



Five-year epidemiology of head, neck, and spinal cord injuries in West Azerbaijan province

Vahid Hosseinpour ^{1#}, Bahlol Rahimi ^{2#}, Hadi Lotfnejad Afshar ², Hamid Hosseinpour ^{3*}, Rohollah Valizadeh ^{4*}

1. Department of Emergency Medicine, Urmia University of Medical Sciences, Urmia, Iran

2. Health and Biomedical Informatics Research Center, Urmia University of Medical Sciences, Urmia, Iran and Department of Health Information Technology, School of Allied Medical Sciences, Urmia University of Medical Sciences, Urmia, Iran

3. Department of Neurology, Urmia University of Medical Sciences, Urmia, Iran (Corresponding Author)

4. Urmia University of Medical Sciences, Urmia, Iran (Corresponding Author)

***Corresponding author:** Hamid Hosseinpour, **Address:** Department of Neurology, Urmia University of Medical Sciences, Urmia, Iran, **Email:** hamidhosseinpour87@gmail.com, **Tel:** +98 - 44 - 3223 4897

Abstract

Background & Aims: Considering that trauma is one of the important causes of death, especially head and neck trauma, knowledge of the epidemiology of trauma can be of great help in making management decisions. This study examined the 5-year epidemiology of head, neck, and spinal cord injuries in West Azerbaijan province.

Materials & Methods: In this descriptive cross-sectional study, 6,336 trauma patients who resided in the province of West Azerbaijan were included between 2019 and 2023. The province's national trauma registration program provided the data collection form. Individuals whose medical records were incomplete were not included.

Results: The mean age of the patients was 33.39 years. The most common cause of trauma was road traffic accidents (38.3%, N = 2429), followed by falls (23.1%, N = 1461). At the moment of the accident, 107 patients were using alcohol, 45 patients had drug abuse, and 56 patients took tranquilizers like benzodiazepine; in total, 443 patients needed transfusion. The mean stay at the ICU and hospital was 8.49 ± 3.76 days and 5.05 ± 1.25 days, respectively. Many of the injured patients had a moderate (46.4%) and minor (31.1%) Abbreviated Injury Scale (AIS) in the assessment, in which male gender had poor condition in this regard ($p < 0.001$).

Conclusion: There are many injured individuals with low levels of education, indicating the urgent need to raise awareness among this group to help prevent road accidents. Post-trauma measures are clearly important, particularly in the fields of orthopedics, general surgery, and head and neck trauma.

Keywords: Epidemiology, Head, Neck, Spinal cord, Trauma

Received 06 November 2023; accepted for publication 13 December 2023

This is an open-access article distributed under the terms of the Creative Commons Attribution-noncommercial 4.0 International License, which permits copy and redistribute the material just in noncommercial usages as long as the original work is properly cited

Introduction

With an estimated 50 million injuries annually, trauma has become a significant health consequence due to global transportation, currently ranking as one of the biggest threats to human life and health (1). It is projected that these figures will increase by 65% over the next 20 years (1, 2). According to World Health Organization (WHO) projections, traffic accidents will be the seventh-highest cause of disease burden in 2030 (3). Trauma types can be classified based on the mechanisms of injury, the location of the injury, and the cause of the trauma. Psychological injuries can also be included in this category, in addition to physical injuries such as burns, falls from heights, poisoning, accidents, and other types of injuries. Accidents are the most common cause of death in trauma among these (4).

An estimated 5 million individuals globally pass away in accidents every year, or 570 per hour. Teenage mortality in developing countries is primarily caused by trauma. Along with health-related problems, it also results in disability and financial damage (5). One of the main causes of death in Iran is thought to be trauma (6,7). Iran's second-highest cause of mortality, after firearms, claims 24,896 lives each year (3). Head trauma, abdominal trauma, and so on are additional categories of trauma. In light of the location of the injury or based on the characteristics of the agent that caused the trauma, such as penetrating abdominal trauma (using a sharp object, for example), non-penetrating (blunt) trauma, or heat or pressure trauma (barotrauma) (8–10). Given that accidents in Iran result in higher death rates than in other middle-income countries, and considering that cervical vertebrae and spinal cord injuries are highly significant because of their high mortality rates and complications, we conducted an epidemiological study on trauma in the

injured patients of West Azerbaijan province.

