

EPIDEMIOLOGY OF TRAFFIC TRAUMATISM

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Primljen/Received 01. 07. 2024.

Prihvaćen/Accepted 26. 07. 2024.

Abstract: Through a review of relevant literature, we provide insight into the public health issue of traffic trauma both globally and locally. According to estimates by the World Health Organization (WHO), approximately 1.35 million people die annually in traffic accidents, while nearly 50 million suffer minor or severe injuries. Globally, traffic injuries account for about 2.37% of all deaths, ranking eighth among all causes of death. The Global Status Report on Road Safety 2018 indicates that the number of traffic deaths did not decrease in any low-income country between 2013 and 2016, although a reduction was observed in 48 middle- and high-income countries during that period. Despite the increase in absolute numbers, the global road traffic mortality rate has remained fairly constant at around 18 deaths per 100 000 inhabitants over the past 15 years, with the highest rate in the African region and the lowest in the European region. Currently, traffic accidents are the leading cause of death among children and young adults aged 5 to 29 years, with a higher incidence among males. Further research is needed to better understand the specific characteristics of traffic injuries in the local population and to identify the most effective intervention programs.

Keywords: Trauma, trauma registry, polytrauma, public health.

INTRODUCTION

According to estimates from the World Health Organization (WHO), approximately 1.35 million people die in traffic accidents worldwide each year. In addition, nearly 50 million people suffer minor or serious injuries as a result of traffic trauma, whether during the accident, transport, or hospitalization (1). Globally, of the 56.9 million deaths worldwide, road traf-

fic injuries account for about 2.37% and rank eighth among all causes of death, including both communicable and non-communicable diseases. Traffic accidents are currently the leading cause of death among children and young adults aged 5 to 29 years, with a higher incidence among males (1, 2). The WHO estimates that by 2030, traffic injuries will become the fifth leading cause of death, with 2.4 million deaths per year, and the third leading cause of disability, significantly impacting individuals, families, and society as a whole (3). Over 90% of traffic deaths occur in low- and middle-income countries, which, despite having about 60% of the world's vehicles, suffer from poor road infrastructure, inadequate vehicle maintenance, and insufficient education (4, 5). Literature suggests that road traffic fatality rates are three times higher in low-income countries compared to high-income countries (27.5 versus 8.3 deaths per 100 000 population), highlighting a significant concern for public health systems in these regions.

Epidemiology of traffic trauma in the world

The Global Status Report on Road Safety 2018 indicates that the number of traffic deaths did not decrease in any low-income country between 2013 and 2016, though a reduction was observed in 48 middle- and high-income countries during that period (1). Despite an increase in absolute numbers, the global road traffic mortality rate has remained relatively constant at around 18 deaths per 100 000 inhabitants over the past 15 years (1, 6), with the highest rate in the African region and the lowest in the European region (1).

Figure 1 illustrates the incidence of traffic injuries and their trends from 1990 to 2019 across 204

