



## STUDY OF INJURIES EPIDEMIOLOGICAL CHARACTERISTICS IN GEORGIA ON THE EXAMPLE OF ADJARA REGION

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**Introduction.** Injury is a significant public health concern that is a leading cause of mortality and disability worldwide. Injuries have a significant financial and quality-of-life impact on persons and communities. The absence of fundamental epidemiological data on the prevalence of injuries prevents developing countries from creating effective prevention programs. The goal of this study was to characterise the epidemiological features of injury in the Adjara region. **Material and methods.** The database and source of the data that we used in this article were provided from the Georgian National Center for Disease Control and Public Health's 2019 database, which contains all hospitalizations in the Adjara area and was utilized to find trauma cases that were treated at medical facilities. Based on the ICD-10 diagnosis codes S and T, as well as V-Y, cases were chosen. Version 23.0 of SPSS was used to analyze the data. **Results.** Between the ages of 0 and 103, there were a total number of 2,239 patients, inclusive 1,321 (59%) – males, and 918 (41%) – women, who were hospitalized for treatment of an injury. The incidence was highest among those aged 65 and over (n=510; 23%), followed by those aged 20-34 (n= 488; 20%). The most prevalent cause of injury was falling (n=1,324; 59%), followed by exposure to inanimate mechanical forces (n=244; 11%). The range of hospital stays was from 1 to 3,652 days, with a median and mode of 3 and 2 days. **Conclusions.** This study provides information for public health decision-making. In order to enhance the standard of treatment and focus efforts on avoiding more injuries, intervention strategies may be devised using our data to understand better the extent of the injuries and outcomes linked to traumatic injury hospitalizations.

**Cuvinte cheie:** leziuni, epidemiologie, spitalizare, Regiunea Adjara, Georgia.

**STUDIUL CARACTERISTICILOR EPIDEMIOLOGICE ALE LEZIUNILOR DIN GEORGIA AVÂND CA EXEMPLU REGIUNEA ADJARA**

**Introducere.** Leziunea reprezintă o problemă semnificativă de sănătate publică, fiind o cauză principală de mortalitate și dizabilitate la nivel mondial. Leziunile au un impact financiar semnificativ asupra calității vieții atât a persoanelor, cât și a comunităților. Absența datelor epidemiologice fundamentale privind prevalența leziunilor împiedică țările în curs de dezvoltare să creeze programe eficiente de prevenire. Scopul acestui studiu a fost de a descrie caracteristicile epidemiologice ale leziunilor din regiunea Adjara. **Material și metode.** Datele pentru anul 2019, folosite în acest articol, au fost furnizate de către Baza de date a Centrului Național Georgian pentru Controlul Bolilor și de Sănătate Publică. Acest centru înregistrează toate spitalizările din zona Adjara. Baza de date a fost utilizată pentru a selecta cazurile de traumă care au fost tratate la unitățile medicale. Prin intermediul Clasificatorului Internațional al Maladiilor – 10, cazurile au fost alese pe baza codurilor de diagnostic S, T și V-Y. Pentru analiza datelor a fost utilizată Versiunea 23.0 a SPSS. **Rezultate.** A existat un număr total de 2239 de pacienți, inclusiv 1321 (59%) – bărbați, 918 (41%) – femei, cu vârsta între 0 și 103 ani, care au fost internați pentru tratamentul unei răni/leziuni. Incidența a prevalat în rândul celor cu vârsta de 65 de ani și peste (n=510; 23%), fiind urmați de cei cu vârsta între 20 și 34 de ani (n=488; 20%). Cea mai răspândită cauză a leziunilor a fost căderea (n=1324; 59%), urmată de expunerea la forțe mecanice neînsuflețite (n=244; 11%). Intervalul de spitalizare a fost de la 1 la 3652 zile, cu o medie de 3 și 2 zile. **Concluzii.** Studiul oferă informații pentru luarea deciziilor în domeniul sănătății publice. Pentru a îmbunătăți standardul de tratament și pentru a concentra eforturile de evitare a mai multor răni, pot fi concepute strategii de intervenție aplicând datele obținute, care contribuie la o evaluare mai exactă a gravității leziunilor traumatice și, implicit, a rezultatelor preconizate a fi obținute în urma spitalizării.