Materials & Methods

Design and settings:

This descriptive cross-sectional study included 6,336 traumatic patients who lived in West Azerbaijan province between 2019 and 2023. The data collection form was taken from the national trauma registration program of the province. Data on age, sex, marital status, education, hospitalization, trauma mechanism, occupation, alcohol and drug use, etc., of the injured were provided by the West Azerbaijan province's national trauma registration program. Patients without fully completed medical records were excluded. This study was approved by the Ethics Committee of Urmia University of Medical Sciences (IR.UMSU.REC.1402.093).

Statistical analysis:

The analysis of the data was done using SPSS version 21. The findings for qualitative variables were expressed as "frequency (percentage)" and for quantitative variables as "mean \pm standard deviation.". To compare the distribution of the deceased people, the chi-square test was employed.

Results

The mean age of the patients was 33.39 ± 20.66 years (range 1-101). Regarding gender, 28.1% (N = 1779) were female, and 71.9% (N = 4557) were male. Regarding marital status, 50.2% (N = 3180) were married, 43.6% (N = 2764) were single, 1.2% (N = 76) were divorced, 3.5% (N = 220) were widow/widower, and others were unknown. The majority of the patients were diploma or less (91.8%, N = 5819). (24.1%, N = 1531) had primary education following illiteracy (23.8%, N = 1507) (Table 1).

Table 1. Frequency distribution of the education in the studied patients

Variable	N	%
Primary	1531	24.1
Illiterate	1507	23.8

Variable	N	%
Middle	1151	18.2
Diploma	1006	15.9
High school	624	9.8
Bachelor	265	4.2
Associate	159	2.5
Master	67	1.1
Unknown	19	0.3
Doctorate / Ph.D.	7	0.1

The most common cause of the trauma was road traffic accidents (38.3%, N = 2429) followed by falls (23.1%, N = 1461) (Figure 1).

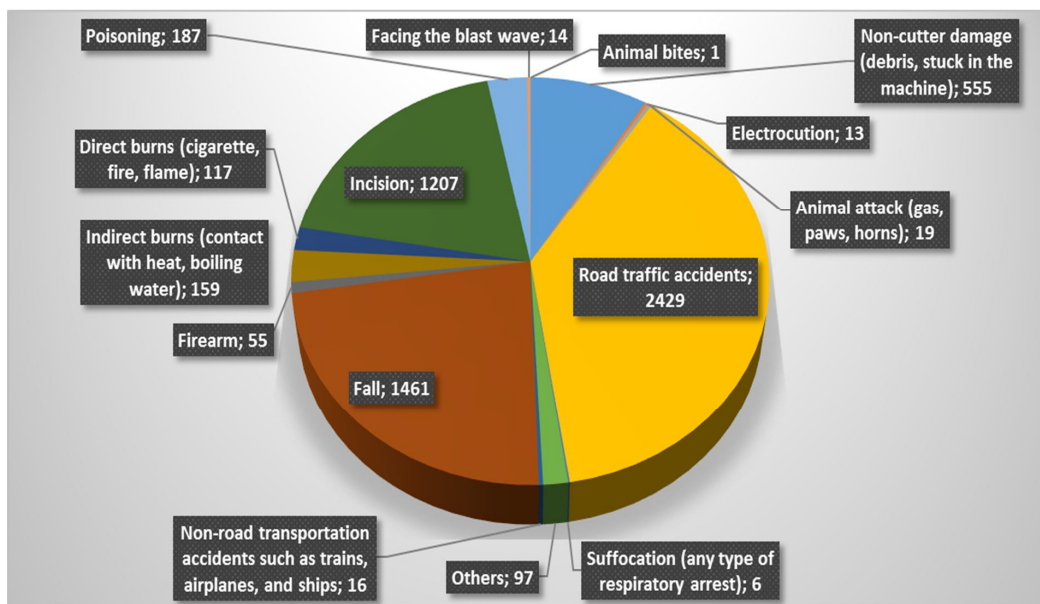


Fig. 1. Dispersion of trauma reason frequencies among the patients under study.

