio of death in males was higher than that in females, which is not in line with the results of the current study. The higher prevalence of death in males could be possibly due to the higher occupational and environmental exposures. Furthermore, educational level is recognized as a risk factor for intentional injuries in the current study which is similar to the finding reported by Laski (31).

Based on the evidence, it seems that age is not related to death. This result is in discrepancy with a previous report in Iran in which the prevalence of death among people aging from 30 to 59 years was higher than its abundance in the age group of 20-30 years.

As it was found in this study, it seems that the odds of death among illiterate people was higher than that among university graduates (32). This study indicated that injuries are more frequent among younger age groups, compared to the older ones.

Similar to our findings, the vast majority of previously published studies show that males are at a higher risk of having fights than females (28). Males were most likely to be injured outdoors. In this study, the occurrence of the fight was too high, whereas the death rate was relatively low. It can be concluded that conflicts were more often terminated resulting in reduced severe physical harm, and consequently, the individuals did not seek to cause severe physical harms to whom they are fighting.

Conclusion

This study provides rigorous data on the prevalence and patterns of injuries in South-East Iran. According to the results, younger age groups were more likely to be injured, compared to other categories. Therefore, it is necessary to implement appropriate instructing planning and prioritization for the reduction of fights in families and schools. Taking such actions should target the frequently-suffered groups. As the main health problem, such injuries demand the attention of decision- and policy-makers in the public health arena. The results of this study could be useful to identify interventional measures and determine the local and cultural gaps of the societies. A general understanding of the size and type of injuries and their burden in Iran will also help policy-makers and health planners to prevent injuries and manage them in the case of occurrence.

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Conflict of interest

There is no conflict of interest.

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