



Epidemiology and Seasonality of Interpersonal Violence in Southeastern Iran: A Cross-Sectional Study

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Abstract

Introduction: Interpersonal violence can be affected by many different environmental factors, including ethnic diversity, regional deprivation, and border location. Given the lack of local data from southeastern Iran, this study aimed to examine the pattern and characteristics of injuries resulting from interpersonal violence among patients referred to the emergency department of Khatam Al-Anbia Hospital in Zahedan.

Methods: This is a descriptive cross-sectional study that involved all patients admitted to the emergency department because of interpersonal violence from 2023 to 2024. Data were collected from the patient's files and analyzed using SPSS version 27.

Results: A total of 1,838 victims of interpersonal violence were included. The majority were male (93%), and the median age was 23 years. Firearms accounted for 202 (10.9%) of cases, while 418 (22.8%) involved cold weapons. Penetrating trauma occurred in nearly 1,010 (55%) of conflicts, and most injuries involved the extremities. In assessing seasonal changes, the frequency of injury severity and the types of interpersonal violence showed statistically significant differences ($p < 0.001$ and $p = 0.02$, respectively). The highest prevalence of interpersonal violence was observed during the summer season (587, 31.9%). Also, the most severe injuries (ESI levels 1 and 2: 558, 95.1%) occurred in this season.

Conclusions: It can be seen from the results that interpersonal violence in Zahedan conforms to national trends, but the greater use of weapons necessitates regional preventative measures.

Keywords: Violence; Trauma; Seasons; Emergency.

Introduction

Interpersonal violence (IPV) is considered a major public health problem around the world, as it is a contributing factor to many preventable diseases and deaths ¹. According to the latest report by the WHO, interpersonal violence leads to over 1.6 million deaths annually all over the world. It is one of the major causes of death in people between the ages of 15 and 29 ². The rates and trends of IPV vary considerably by age group, gender, and location³.

It can be seen from an analysis of trends in interpersonal violence that there are multiple causes of violence, and

various socio-economic and cultural factors determine them. Some of the factors that play an important role as the causes of violence include unemployment, poverty, illiteracy, and the availability of weapons ⁴. Although recent studies suggest a declining trend in interpersonal violence across Middle Eastern countries, this trend remains relatively higher compared to other regions. Variables such as urbanization, absolute poverty, per capita income, unemployment, and levels of democracy are significantly associated with interpersonal violence. Accordingly, adopting a health-oriented approach across all policies—with a focus on the social

determinants of health—is recommended as an effective strategy for violence reduction⁵.

Furthermore, previous studies have shown that temperature changes affect the frequency of different types of violence as well. Nonetheless, the effect of temperature on violence is influenced by demographics, economics, culture, environment (e.g., population density, economic inequality, gun control laws), and varies from region to region⁶. In particular, it is essential to understand that the connection between violence and socioeconomic status (SES) can change depending on the region and culture. Considering the variability of this connection, EDs, as the first point of contact for the victims of violence, can collect the most accurate information on the factors influencing violence^{7,8}.

The purpose of this research is to assess the pattern of interpersonal violence among individuals admitted to the emergency department of Khatam al-Anbiya Hospital, a referral center in Zahedan, southeastern Iran. The specific objectives of this study are to: (1) determine the demographic profile of the victims; (2) determine the type of violence; (3) determine the location of occurrence; (4) establish the relationship between the victim and the perpetrator; (5) determine the type of weapon used; and (6) determine the injury patterns caused by such violence. The information gathered will serve as an empirical basis for developing preventive measures that are culturally suited to the community in which this research is conducted.

Methods

In this study, a cross-sectional design was used to investigate the epidemiology of interpersonal violence cases referred to the emergency department of Khatam al-Anbiya Hospital in Zahedan, Iran, from March 2023 to March 2024. The study population consisted of all those people admitted to the hospital as victims of violence including, but not limited to, interpersonal violence, domestic violence, child abuse, and any other abuse. The triage was done by the emergency nurses, who recorded data in accordance with the standard triage form according to the protocol of Emergency Severity Index (ESI) of the hospital. Data were collected from structured triage forms, and incomplete records were not used for further analyses. A census sampling method was utilized, encompassing all eligible cases during the study period, resulting in a final sample of 1,838 individuals.