## INTRODUCTION

Georgia ranks fourth for fatalities due to injuries. Traffic-related injuries have a prominent position in the hierarchy of all injuries. The high number of fatalities and injuries on Georgia's roads is a serious concern (1). Several organizations in Georgia, including the National Statistics Office, the Ministry of Labour Health and Social Affairs, the National Centre for Disease Control and Public Health, the Emergency Medical Service of Georgia, and the Ministry of Internal Affairs of Georgia are responsible for compiling data on the number of fatalities and injuries that occur as a result of accidents and acts of violence in the country. The number of new cases was 7,384. In 2017, there was no significant change in prevalence and incidence in the regional distribution of "Some Other Impacts of Injuries, Poisoning and External Causes", except for Adjara and Samegrelo-Zemo Svaneti. In contrast, in 2017, there was a sharp decline compared to the previous year. According to a report submitted to the NCDC in 2017, 24,527 patients were hospitalized in Georgian hospital service facilities due to "some other effects of injuries, poisoning and external causes". Structural analysis of the causes of injuries to hospitalized patients in 2017 revealed a 65% (14,680) fall in incidence, 14% (3,107) road accidents, burns and electric shock, and 9 (0.03%) accidental poisoning, 6 (0.02%) is due to suffocation/cessation of breathing, and 6.9% is due to other external cause. In 2017, Tbilisi was the leader in the regional distribution of hospitalized patients due to "some other effects of trauma, poisoning and external causes". I.e., Most of the injured as a result of external causes 51% - receive inpatient treatment in Tbilisi, 16% - in Imereti, 10% - in Adjara, 6.5% - in Kakheti, etc. (2).

In Georgia, as in other low- and middle-income countries, the most vulnerable group of road users are pedestrians (especially children and the elderly) and passengers of cars. Among the patients hospitalized due to a car accident in 2017, pedestrians and passenger cars are the leaders in all age categories. The number of deaths due to traffic accidents in Georgia has been decreasing from 2008 to 2014; however, in 2015, the rate increased by almost 18% compared to 2014, and in 2016 the tendency decreased again and in 2017, compared to 2016, the rate decreased by 12%. This positive dynamic is probably due to the legislative changes in the field of road safety in 2016, namely: the so-called roads. Neutralising "black spots", introducing a points system, the leading causes of road accidents and deaths - incorrect

manoeuvring, speeding, driving under the influence of alcohol, tightening administration, contactless patrolling, etc. (1). Due to the fact that previous research of a comparable nature had not been carried out in the Adjara region, *the primary objective* of our study was to investigate and describe the characteristics of injury, the types of injury, and the consequences of injury in the Adjara region in order to gain an understanding of the appropriate path to take when planning preventive measures. As a result, the research offered decision-makers and other stakeholders' access to baseline data, which will be of assistance in the development of future research, policy, and funding agendas.

## MATERIAL AND METHODS

The injured patients who were admitted to private and public hospitals in the Adjara region between the ages of 0-65 underwent a retrospective, descriptive examination by the researchers. Hospitals in the Autonomous Republic of Adjara, Georgia's political and administrative region, provided the data. The research was conducted between January 1 and December 31, 2019. The official National Center for Disease Control and Public Health database in Georgia served as the source of the data used in this article (NCDC). The kind of injury was recognized using class XX and the ICD-10 categories were identified using class XIX (S and T codes) (V-Y codes). A class XX code defining the source of the damage is appended to a class XIX code describing the kind of injury in the National database. Injuries to the head, upper extremities, lower extremities, thorax and neck, abdomen, lower back, lumbar spine and pelvis, and other/unspecified were divided into six groups based on their anatomical position. Length of stay (LOS) for hospitalizations was split into two categories: short LOS (1-3 days) and protracted LOS (more than 3 days). For statistical data analysis, version 23.0 of the SPSS program was utilized. The features of the injured individual and the injury were studied. Pearson's chi-square test was used to categorical data to evaluate if there is a statistically significant difference between variables. The duration of stay variable was dichotomized into three days and less than three days. The whole model includes demographic and clinically important patient information, such as the affected body area and kind of injury. In the final model, only variables with p-values of 0.05 were preserved. Statistical significance was considered for  $p < 0.05$ .