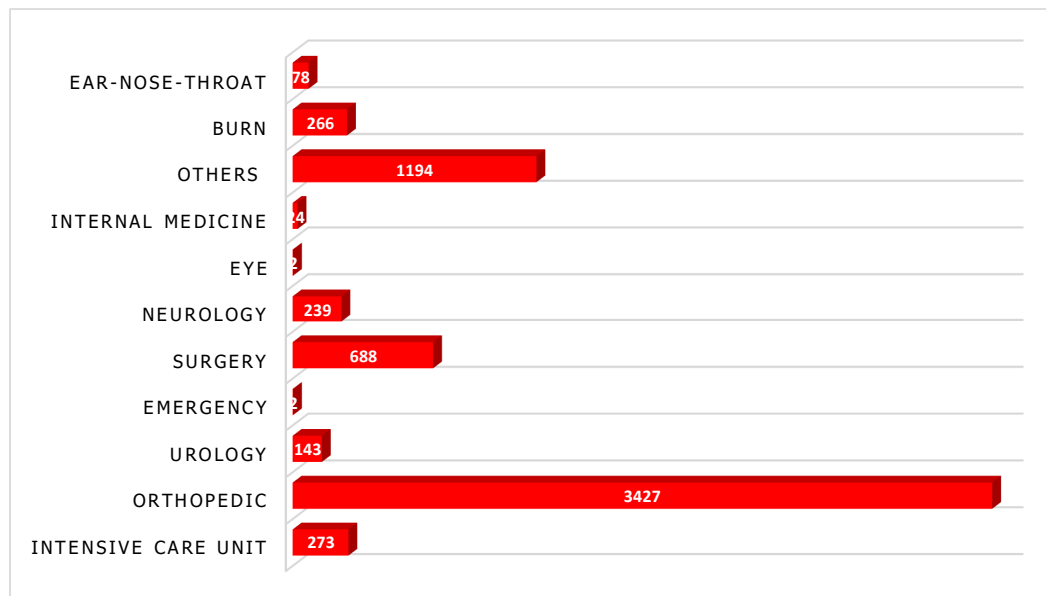
Regarding car safety, only 6.2% of patients (N = 391) had fastened safety belts. None of the patients used a child seat. At the time of the accident, 0.7% (N = 47) reported the correct performance of the airbag. In motorcycles, 0.8% (N = 52) reported the use of a helmet. Regarding jobs, 3.3% (N = 212) were

employees, 29.4% (N = 1863) were self-employed, 13% (N = 820) were workers, and others were unknown. Regarding the place of the accident, 34.6% (N = 2194) happened at home, and 44.9% (N = 2844) happened on the street, highway, sidewalk, or road (Table 2).

Table 2. Distribution of event location

Place of event	N	%
Accommodations (dormitory, sanatorium, and penitentiary)	54	0.9
Home	2194	34.6
Street, highway, sidewalk, road	2844	44.9
School, public, and religious administrative areas	128	2.0
Unknown	198	3.1
Sports venues	68	1.1
Service and commercial areas	250	3.9
Construction and industrial areas	274	4.3
Agricultural areas and farms	326	5.1

The most common wards to admit trauma patients were orthopedic (54.1%, N = 3427) followed by surgery (10.9%, N = 688) (Figure 2).

