DOI: https://doi.org/10.54393/pjhs.v7i5.3671

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 7, Issue 05 (May 2026)

Original Article

OPEN ACCESS

From Crash to Care: An Interdisciplinary Analysis of Road Traffic Accidents in Pakistan; Unifying Forensic Medicine and Public Health for Causes, Prevention and Emergency Response

Irshad Ul Haq[1], Sanaila Gull Sana[2*], Sadia Syed[3], Amna Zaffar[4], Samra Sabir[5] and Younas Khan[6]

[1]Punjab Emergency Service Rescue 1122, Dera Ghazi Khan, Pakistan
[2]Department of Forensic Medicine, Federal Medical College, Islamabad, Pakistan
[3]Department of Forensic Medicine, Shifa College of Medicine, Shifa Tameer e Millat University, Islamabad, Pakistan
[4]Department of Forensic Medicine, Akhtar Saeed Medical College, Rawalpindi, Pakistan
[5]Rawalpindi Medical University, Rawalpindi, Pakistan
[6]Department of Forensic Medicine, Zeb Medical and Dental College, Timergara, Pakistan

ARTICLE INFO

Keywords:
Road Traffic Accidents, Rescue 1122, Over-speeding, Public Health

How to Cite:
Haq, I. U., Sana, S. G., Syed, S., Zaffar, A., Sabir, S., & Khan, Y. (2026). From Crash to Care: An Interdisciplinary Analysis of Road Traffic Accidents in Pakistan; Unifying Forensic Medicine and Public Health for Causes, Prevention and Emergency Response: Road Traffic Accidents in Pakistan: A Forensic–Public Health Analysis. Pakistan Journal of Health Sciences, 7(5), 116-121. https://doi.org/10.54393/pjhs.v7i5.3671

***Corresponding Author:**
Sanaila Gull Sana
Department of Forensic Medicine, Federal Medical College, Islamabad, Pakistan
sanaila.gul.sana@gmail.com

Received Date: 1st December, 2025
1st Revision Received: 23rd February, 2026
2nd Revision Received: 6th March, 2026
3rd Revision Received: 24th March, 2026
Acceptance Date: 26th March, 2026
Published Date: 31st May, 2026

ABSTRACT

Road traffic accidents (RTAs) are an emerging public health concern in Pakistan and have become a major cause of death and disability worldwide. The escalation in traffic-related injuries and fatalities has been mostly caused by rapid urbanization, inadequate emergency services, bad infrastructure, and a lack of enforcement of traffic laws. **Objectives:** To determine the primary causes and contributing elements of traffic accidents in Pakistan. **Methods:** Secondary data from the District Emergency Service, Rescue 1122, for the years 2022–2023, were used in a descriptive retrospective study design. Data on 12,407 victims of 8,170 RTAs were analyzed. Major risk trends were identified using descriptive and inferential statistics. **Results:** Almost over 50% of crashes involved motorbikes, with the most impacted age group being those between the ages of 21 and 30. The most common cause of death and disability was head injuries. The most frequent causes were driving underage and speeding. During the study period, 177 fatalities were reported. **Conclusions:** The results highlight how important it is to improve emergency systems, enforce traffic laws, and raise public awareness in order to reduce RTAs.

INTRODUCTION

Even if science and technology are advancing day by day, public health and humanitarian issues are becoming more complicated. With advancements in every area, no person or society can totally prevent unanticipated crises. Any circumstance that is beyond human capacity to handle and requires coordinated, quick action to avoid deadly consequences is considered an emergency. Emergency management systems around the world are built on the capacity to successfully respond to such emergencies, whether they be mechanical, environmental, or medical [1].