## RESULTS

During the research period, a total of 2,239 hospitalizations due to injuries were recorded. Males made up 59% (1,321) of patients, while females made up 41% (918), a ratio for a male to female of 1.4:1. Patients varied in age from 0 to 103 years, with a median and mean of 43 years. The age group with the largest proportion of patients was 65+ years, which accounted for 510 (22.8%) patients, followed by 15-29 years with 446 (19.9%) patients and 30-44 years with 431 (19.2%) patients.

The most frequent form of arrival to the hospital was emergency medical services (EMS) (56.6%), followed by private/public transport (42.2%),

and then a referral from a medical institution (1.2%). Patients over the age of 65 constituted 30% of those evacuated by EMS, while those aged 20 to 34 constituted 22%. Patients arriving by private/public transport mainly were aged 0 to 19 years (26.1%). Unintentional injuries were reported for 80% of all injury-related hospital admissions, and they led in all age categories. Undetermined intent and other injuries occurred in 19% of the cases. Intentional injury was recorded in 1.3% of patients. There were 28 fatalities that took place among the injured people who were hospitalized. The remaining 2063 patients were discharged after receiving treatment (tab. 1).

Table 1. Characteristics of the population according to age group.

Characteristics of the population	Age group					Total N (%)	p - value
	0-19 N (%)	20-34 N (%)	35-49 N (%)	50-64 N (%)	65+ N (%)		
<b>Gender</b>							
Male	279 (71)	343 (70)	280 (67)	231(54)	188 (37)	<b>1321(59)</b>	<b>&lt;0.001</b>
Female	113 (29)	145 (30)	138 (33)	200 (46)	322 (63)	<b>918 (41)</b>	
<b>Mode of arrival</b>							
Walk-in	247 (63)	206 (42)	173 (41)	156 (36)	163 (32)	<b>945 (42)</b>	
Referral from a medical facility	10 (3)	4 (1)	4 (1)	3 (1)	5 (1)	<b>26 (1)</b>	<b>&lt;0.001</b>
Emergency medical service	135 (34)	278 (57)	241(58)	272 (63)	342 (67)	<b>1268 (57)</b>	
<b>Length of stay</b>							
1-3 days	210 (54)	379 (78)	291 (70)	264 (61)	208 (41)	<b>1352 (60)</b>	<b>&lt;0.001</b>
4 and more days	182 (46)	109 (22)	127 (30)	167 (39)	302 (59)	<b>887 (40)</b>	
<b>Intent</b>							
Unintentional	374 (95)	382 (78)	320 (77)	314 (73)	402 (78.8)	<b>1792 (80)</b>	
Assault	0	15 (3)	6 (1)	5 (1)	2 (0.5)	<b>28 (1)</b>	<b>&lt;0.001</b>
Undetermined intent and other	18 (5)	91 (19)	92 (22)	112 (26)	106 (20.7)	<b>419 (19)</b>	
<b>Outcome</b>							
Completed treatment	346 (88)	456 (93)	396 (95)	410 (95)	455 (89)	<b>2063 (92)</b>	
Referral	44 (11)	28 (6)	13 (3)	19 (4)	34 (7)	<b>138 (6)</b>	<b>&lt;0.001</b>
Death	0	1 (0.2)	7 (1.7)	2 (1)	18 (3.5)	<b>28 (1.2)</b>	
Discontinued treatment	2 (1)	3 (0.8)	2 (0.3)	0	3 (0.5)	<b>10 (0.8)</b>	

The most common mechanism of injury across all age groups was falling (n=1,324, 59%), followed by exposure to inanimate mechanical forces (n=244, 11%), and road traffic injuries (n=161, 7%) (tab. 2). The 65+ age group had the most falls (n=348, 68%), followed by the 20-34 age group (n=238, 49%), and the 50-64 age group (n=235, 55%). Falls were the major cause of injury-related

hospitalizations in both men (n=760, 58%) and women (n=564, 61%).