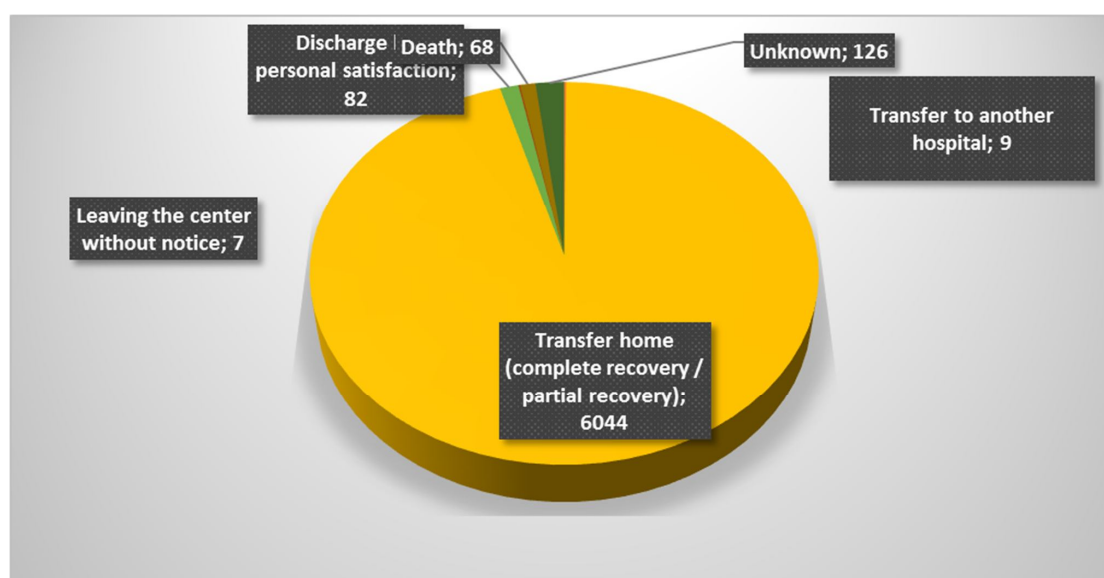
**Fig. 2.** Frequency of the ward used to admit the patients

At the moment of the accident, 107 patients used alcohol, 45 patients had drug abuse, and 56 patients took tranquilizers like benzodiazepine; in total, 443 patients needed transfusion. The mean stay at the ICU

and hospital was 8.49 ± 3.76 days and 5.05 ± 1.25 days, respectively (Table 3). According to the report, 6,044 patients were discharged in good condition, and 68 patients (1.1%) died (Figure 3).

Table 3. Assessment of admitted injured patients

Variable		Frequency	Percent
Alcohol	Yes	107	1.7
	No	6229	98.3
Substance abuse	Yes	45	0.7
	No	6291	99.3
Tranquilizer	Yes	56	0.9
	No	6280	99.1
Smoking	Yes	949	15
	No	5387	85
Need for transfusion	Yes	443	7.0
	No	5893	93.0
Need for ventilator	Yes	196	3.1
	No	6140	96.9
Stay at ICU (mean \pm SD), day		8.49 \pm 3.76	
Stay at hospital (mean \pm SD), day		5.05 \pm 1.25	

**Fig. 3.** Discharge status of the injured patients

Many of the injured patients had a moderate (46.4%) and minor (31.1%) AIS in the assessment, in which the male gender had a poor condition in this regard ($p < 0.001$) (Table 4).

Table 4. Assessment of the Abbreviated Injury Scale (AIS) among injured patients by gender

Severity of damage based on AIS	N	%	Male	Female	<i>p</i> value
Critical	25	0.4	13	12	< 0.001
Serious	876	13.8	599	277	
Minor	1971	31.1	1488	433	
Severe	33	0.5	24	9	
Moderate	2943	46.4	2056	887	
Maximum	9	0.1	6	3	
Unknown	479	7.6	264	215	

Discussion

A growing issue for development and health is traffic injuries. Over the past forty years, the number of road accidents-related deaths has declined in high-income countries while rising in other nations, such as Iran. In general, there are three categories of risk factors associated with traffic accidents: environment, vehicle, and person (11). Our research once more demonstrated that men are generally associated with the majority of fatalities resulting from traffic accidents, which was shown in our study too, and 71.9% of the patients were male.

For every accident-related death, serious injury, or disability, there are numerous individuals who are profoundly impacted, as well as numerous families who must bear the heavy financial burden of caring for a disabled family member or the extended expense of medical care. Survivors of accidents, their families, friends, and other caregivers frequently experience psychological, physical, and physiological harm (12).