DOI: https://doi.org/10.54393/pjhs.v7i5.3671

From an epidemiological standpoint, industrialization and population growth have resulted in an unparalleled increase in emergencies, especially RTAs. Rapid motorization, urbanization, and population growth have increased the exposure to traffic risks, but emergency management skills have not kept pace accordingly [2]. Despite accounting for less than half of all registered automobiles worldwide, the WHO reported that over 90% of RTAs worldwide occur in low- and middle-income nations [3]. Pakistan has an estimated 25.3 deaths per 100,000 people, which is still dangerously high by international standards, according to the WHO's 2009 study [4]. With increasing rates of traffic-related fatalities and injuries, the province of Punjab, and especially the Sahiwal Division, seriously takes these issues into account. People from low-income groups who rely on road transportation for their livelihoods and who are their families' only source of income suffer from life-altering and life-threatening conditions, including paralysis, fractures, or severe brain damage, which in turn force households into poverty traps, and there continues a never-ending vicious circle. Additionally, these injuries raise the socioeconomic load on communities and health systems as a whole, which results in long-term dependence on caretakers [5]. Pakistan, being one of the most populous countries in South Asia, nevertheless struggles with systemic inequality, resource shortages, violence, corruption, and illiteracy. Approximately 85 million men and 89 million women make up the nation's population of over 174 million, and more than 75% of them lack access to quality healthcare and education. [6]. The causes of traffic injuries and related problems are complicated and multifactorial, like rapid industrialization, urban overpopulation, terrorism, workplace dangers, unsuitable automobiles, inadequate law enforcement, and disregard for safety procedures [7, 8]. Due to traffic jams and overworked road systems, crash rates are typically greater in densely populated urban regions than in rural areas. According to a study by Dandona *et al.* in low-resource environments, underage, inexperienced, and unauthorized drivers considerably raise road traffic injuries [9]. Improved driver education, vehicle standards, and public awareness are essential components for lowering accident-related morbidity and mortality, according to the PLOS Medicine Editors [10]. Similar trends were found in Ghana by Keller *et al.* who emphasize three crucial aspects: behavioral irresponsibility, a lack of enforcement, and inadequate infrastructure. These all contribute to escalating cases of traffic injuries [11]. Furthermore, Ayuurebobi *et al.* demonstrated that the severity and results differ largely according to response systems, healthcare access, and road conditions [12]. According to Yousefifard *et al.* analysis of Iranian trends, the socioeconomic status always has a direct impact on the probability of death [13]. These results are relevant to Pakistan, where an enormous number of RTC victims have low-income families. Such socioeconomic differences influence the frequency and consequences of RTAs, according to a ten-year study conducted in Libya by Bodalal *et al.* [14]. The most common and avoidable causes of serious RTAs continue to be excessive speeding, careless driving, and negligence. Particularly in young individuals and daily wage earners, these activities lead to death or permanent impairments [15]. According to studies, accident rates can be significantly decreased by putting in place skill-based driver education, imposing severe penalties for violations, and performing routine vehicle fitness tests [16]. Risky driving practices are the primary cause of RTAs in low- and middle-income countries, according to Adams *et al.* and Hareru *et al.* [17, 18]. Moreover, the value of forensic medicine in this context cannot be overlooked, especially when it comes to identifying the exact cause of death, the kind of injuries, and contributing factors in traffic deaths; forensic specialists cannot be replaced. Their medico-legal investigations offer vital evidence for preventive policies, legal accountability, public health surveillance, and the formation of a proper service structure for catering to RTCs. Marri *et al.* analyzed 2,090 medico-legal autopsies in Karachi and discovered that 27.8% of cases were RTC victims, primarily males between the ages of 20 and 40, resulting in a male-to-female ratio of 7:1 [19]. In addition to improving the knowledge of patterns of fatal injuries, forensic documentation also greatly contributes to the modification of traffic safety regulations and driver education initiatives. Forensic medicine plays an important part in comprehending and handling traffic fatalities. To distinguish between main impact injuries and secondary traumas, such as ejection or post-impact falls, forensic specialists offer essential insights into the nature, mechanism, and causation of injuries [20]. Forensic specialists use post-mortem examinations to identify whether deaths were accidental, homicidal, or the result of negligence. This information is mandatory for both legal accountability and the development of road safety policies [21]. Integrating forensic data into traffic injury registries helps in terms of uncovering risk trends, enhancing legal enforcement, and informing public awareness efforts [22]. Thus, forensic medicine not only determines the cause of death but also acts as a cornerstone for justice, prevention, and systemic improvement in emergency and road safety management systems. Finally, research on traffic incidents in Sahiwal and throughout Pakistan shows that where forensic investigation and emergency preparedness need to work together, public education and awareness