The data were gathered retrospectively on a structured extraction form, which included: demographics (age, gender), details of the event (date, location, nature of violence), mechanism of injury (blunt or penetrating injury, type of weapon), and clinical profiles (location of the injury, severity, associated injuries, means of arrival). The types of weapons were categorized in three types: guns (handguns, rifles); cold weapons (knives, machetes, sticks), and ‘no weapon’. The latter refers to interpersonal violence involving blunt force without an external object (e.g., punches, kicks, pushes). The triage staff determined the primary complaint and urgency, performed vital sign checks, and assigned a score of 1 to 5 according to the Emergency Severity Index: ESI 1: Requires immediate medical intervention; ESI 2: Critical; ESI 3: Requires immediate attention; ESI 4: Non-urgent; ESI 5: Minor problem. Ethical considerations for this research were confirmed by the Ethics Committee of Zahedan University of Medical Sciences (IR.ZAUMS.REC.1401.247). All data were anonymously treated. Data analysis was conducted using SPSS software (version 27). Since age is not normally distributed, the results are presented as median (IQR) and tested with the Kruskal–Wallis test. Categorical variables are reported as frequency (percentages). Seasonal patterns of interpersonal violence are reported with the help of the Chi-square test. For all tests, 0.05 significance level was applied.

Results

A total number of 1,838 patients who presented to the emergency department of Khatam Al-Anbiya Hospital in Zahedan due to interpersonal violence during March 2023–March 2024 was considered in this research. The median age of the patients was 23 years, with an interquartile range of 19–32 years. Most of the participants were male, including 1,710 persons (93%). Most of the cases of interpersonal violence occurred in public places (1,628 or 88.5% of all cases). Penetrating injuries were detected in 1,010 patients (55% of all participants).

Based on the ESI, 49 patients (2.6%) had an ESI score of 1 (requiring urgent care), and the largest group had ESI score 2 (1,615 patients, 87.9%). Firearm injuries were recorded in 202 patients (10.9%). The highest frequency of interpersonal violence was observed in June and July (222, 12.1%) and July and August (216, 11.8%).

Regarding weekly distribution, the highest number of cases occurred on the first days of the week: 273 (14.8%) on Saturday and 290 (15.7%) on Sunday. The majority of patients (1677, 91.3%) were victims of interpersonal violence, while the remaining cases involved child abuse, elder abuse, and domestic violence.

The most common injury site was the head and neck (549, 30%), and the least common was the genitalia (37, 2%). Vascular injuries were the most frequent type (1,066, 58%). Regarding transportation mode, most patients (1,011, 55%) were brought to the emergency department by companions or relatives, followed by ambulance (753, 41%). **(Table 1)**

Table 1. Distribution of Interpersonal Violence According to Study Variables (N = 1,838)

Variable	Subgroup	n	%
Gender	Male	1710	93
	Female	128	7
Location	Public	1628	88.5
	Private	210	11.5
Injury type	Blunt	828	45
	Penetrating	1010	55
ESI (Emergency Severity Index)	1	49	2.6
	2	1615	85.7
	3	165	8.8
	4	54	2.9
Type of weapon	Firearm	202	10.9
	Cold weapon	418	22.8
	Without weapon	1218	66.3
Types of interpersonal violence	Child abuse	60	3.3
	Domestic violence	89	4.8
	Elder abuse	12	0.7
	Interpersonal violence	1677	91.2
Site of injury	Head and neck	549	30
	Thorax	369	20
	Abdomen and pelvis	508	27
	Lower back and spine	179	9.7
	Limbs	1024	55
	Genitalia	37	2
	Neurological involvement	55	3
	Vascular involvement	1066	58
Associated injuries	Fracture	827	45
	Ambulance	753	41
	Injured person with personal vehicle	74	4
Method of transportation	By friends or relatives	1011	55
	Spring	434	23.6
	Summer	587	31.9
Season	Autumn	426	23.2
	Winter	391	21.3
Month of the year	March–April	113	6.1
	April–May	169	9.2
	May–June	152	8.3
	June–July	222	12.1
	July–August	216	11.8
	August–September	149	8.1
	September–October	145	7.9
	October–November	130	7.1
	November–December	151	8.2
	December–January	139	7.6
	January–February	114	6.2
	February–March	138	7.5

On average, there were 153 referrals per month, which decreased to 136 for Ramadan. The use of firearms in Ramadan also had the same annual pattern.

There was a significant statistical difference between injuries severity during different seasons ($p < 0.001$). Most of injuries were observed occurring in summer (95.1%, $n=558$), whereas the fewest were in winter (82.4%, $n=322$). With respect to injury types, the most prevalent injuries across all seasons were penetrating injuries. There was no significant difference between penetrating and blunt injuries across the seasons ($p = 0.27$).

A consistent male predominance was observed across all seasons, with no significant seasonal variation in

gender distribution ($p = 0.24$). The seasonal distribution of violence types exhibited distinct patterns. Cases of child abuse and domestic violence were most prevalent in spring (4.4%, $n=19$, and 6.0%, $n=26$, respectively), declining in subsequent seasons. In contrast, elder abuse was reported most frequently in summer (1.7%, $n=10$), with no cases recorded during autumn and winter.