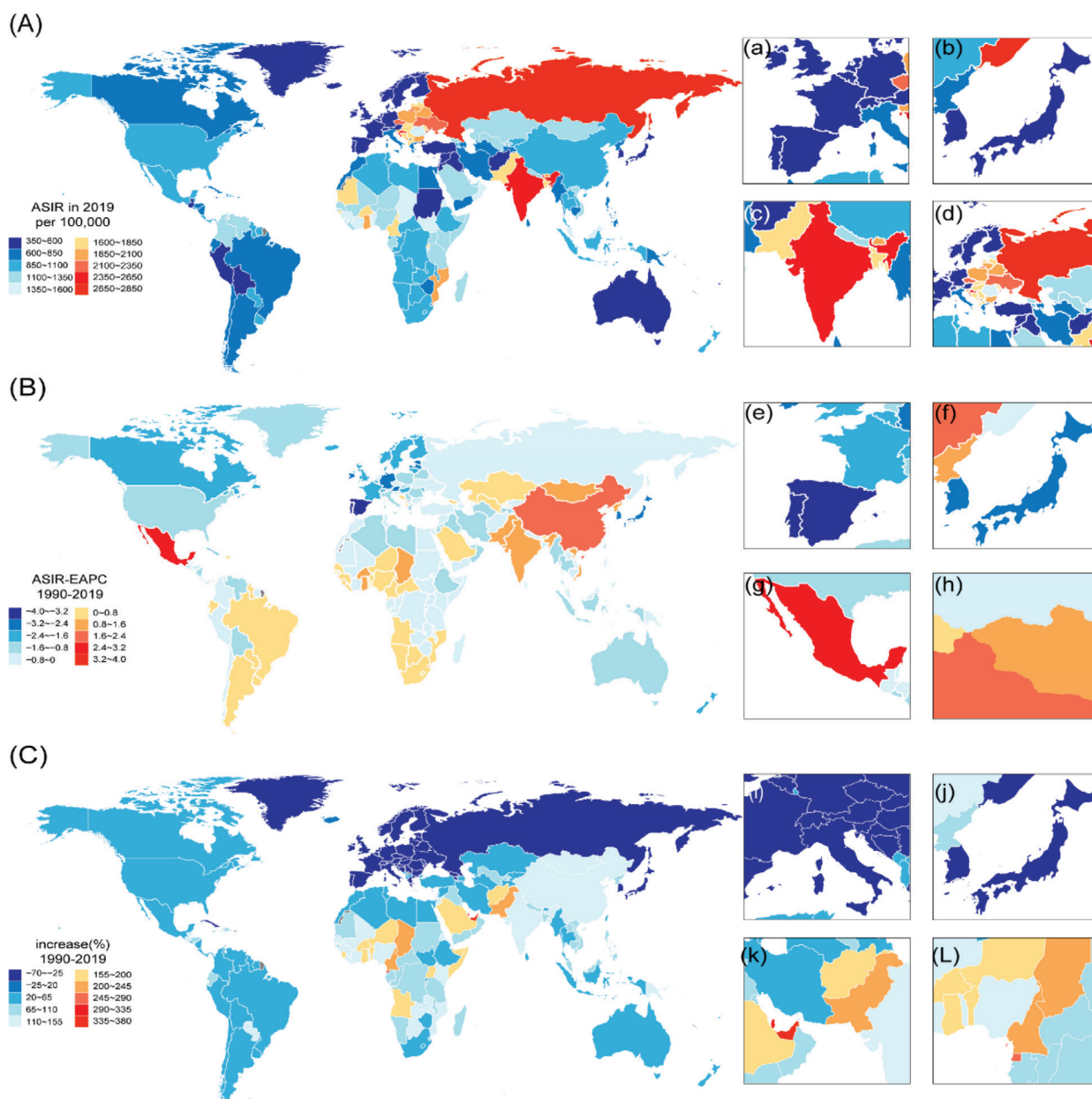


Figure 1. Global burden of road injuries from 1990-2019

(Source: Xu Y, Chen M, Yang R, Wumaierjiang M, Huang S. Global, Regional, and National Burden of Road Injuries from 1990 to 2019. *Int J Environ Res Public Health*. 2022; 19(24): 16479.)

countries, including Western Europe, South Asia, the Asia-Pacific Region, Eastern and Western Europe, East Asia, Central and Latin America, North Africa, the Middle East, and Sub-Saharan Africa (7). The results show a decrease in incidence after 2010, which is attributed to global improvements in road infrastructure and the implementation of traffic injury prevention regulations. The highest incidence is recorded in India, with South Asia showing the largest numerical value (7).

In all age groups, the annual rates of fatal injuries are higher in men compared to women (79 per 100 000 versus 34 per 100 000, respectively) (7). Traffic injuries are the leading cause of death for children and

young people aged 5 to 29 years globally, with males being more likely to be involved in traffic accidents; 73% of all road deaths in this age group occur among young men (1).

The leading causes of mortality from traffic trauma worldwide are head injuries and bleeding. Bleeding is responsible for 80% of deaths that occur within the first hours after the accident, and 55% of those who die in the hospital succumb within the first 24 hours. Head injuries are more common among those who die between 1 and 6 days after hospitalization (8).

The economic costs of traffic accidents are substantial, with nearly two-thirds (60.7%) of fatal accidents involving the most productive segment of the

population, making traffic accidents a leading cause of disability (9). Additionally, the annual costs of caring for and treating the injured represent a significant economic burden on society (10). In 2019, the costs of care, treatment, and rehabilitation for traffic accident victims in the United States amounted to 340 billion dollars, leading to a tremendous economic burden, with one in ten hospital beds occupied by traffic accident patients (11). Ameratunga et al. predict that an increase in the number of vehicles per inhabitant will result in an 80% increase in the number of traffic-related injuries and deaths. They also forecast that medical costs due to traffic accidents will rise by 1.0% of gross national income in low-income countries, 1.5% in middle-income countries, and 2.0% in high-income countries (12).