DOI: https://doi.org/10.54393/pjhs.v7i5.3671

need to be done at an equal pace. To achieve a sustainable decrease in road traffic fatality, we need to bolster emergency response capabilities, uphold the law, encourage civic engagement, and incorporate forensic evidence into policies. Therefore, road safety is a multifaceted public health concern that requires cooperation from the government, the community, and individuals.

Road traffic accidents continue to be a major public health issue in Pakistan, but little research has been done to examine in detail the causes of the issue and the contribution of emergency response systems based on the local accident rates. This disparity restricts the formulation of effective measures to curb the number of traffic-related injuries and deaths. Thus, the study aims to examine the primary causes and risks of the RTAs in Pakistan and assess the role of the emergency response services in enhancing the survival rates and informing the evidence-based road safety measures.

METHODS

This study was a descriptive retrospective, conducted at the District Emergency Service, Rescue 1122, Sahiwal, Punjab, Pakistan. The study utilized one year of official emergency records covering the period from 2022 to 2023. Official approval for the study and access to the trauma register and emergency call records were granted by the District Emergency Officer, Rescue 1122, Sahiwal (ref. No.28/2022/REO (SWL-DIV)), along with the operational team. Ethical approval was obtained from the Ethical Review Board of Federal Medical College (Ref No. F.10/2025/Admin-FMC). Technical and ethical approval for the study protocol was provided to ensure compliance with ethical guidelines for the use of secondary data. The target population includes all victims of road traffic crashes reported in Sahiwal, Pakistan, during 2022-2023. These instances covered a broad spectrum of demographics, including age, gender, socioeconomic status, and place of residence (rural versus urban). The sample size included all instances (n=12,407) that were reported during the designated time frame. The practicality of examining all records and the comparatively manageable dataset size led to the adoption of this census-based method. A non-probability purposive sampling technique was adopted, as the study relied on existing official records from the emergency service database. The compiled data were presented through tables, charts, and graphs to visualize frequency distributions, relationships, and trends across variables. Data were cross-validated using the Trauma Registry Form from the District Headquarters Hospital, Sahiwal, to ensure accuracy between pre-hospital and hospital records.

Data were entered and analyzed using SPSS version 26.0. Descriptive statistics were applied to summarize frequency distributions, means, and percentages. Inclusion Criteria include: all victims of road traffic accidents recorded by Rescue 1122, both fatal and non-fatal injury cases, and cases involving motorbikes, cars, trucks, rickshaws, and other vehicles. Exclusion Criteria include: cases unrelated to road traffic incidents (e.g., burns, assaults, drowning) and incomplete or untraceable records with missing demographic or outcome data.

RESULTS

This study demonstrates various variables with respect to their data types and respective attributes with description, e.g., age groups, injury severity, gender, etc. (Table 1).

Table 1: Variables and Data Types

Types	Variables	Attributes / Description
Independent Variables	Driver's Age, Vehicle Type, and Cause of Accident	Age Groups (≤20, 21–30, 31–40, >40); Causes Include Over-Speeding, Negligence, and Mechanical Fault
Dependent Variables	Injury Severity, Mortality Rate	Minor, Moderate, Severe, Fatal
Confounding Variables	Response Time, Location, Time of Day	Continuous Data in Minutes/ Hours
Categorical Variables	Gender, Residence	Male/Female; Urban/Rural

The total number of Road Traffic crashes reported is 12407, amongst them, expiries are 177(1.43%), further broken up into 9757, 2650 males and females respectively (Table 2).