While the absolute number of interpersonal violence cases presenting to the emergency department was highest in summer (89.4%, $n=525$), the relative frequency—calculated as the proportion of total cases within each season—peaked in winter (95.9%, $n=375$) (Table 2, Figure 1).

Table 2. Comparison of Seasonal Patterns of Interpersonal Violence

Variable	Subgroup	Spring	Summer	Autumn	Winter	P-value
ESI	Severe (1,2)	405 (93.3%)	558 (95.1%)	382 (89.7%)	322 (82.4%)	<0.001*
	Non-severe (3,4,5)	29 (6.7%)	29 (4.9%)	44 (10.3%)	69 (17.6%)	
Injury type	Blunt	189 (43.5%)	252 (42.9%)	196 (46%)	191 (48.8%)	0.27*
	Penetrating	245 (56.5%)	335 (57.7%)	230 (54%)	200 (51.2%)	
Gender	Male	396 (91.2%)	544 (92.7%)	401 (94.1%)	369 (94.4%)	0.24*
	Female	38 (8.8%)	43 (7.3%)	25 (5.9%)	22 (5.6%)	
Types of interpersonal violence	Child abuse	19 (4.4%)	19 (3.2%)	14 (3.3%)	8 (2%)	0.02*
	Domestic violence	26 (6%)	33 (5.6%)	22 (5.2%)	8 (2%)	
	Interpersonal violence	387 (89.2%)	525 (89.4%)	390 (91.5%)	375 (95.9%)	
	Elder abuse	2 (0.5%)	10 (1.7%)	0 (0%)	0 (0%)	
Age		23 (18–31)	24 (19–33)	23 (18–32)	24 (19–31)	0.55†

ESI: Emergency Severity Index. *Chi-square test. †Kruskal–Wallis test

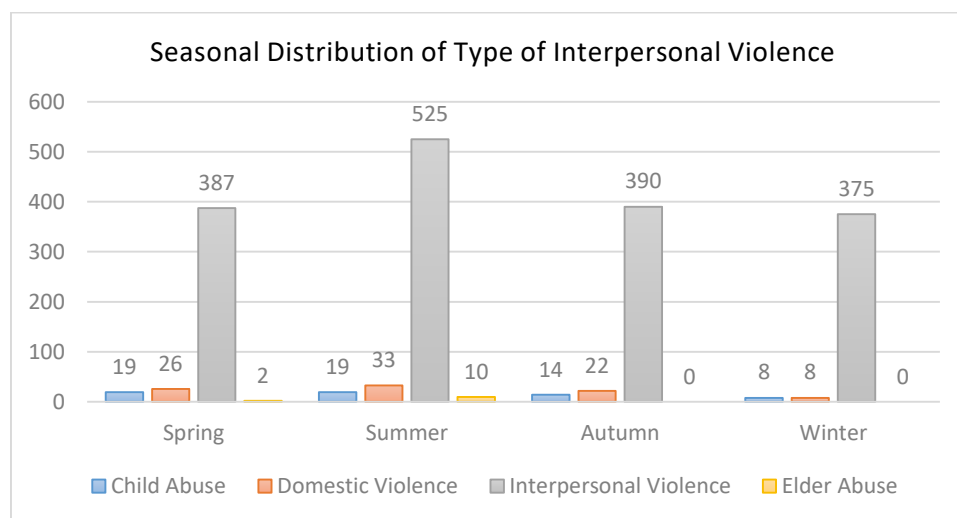


Figure 1. Seasonal distribution of interpersonal violence types.

Discussion

In this study, the incidence of IPV was investigated among patients admitted to the emergency department at Khatam Al-Anbia Hospital in Zahedan, Iran. The Khatam Al-Anbia Hospital is the major trauma referral center in Sistan and Baluchestan Province in southeastern Iran. According to the study, the victims were predominantly young males (93%) with a median age of 23 years, and the majority of the cases occurred in public areas (88.5%). Penetrating wounds with sharp instruments were the main category of injury (66%), representing 55% of injuries, primarily involving limbs (55%) and the neck/neck (30%). Notably, severe injuries (ESI levels 1-2) were significantly more common in summer (95.1%) than in winter (82.4%). This could link to socioeconomic factors in Sistan and Baluchestan Province that have features of a lot of poverty, very fast population growth, and lack of employment opportunities⁹. These may create more pressure on society, especially youth, and lead to increased violence prevalence in public places. The presence of knives as an important feature may be linked to the general situation in this community^{10, 11}.