Epidemiology of Traffic Trauma in Europe

In Europe, traffic accident mortality ranks 15th among all causes of death. Annually, approximately 120 000 people die in traffic accidents, and around 2.5 million sustain minor or severe injuries (13). Traffic accidents in Europe are the fourth leading cause of injury, with over 90% of fatal cases occurring among individuals under forty years of age (14, 15, 16). The traffic mortality rate in middle-income countries in Europe is 14.4 deaths per 100 000 inhabitants, nearly three times higher than in high-income countries, where the rate is 5.1 deaths per 100 000 inhabitants. Mortality is particularly high among the younger population in low- and middle-income countries (17, 18).

Except for the Eastern Mediterranean region, the rate of traffic deaths per 100.000 inhabitants generally decreases with increasing income (6). The geographical distribution of mortality from road traffic accidents reveals that Western European countries have much lower mortality rates compared to Central and Eastern European countries (19). Although there has been a significant reduction in traffic accident mortality over the past three decades due to improvements in road infrastructure, public education, and preventive campaigns, the reasons for the relatively high death rates in Central and Eastern Europe remain unclear, necessitating continued efforts to reduce mortality in these regions.

In 2022, Sweden reported the lowest traffic death rate in Europe at 21 deaths per million inhabitants, followed by Denmark with 26 deaths per million. In contrast, Romania (86/million) and Bulgaria (78/million) had the highest death rates. The average death rate in the EU due to traffic trauma was 46 road deaths per million inhabitants. Among Western Balkan countries,

Montenegro had the highest fatality rate (88 per million inhabitants) in 2022, with Serbia in second place (75/million). Montenegro also experienced the largest increase in fatalities, rising by 33% compared to 2021.

In 2021, 52% of traffic deaths in the EU occurred on rural roads, 39% in urban areas, and 9% on highways. Men were responsible for three out of four deaths (78%). Car occupants (drivers and passengers) accounted for 45% of all road deaths, pedestrians 18%, users of two-wheeled motor vehicles (motorcycles and mopeds) 19%, and cyclists 9%. In urban areas, pedestrians, cyclists, and motorized two-wheeler users together accounted for slightly less than 70% of total fatalities (20).

Adolescents, dominated by the male population, aged 16 to 19 years are faced with the highest risk of traffic accidents due to the consumption of alcohol and psychoactive substances and the use of mobile phones, especially during the first year of driving, and teenagers in this age group have twice the mortality rate of girls (14, 4).

Epidemiology of Traffic Trauma in the Republic of Serbia

Traffic injuries in the Republic of Serbia rank among the top causes of death, following cardiovascular diseases and malignant neoplasms (21, 22, 23). According to data from the Agency for Traffic Safety of the Republic of Serbia, between 2017 and 2021, there were a total of 173360 traffic accidents, resulting in 2674 fatalities, 16474 severe injuries, and 83280 minor injuries. Among the participants in traffic accidents, the highest number of fatalities were drivers and passengers in passenger cars (45%), followed by pedestrians (26%), cyclists and motorcyclists (9% each), tractor drivers and passengers (5%), and drivers and passengers in heavy vehicles (3%) (22).

The statistical report on traffic safety for 2021 shows that 521 people died and 3347 sustained severe injuries during that year. Men accounted for 78% of fatalities and 61% of those injured. Among the deceased, the majority were drivers of passenger cars (47%), followed by passengers in motor vehicles (33%), pedestrians (13%), and cyclists (7%). The age distribution of fatalities indicates that the highest proportion of deceased individuals were aged 65 and older (33.6%), followed by those aged 15-30 years (19.4%), and 31-44 years (15.2%). The highest proportion of deceased drivers were in the 65 and older age group, followed by those aged 15-30 years. Among pedestrians and cyclists, those aged 65 and older were most frequently represented (22).

Analysis of fatalities and injuries by gender reveals that men are more likely to die as drivers and

pedestrians compared to women. Conversely, women are more likely to be injured as passengers and pedestrians, while men are more frequently injured as drivers of motor vehicles. The public risk in Serbia is significantly higher compared to EU countries, with an average of approximately 33 more fatalities per million inhabitants (24).

On September 1, 2018, Serbia established a trauma registry, initiated by the Resuscitation Council of Serbia (RSS). This registry enables the monitoring of epidemiological data related to trauma and is the first to record all injuries treated by Emergency Medical Services (25).

Epidemiology of Traffic Trauma in Montenegro

Montenegro, with a population of approximately 630,000 inhabitants, has an economy primarily based on services, with tourism as a key sector. The nominal GDP of Montenegro for 2015 was estimated at 3.4 billion euros, with projected annual GDP growth of 3% until 2025 and 2.5% until 2035 (26, 27).