Table 2: Total number of RTCs with Victims Detail

Sr.#	Total No. of RTCs	Total No. of Victims	Male Victims	Female Victims	Expiries
1	8170	12407	9757	2650	177

If we further break up these road traffic crashes into annual, six-month, per month, per week, and per day, we have an average of 1992 emergencies annually, 996 emergencies biannually, 166 per month, 41 emergencies per week, and an average of 6 emergencies per day. If we look at the total experiences, we figure out that there are 44 experiences annually, and 3 per month. Out of the total 12407 victims, 9757 are males, and 2650 are female victims. If we further break it down, we find 3101 victims annually, 2439 of them are male, while 662 victims are female. Biannually, 1219 males and 331 victims are female. Monthly, 203 male and 55 female victims, while weekly, 50 male and 13 female victims, and daily, 7 male and 2 female victims suffer from road traffic accidents. As per the interpretation of the data which we have received about the vehicles involved so far is as follows (Figure 1).

DOI: https://doi.org/10.54393/pjhs.v7i5.3671

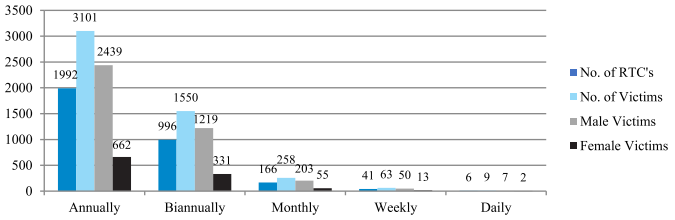

Figure 1: Bifurcation of Victims and Time Period

There is an alarming situation with respect to motorbike involvement (55.4%) and traumatic head injuries. Careless attitude and unskilled driving contribute up to 50.66% in overall cases. Fractures are the most common lower extremity injury and are diagnosed in 52% and 42% of riders with nonfatal and fatal injuries, respectively. Of the 12109 vehicles involved in road traffic accidents, 1080 are cars, accounting for 8.77% of the total. 489 of the totals are buses, which make 4.88% of total vehicles involved in the Sahiwal Division. 631 out of 12109 vehicles are trucks involved in RTAs, causing multiple injuries. Another major cause of road traffic crashes and traumatic head injuries is rickshaws and motorbike rickshaws. There are 1216 other vehicles, tractor trolleys, bull carts, donkey carts, bicycles, pedestrians, etc. This category-wise analysis helps to determine the most vulnerable age group with respect to mortality and morbidity on account of traumatic head injuries. The most vulnerable group is the third decade, 21-30 years of life, which has accounted for 4323 victims in this period, and the second most vulnerable age group is the second decade, from 11-20 years, which has accounted for 2646 victims. The third highest risk group is between 31 and 40 years, which accounts for 2283 victims during this study span. Amongst all the victims of road traffic crashes, the highest number is of victims of head injury, with the highest rate and ratio of death. The number reported so far is 1686. The next highest number is multiple injuries with multiple fractures in a single RTA, which is 1188. The lowest number is of the spinal injuries, which are 100, and the number of fractures of extremities, especially leg fractures, is 739. Minor injuries reported as 8694. In the number of incidents, any reason becomes the cause of so many fatal incidents, such as speeding, carelessness, wrong turns, and U-turns, etc (Table 3).

Table 3: Distribution of Vehicles Involved, Age Groups of Victims, Injuries Reported, and Causes of Road Traffic Crashes

Categories	Subcategory	No. of Accidents
Types of Vehicles	Bikes	6712
	Cars	1080
	Buses	489
	Trucks	631
	Vans	609
	Rickshaws	1372
	Others	1216
Age Group of the Victims	1Y-10Y	977
	11Y-20Y	2646
	21Y-30Y	4323
	31Y-40Y	2283
	41Y-50Y	1280
	51Y-60Y	593
	Above 60Y	305
Injuries Reported from Road Traffic Crashes	Spinal Injuries	100
	Head Injuries	1686
	Leg Fractures	739
	Multiple Fractures	1188
	Minor Injuries	8694
Causes of Road Traffic Crashes	Over Speeding	4578
	Carelessness	2583
	Wrong Turn	471
	U Turn	25
	Others	513

Among the causes of RTCs, the biggest reason is the speeding of vehicles (4578). It also indicates the lack of adherence to the traffic rules, as well as the poor monitoring of traffic black spots by the relevant department. During this span of study, it is determined that the death rate is on the higher side, that is, 65 per annum, only in road traffic crash emergencies, which was 35 at the start of this span of time, and reached the sad figure of 65. This clearly shows the proportion of deaths with an increasing number of risks and vulnerabilities on the roads (Figure 2).