Impaired driving ability due to the consumption of alcohol, drugs, or psychotropic substances is an effective factor in the risk of traffic accidents and the severity of injuries resulting from accidents. In this regard, our study showed a lower rate of abuse but remains a challenge. The frequency of alcohol or drug use varies from country to country but is considered a major risk factor for road accidents worldwide. In our study, it was observed that few people use helmets or seat belts. The main risk factor for two-wheeled motor vehicle drivers is the lack of use of impact-resistant

helmets. Failure to properly use helmets increases the risk. Trauma and brain injuries are the leading cause of injury and disability in such people. Many of these brain injuries can be prevented or reduced through the use of cheap and simple protective helmets or seat belts, showing the need to raise people's awareness, especially young people (12), while even in our study the mean age of the patients was 33.39 years. Correctly worn seat belts reduce the risk of death in an accident (13).

Taking sedatives is also one of the causes of accidents; tiredness and sleepiness are related to a number of factors but in our study, according to the results, only 6.2% of patients had fastened seat belts and in motorcycles, just 0.8% reported the use of a helmet. Some of these factors that are associated with traffic accidents are long-distance driving, lack of sleep, and disturbances in body functions, as reported in our study. Consistent with our results, in a study by Khorrami et al., the mortality rate was higher in men (more than 77%) and self-employed, in the age group of 25-34 years, uneducated, and single. Most of the victims died during the accident due to brain trauma. The highest frequency of deaths was related to the driver (43.65%) and then the passengers (14).

Research shows about 68% of the injured were men and 32% were women (15). In a study by Karbakhsh et al., the mean age of patients was 25 years, and 78% of all patients were men. The most common accident mechanism was vehicle accidents, followed by falls, cuts, and poisoning. They suggested that according to

the hot spots of trauma in the city of Tehran, the facilities of optimal health and treatment services should be strengthened in these places (16). This study was consistent with our results.

Due to the fact that men use motorcycles more frequently and more men use personal vehicles, they should be taught the necessary safety tips, and the safety of vehicles should be given more attention by the authorities and car manufacturers. The results of the Singapore Trauma Registry study showed that the chance of death in men is significantly higher than that of women (17). As mentioned, paying attention to head and neck trauma is of great importance, in which Yadollahi et al. indicated that the likelihood of dying increases threefold in the case of head, neck, and abdominal injuries, and sixfold in the case of abdominal injuries (18).

Conclusion

It is evident that there are injured individuals with low levels of education, indicating the urgent need to raise awareness among this group to help prevent accidents. Post-trauma measures are clearly important, particularly in the fields of orthopedics, general surgery, and head and neck trauma. Accidents can be caused by drug and alcohol use, particularly in young people. We found that the most common cause of the trauma was road traffic accidents, so collaboration of relevant authorities and officials with health policy-makers is necessary.

Acknowledgments

The author would like to thank the Vice Chancellor of research of Urmia University of Medical Sciences for any support in the implementation of this research.

Conflict of interest

The authors have no conflict of interest in this study.

Funding/support

This research was supported by Urmia University of Medical Sciences (grant#12262)

Data availability

The raw data supporting the conclusions of this article are available from the authors upon reasonable request.

Ethical statement

This study was approved by the Ethics Committee of Urmia University of Medical Sciences (IR.UMSU.REC.1402.093).