Montenegro lacks a dedicated trauma registry, leading to limited data on traffic trauma. Available data is sourced from the “Statistical Office” and the “Ministry of Interior.” In 2021, the Ministry of Interior reported 6,109 traffic accidents, marking an increase of 1517 accidents or 33.0% compared to 2020, which had 4592 accidents (28). The state of road traffic safety report indicates that 3,003 people were injured in traffic accidents in 2021, an increase of 916 or 43.9% from 2020 (Table 1).

Regarding fatalities, 55 people died in traffic accidents in 2021, compared to 48 in 2020, representing an increase of 7 fatalities or 14.6% (Table 2). According to the Ministry of Interior, the most frequent fatalities were drivers of motor vehicles, accounting for 50% of all deaths. Passengers made up 25% of fatalities, pedestrians about 17%, and motorcyclists approximately 8%. The majority of fatalities occurred on main roads (60%), followed by streets (20%), local roads (5%), regional roads (3%), and unclassified roads (2%).

Table 1. Traffic Accidents with Injuries

	2021	2020	Change (%)
Total injured persons	3,003	2,087	43.9%
Seriously injured persons	474	380	24.7%
Slightly injured persons	2,529	1,707	48.2%

(Source: Ministry of Interior of Montenegro, report on the state of road traffic safety for 2021. Available at: <https://wapi.gov.me>)

Table 2. Traffic Accidents with Fatalities

	2021	2020	Change (%)
Total fatalities	55	48	14.6%
Drivers	27	21	28.6%
Passengers	10	16	-37.5%
Cyclists	1	0	/
Motorcyclists	10	4	150.0%
Pedestrians	7	7	/

(Source: Ministry of Interior of Montenegro, report on the state of road traffic safety for 2021. Available at: <https://wapi.gov.me>)

Human factors are identified as the primary cause of most traffic accidents in Montenegro (28, 29). A study by Peličić and colleagues conducted from 2011 to 2020 highlights that the distance to the nearest hospital and specialized treatment centers, as well as transport time, significantly impact the outcomes of traffic accident injuries (30).

CONCLUSION

The literature review indicates that traffic injuries are a significant global public health issue, requiring coordinated efforts at both national and international levels. Implementation of preventive measures and strategies, including the establishment of trauma registries, is crucial for reducing the incidence of traffic injuries. This may involve driver education, enforcement of traffic safety measures, and infrastructure improvements. Prompt and efficient emergency medical assistance can significantly reduce mortality and long-term consequences following traffic accidents. Further research is necessary to better understand the specific characteristics of traffic injuries within local populations and to develop the most effective intervention programs.

Conflict of Interests: The authors declare no conflicts of interest related to this article.

Funding: No external funding was received for this study.

Note: Artificial intelligence was not used as a tool in this study.

Author Contribution: All authors contributed equally to writing and revising this article.

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Sažetak

EPIDEMIOLOGIJA SAOBRAĆAJNOG TRAUMATIZMA

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Kroz pregled relevantne literature, pružili smo uvid u javnozdravstveni problem saobraćajnih povreda kako globalno, tako i lokalno. Prema procenama Svetske zdravstvene organizacije (SZO), oko 1,35 miliona ljudi godišnje umre u saobraćajnim nesrećama, dok skoro 50 miliona ljudi pretrpi manje ili teže povrede. Globalno gledano, saobraćajne povrede čine oko 2,37% od ukupnog broja smrtnih slučajeva širom sveta, što ih svrstava na osmo mesto među svim uzrocima smrti. Globalni izveštaj o stanju sigurnosti na putevima 2018. pokazuje da se broj smrtnih slučajeva u saobraćaju nije smanjio ni u jednoj zemlji s niskim prihodima između 2013. i 2016. godine, ali je u tom periodu uočeno sma-

njenje u 48 zemalja sa srednjim i visokim dohotkom. Uprkos porastu u apsolutnim brojevima, globalna stopa smrtnosti u saobraćaju je ostala prilično konstantna, na oko 18 smrtnih slučajeva na 100.000 stanovnika u proteklih 15 godina, sa najvišom stopom u afričkom regionu i najnižom u evropskom regionu. Trenutno su vodeći uzrok smrti među decom i mladima od 5 do 29 godina gde prednjači muška populacija. Potrebna su dalja istraživanja kako bi se bolje razumele specifične karakteristike saobraćajnih povreda u lokalnoj populaciji i identifikovali najefikasniji programi intervencija.

Cljučne reči: Trauma, registar traume, politrauma, javno zdravlje.

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How to cite this article: Damir P, Branko R, Svetlana R. Epidemiology of traffic traumatism. *Sanamed*. 2024; 19(2): 233-238. Doi: 10.5937/sanamed0-5191.