Road traffic injuries (RTI) were among the third mechanisms of harm for all age groups, with mechanical forces coming in second. Nonetheless, these processes differed across groups depending on the age of the hospitalized patients. Following falls, the most common mechanisms for hospita-

lization for patients 0-19 years old were exposure to mechanical forces (n=39, 10%) and road traffic injuries (n=21, 5%); for patients 20-34 years old, the order was exposure to mechanical forces (n=81, 17%) and road traffic injuries (n=49, 10%); and for those aged 35-49 years old, the order was exposure to mechanical forces (n=56, 13%) and road traffic injuries (n=49, 10%). The order was exposure to mechanical forces (n=28, 5%) and road traffic injuries (n=12, 2%) for the geriatric age group, 65 years and older. Patients admitted to hospitals due to transportation injuries were mostly male, with a sex ratio of 1.55:1. Mechanical force exposure disproportionately harmed men, with a sex ratio of 2.2:1. The majority of instances (n=244, 11%) were caused by inanimate mechanical forces. The most frequent body areas injured were the head, lower limbs, and upper extremities, accounting for 45% (n=1,009), 20% (n=455), and 18% (401) of cases, respectively. However, among male patients, the most prevalent injury site was the head (n=583, 44%), followed by upper extremity (n=278, 21%) and lower extremity (n=236, 17%) injuries. The most prevalent injury site in females was the head (n=426, 46%), followed by the lower extremities (n=261, 28%) and the upper extremities (n=123, 13%). In terms of injured body region ratios, there were various disparities across patient age groups. The percentage of head injuries varied by age (20-34, 29 percent; 35-49, 21 percent; 50-46, 18 percent; 65+, 16 percent; 0-19, 16 percent). The proportion of patients who sustained injuries to their lower extremities ranged from 4% in the youngest group of patients up to 48% in the oldest group of patients who were 65 or older (0-19 years old: 4%; 20-34 years old: 11%; 35-49 years old: 14%; 50-64 years old: 20%; 65+ years old: 48%).

The average length of stay in the hospital was three days. Generally, 60% (n=1 352) of all injured patients were treated for three days or fewer. The oldest age category (65+) had the largest percentage of individuals spending four days or more (n=302, 59%) compared to those staying three days or less (n=208, 41%). Age groups 15-29 had the biggest percentage of individuals staying for three days or fewer (n=379, 78%). Depending on the age group, there were variances in the longer LOS between men and females. LOS in females varied by age group: 0-19 years 68%, equivalent to or less than three days, 20-34 years 83%, 35-49 years 77%, 50-64 years 66%, and 65+

years 39%. LOS for men ranged from 48% for those ages 0 to 19, 75% for those ages 20 to 34, 66% for those ages 35 to 49, 57% for those 50 to 64, and 44% for those 65 and beyond (tab. 2). LOS equal to or less than three days was 55% in fall-related patients, exposure to inanimate mechanical forces 75%, and transport accidents 62%. Injuries to the head, upper extremities, low extremities, unspecified, thorax/neck and abdomen, lower back, lumbar spine and pelvis required length of stay equal to or less than three days, with 61%, 16%, 10%, 9%, 3%, 2% accordingly.

## DISCUSSIONS

The Adjara region's 2019 injury hospitalisations were all analysed. According to the findings, men make up the vast majority of the injured patients, and those aged 65 and over had the most injuries. The variety of exposures, behavioural tendencies, and environmental risks that vary by age and gender may cause this prevalence. In our research, it was not able to determine these distinct causative elements. Previous research has demonstrated a higher rate of injuries in men than in women (3, 4). In our analysis, the most prevalent form of admission to the hospital was by emergency medical services, and the majority of patients were 65 or older. This result is probably attributable to the fact that emergency medical assistance in Georgia is provided free of charge, and calls to the Emergency Response Center, which the general public can reach by dialling the national number „112“ are also provided free of charge from any fixed-line or mobile network in the country.