References

1. Norris FH. Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology*. 1992 Jun;60(3):409. DOI: 10.1037/0022-006X.60.3.409
2. Rustami K, Zohouri H, Sayad Rezaei E. The epidemiology study of mortality death related car accidents. *Journal of Ardabil University of Medical Sciences*. 2008 Dec 10;8(4):381-6.
3. Sadeghi-Bazargani H, Samadizadeh B, Hosseini-Farzi H. Epidemiology of traffic fatalities among motorcycle users in East Azerbaijan, Iran. *BioMed Research International*. 2018 Aug 19;2018. <https://doi.org/10.1155/2018/6971904>
4. Skog OJ. Alcohol consumption and overall accident mortality in 14 European countries. *Addiction*. 2001 Feb;96(1s1):35-47. DOI: 10.1046/j.1360-0443.2001.961s1035.x
5. Akbari ME, Naghavi M, Soori H. Epidemiology of deaths from injuries in the Islamic Republic of Iran. *Eastern Mediterranean Health Journal*. 2006;12(3-4):382-390.
6. Bakhtiyari M, Delpisheh A, Riahi SM, Latifi A, Zayeri F, Salehi M, Soori H. Epidemiology of occupational accidents among Iranian insured workers. *Safety Science*. 2012 Aug 1;50(7):1480-4. DOI: 10.1016/j.ssci.2012.04.011
7. Macleod JB, Lynn M, McKenney MG, Jeroukhimov I, Cohn SM. Predictors of mortality in trauma patients. *The American Surgeon*. 2004 Sep;70(9):805-10. <https://doi.org/10.1177/000313480407000912>

8. Al-Ghamdi AS. Using logistic regression to estimate the influence of accident factors on accident severity. *Accident Analysis and Prevention*. 2002;34(6):729-41. DOI: 10.1016/S0001-4575(01)00063-6. Søreide K. Epidemiology of major trauma. *British Journal of Surgery*. 2009 Jul;96(7):697-8. DOI: 10.1002/bjs.6634
9. Wisner DH. History and current status of trauma scoring systems. *Archives of Surgery*. 1992;127:111-117. <https://doi.org/10.1001/archsurg.1992.01420010133022>
10. Brenneman FD, Boulanger BR, McLellan BA, et al. Measuring Injury Severity: Time for a change? *Journal of Trauma: Injury, Infection, and Critical Care*. 1998;44(4):580-2. DOI: 10.1097/00005373-199804000-00015
11. Khan MA, Grivna M, Nauman J, Soteriades ES, Cevik AA, Hashim MJ, Govender R, Al Azeezi SR. Global incidence and mortality patterns of pedestrian road traffic injuries by sociodemographic index, with forecasting: findings from the global burden of diseases, injuries, and risk factors 2017 study. *International Journal of Environmental Research and Public Health*. 2020 Mar;17(6):2135. DOI: 10.3390/ijerph17062135
12. Staton C, Vissoci J, Gong E, Toomey N, Wafula R, Abdelgadir J, et al. Road traffic injury prevention initiatives: a systematic review and metasummary of effectiveness in low and middle income countries. *PLoS One*. 2016 Jan 6;11(1):e0144971. DOI: 10.1371/journal.pone.0144971
13. Harper S, Strumpf EC. Primary enforcement of mandatory seat belt laws and motor vehicle crash deaths. *American Journal of Preventive Medicine*. 2017 Aug 1;53(2):176-83. DOI: 10.1016/j.amepre.2017.02.014
14. Khorrami Z, Nazari SS, Ghadirzadeh MR. An Epidemiology study of deaths from road traffic accidents. *Safety Promotion and Injury Prevention (Tehran)*. 2016;4(4):217-24.
15. Yadollahi M, Nazariyat A. An Epidemiologic Study of Traffic Accidents and Factors Affecting their Outcome in Admitted Patients due to Crashes in the Southern Trauma Center. *Sadra Medical Journal*. 2021;9(3):299-310.
16. Karbakhsh M, Salimi J, Zarei MR. Geographic distribution of trauma hot spots in Tehran, Iran. *Payesh*. 2005;4(2):91-96.
17. Wong TH, Nadkarni NV, Nguyen HV, Lim GH, Matchar DB, Seow DCC, et al. One-year and three-year mortality prediction in adult major blunt trauma survivors: a National Retrospective Cohort Analysis. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*. 2018;26(1):28. <https://doi.org/10.1186/s13049-018-0497-y>
18. Zamani M, Esmailian M, Mirazimi MS, Ebrahimian M, Golshani K. Cause and final outcome of trauma in patients referred to the emergency department: a cross sectional study. *Iranian Journal of Emergency Medicine*. 2014;1(1):22-7.