In the context of national and regional research, our demographic findings are consistent with reports from other parts of Iran and the Middle East, where young men constitute the majority of trauma cases resulting from assaults^{5,12}. Specifically, our study's male predominance (93%) and age distribution (mostly 20–30 years) align with patterns observed in Tehran and Saudi Arabia (10,13,14). Furthermore, the high prevalence of penetrating trauma (55%) mirrors findings from Tehran, where sharp object injuries were also a common pattern. Similarly, the anatomical distribution of injuries in this study—affecting the limbs and head/neck—is broadly consistent with studies by Karbakhsh et al. and Arhami et al.

One of the key differences observed was the category of injury inflicted, with a higher percentage of firearm-related injuries in our study population (10.9%), as opposed to Tehran where 43% of the injuries were related to knives. The higher proportion of firearm injuries could imply that the form of violence in Zahedan is more lethal, which can be deduced from the higher incidences of vascular injuries (58%) and fractures (45%). Accordingly, regional trauma centers need to enhance their preparedness for firearm-related

management, and gun control policies need to be strengthened in addition to socioeconomic measures.

As regards the context of the injuries, the higher percentage of injuries sustained in public places (88.5%), at night/evening hours (49.7%), and in spring seasons (41.9%) coincides with previous studies conducted in Tehran¹⁴⁻¹⁶. Differences in geography, socioeconomic status, and weapon availability in Zahedan and Tehran could explain these differences.

Methodological and cultural differences also emerge when comparing IPV subtypes. While community-based screening in Iran has reported elder abuse as high as 80.5%, our emergency department-based registry identified only 0.7%. This difference may be due to both sociocultural factors and underreporting bias; while the respected status of elders in Sistan and Baluchestan likely acts as a protective factor against elder abuse, the possibility of underreporting to health centers due to social stigma cannot be ignored¹⁷. Similarly, the 3.3% prevalence of child abuse in our study likely captures only the most severe physical traumas, whereas community studies capture broader categories like emotional abuse and neglect^{18, 19}.

In the examination of seasonal variations, the highest prevalence of interpersonal violence was observed during summer (31.9%), along with the greatest injury severity (ESI levels 1 and 2: 95.1%) occurring in this season. Seasonal changes in the pattern of interpersonal violence, in addition to temperature effects, may also be associated with cultural events, school holiday periods, and seasonal occupational activities such as agricultural work. These findings align with international evidence; for instance, a study in South Korea demonstrated that increases in daily temperature during warmer months were associated with a rise in violent crime (exhibiting a nonlinear relationship with the highest risk at approximately 28 °C, or the 70th temperature percentile)²⁰. In addition to this temperature-specific influence, which was noted to persist only up to 21 days, is also substantiated by a systematic review and meta-analysis conducted on 83 studies around the world, which revealed that each 10 °C rise in temperature has been associated with about a 9% increase in the risk of violent criminal behavior, mainly assault and domestic violence²¹. This finding, along with the those of numerous other studies, is consistent with the theory of seasonal psychology, which posits that increases in

ambient temperature can serve as a trigger for arousal and interpersonal aggression²².

Finally, while this study was conducted in a primary level III trauma referral center and based on hospital records—meaning prehospital and on-scene mortality were not captured—the population still reflects the majority of trauma cases in the province. Data quality was maintained through standardized protocols by trained nurses, and cases with missing or uncertain information were excluded to ensure reliability.

Conclusion

The pattern of interpersonal violence observed in Zahedan must be interpreted within the specific context of Sistan and Baluchestan Province. As the most socioeconomically deprived province in Iran, its border location and high population growth rate likely contribute to **greater access to firearms**, a finding that stands as a primary novel insight of our study. This shown through the **10.9% prevalence of firearm injury**, a rate which is significantly higher than that seen nationally because of the stringently enforced regulations that usually ensure that weapons are limited to use of knives only. While the city exhibits similar demographics and patterns of injury to those of other regions, the significantly higher prevalence of weapons in terms of firearms (10.9%) has increased the severity of such forms of violence in the area. This study highlights a unique epidemiology of the region that calls for special intervention strategies. Additionally, it was seen that both the occurrence of violent events and injuries were significantly higher during the summer as opposed to other seasons. Therefore, the urgent need for interventions to decrease the flow of illegal firearms, develop the socio-economic status of the region, and improve the trauma system is highlighted.

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Conflict of Interest Disclosures

The authors declare no conflict of interest.

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Authors' Contributions

Conception and design by SS. Material preparation, data collection and analysis were performed by AB, FA and RT and NS. The first draft of the manuscript was written by SS and NS and FA and AB. all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethical Statement

This study was approved by the Ethics Committee of Zahedan University of Medical Sciences (approval code: IR.ZAUMS.REC.1401.247). Informed consent was waived by the ethics committee due to the retrospective nature of the study.

Declaration of Generative AI and AI-assisted technologies

The authors acknowledge the use of an AI-assisted tool for language editing, proofreading, and reference formatting in accordance with AMA style guidelines during the preparation of this manuscript.

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