The majority of injuries were caused by falls, and the percentage of elderly patients with falls was much greater than in other age groups. These findings are consistent with earlier publications (5). These results align with earlier research and are probably caused by concomitant disorders like osteoporosis and the functional effect of ageing on physical endurance (5, 6). Our data also emphasises that a significant portion is related to road traffic injuries. RTI has been found to be one of the causes of injury. Unsurprisingly, road traffic injuries could be frequent because of the chance of situations when there are more chances for disputes between road users, such as when a car changes lanes or comes from behind, or when it is approaching an intersection or a roundabout (6). One of the causes of the rising number of traffic injuries in other LMICs is the expansion of the transportation infrastructure.

Table 2. Length of hospital stay.

Variables	Length of stay		p - value
	≤3 days (n = 1,352)	>3 days (n=887)	
<b>Age</b>			
0-19	210 (16)	182 (21)	<0.001
20-34	379 (28)	109 (12)	
35-49	291 (22)	127 (14)	
50-64	264 (20)	167 (19)	
65+	208 (15)	302 (34)	
<b>Gender</b>			
Male	792 (59)	529 (60)	<0.001
Female	560 (41)	358 (40)	
<b>Mechanism of injury</b>			
Transport accidents	100 (7)	61 (7)	<0.001
Fall	722 (53)	602 (68)	
Exposure to inanimate mechanical forces	184 (14)	60 (7)	
Assault	21 (2)	7 (1)	
Undetermined intent and other	274 (20)	145 (16)	
Unspecified	51 (4)	12 (1)	
<b>Injured body region</b>			
Injuries to the head (S00-S09)	818 (61)	191 (22)	<0.001
Lower extremities (S70-S99)	131 (10)	365 (41)	
Upper extremities (S40-S69)	211 (16)	190 (21)	
Thorax/neck (S10-S29)	43 (3)	60 (7)	
Abdomen, lower back, lumbar spine and pelvis(S30-S39)	26 (2)	40 (5)	
Unspecified	123 (9)	41 (5)	
<b>Outcome</b>			
Completed treatment	1,199 (88)	864 (97)	<0.001
Referral	134 (10)	4 (1)	
Death	12 (1)	16 (1.8)	
Discontinued treatment	7 (1)	3 (0.3)	

The majority of injuries were to the head, based on the body region. Thousands of hospitalisations per year and billions of dollars in healthcare costs are attributed to head trauma, a severe public health issue. The whole direct and indirect costs of head injuries to society are the greatest in the United States alone, where it is the commanding cause of mortality and morbidity in people under the age of 44. According to scientific literature as well as research, patients who have head injuries are often seen in the emergency department. In addition, data demonstrate that head injuries represent the entire direct and indirect costs to society (7). As a result of TBI, more than 5 million Americans already experience long-term impairment, and more than 1.5 million people

experience a new TBI every year (8). According to the outcomes of head injury, men predominate in general. This preponderance is likely caused by biological causes and gender-specific societal variations in activity and risk-taking. Although it was not feasible to identify these criteria for this study, it could be helpful in the future. The descriptive research in Iran reveals comparable results (6). According to the present study's results, the average duration of hospital stay was three days or fewer. This rate varied according to gender, age, injury mode, and injured body location. In men, the LOS rate is equivalent to or fewer than three days, which is more than another variable. Other research found similar results (9). However, there were differences in the longer length

of hospital Stay between males and females depending on the age group (7, 10, 11, 12). In addition, due to disparities in trauma care delivery systems and injury patterns, it is challenging to

compare LOS across nations, and comparing our findings with those of other research reveals inconsistent findings (10).

## CONCLUSIONS

1. Despite these limitations, the study provides valuable information for public health decision-making, and the results of our research offer background data on hospitalizations for traumatic injury; also, it is the first study of its kind in the Adjara region, providing such type of information. In order to enhance the standard of treatment and focus efforts on avoiding more injuries, intervention strategies may be devised using our data to understand better the extent of the injuries and outcomes linked to traumatic injury hospitalizations.
2. Although these statistics can help determine which preventative strategies should be prioritized.

## CONFLICT OF INTERESTS

The authors report no conflicts of interest in this work.

## ETHICAL APPROVAL

Study Protocol was approved by Medical Ethics Committee of National Center of Disease Control and Public Health (N2022-034; 11.04.2022).

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