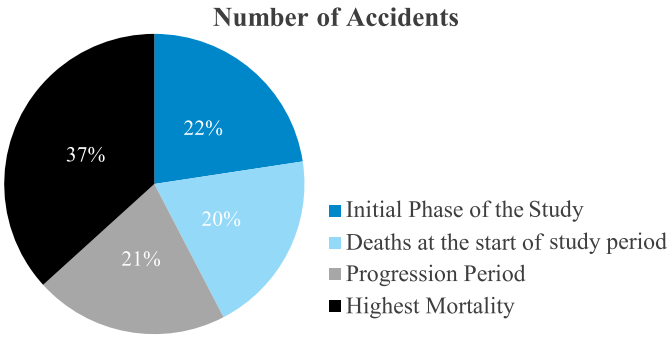

Figure 2: Pie Chart of the Proportion of Deaths

DISCUSSION

The present study focused on RTAs. The total number of crashes that took place is 8170, under which the victims are 12407, of whom 177 were mortalities. These affected 12407 people, out of which 9757 are males and 2650 are females, respectively. From a forensic medicine perspective, this distribution of injuries provides valuable insight into the mechanism, dynamics, and impact forces involved in road traffic collisions. Forensic experts play an essential role in differentiating between injuries caused by primary impact and secondary injuries resulting from falls, ejections, or subsequent hits. The predominance of head injuries and multiple fractures in this dataset is consistent with global

DOI: https://doi.org/10.54393/pjhs.v7i5.3671

forensic findings that identify the cranium and extremities as the most vulnerable anatomical regions in vehicular trauma [23]. Rapid deceleration and acceleration, coup and countercoup injuries, whiplash injuries, not wearing a helmet or seatbelt, and direct accidents with hard surfaces, dice injuries, and bird-foot injuries are common examples and can be confirmed during medico-legal autopsies and forensic biomechanical analysis [24]. The presence of many skeletal and spinal fractures is also consistent with forensic analysis that points to high-velocity collisions and inadequate vehicle restraint systems as the major causes of morbidity and mortality [25]. Despite being less common numerically, spinal trauma like railway-spine injury has serious medico-legal ramifications because it frequently results in permanent impairment. In addition to establishing the cause and manner of injury, forensic investigation of such cases helps determine driver accountability, usage of protective measures, and adherence to traffic safety regulations [26]. Injury patterns also assist investigators and forensic scientists in determining whether the injuries were self-inflicted, accidental, or homicidal in nature, a necessary distinction in medico-legal practice. While severe head and spinal injuries are symptomatic of high-velocity crashes and inadequate emergency care, the large number of minor injuries described in this study probably represents low-speed collisions and non-fatal impacts on people. Reconstructing the sequence of events, quantifying the kinetic energy transfer, and offering evidence-based suggestions for safety improvements are all made easier with the use of such forensic classifications [27].

This study includes victims who contacted rescue 1122 only, and the victims treated elsewhere are not reported here. Activating district-level road safety authorities, evolving driving schools to foster skill development, performing road safety audits of high or low-risk areas, and integrating road safety education into school curricula are some of the strategic ideas that can benefit the system as a whole.

CONCLUSIONS

This study emphasized how essential it is to raise public awareness, enhance road conditions, guarantee vehicle upkeep, and enforce strict traffic regulations. Additionally, forensic investigation helps discover patterns and avoidable causes of fatal injuries, which inform evidence-based safety actions. Ultimately, road safety is a communal obligation of the state, community, and individuals; that is why to lower risks, improve capacity, and save lives, a coordinated national response, incorporating medical, forensic, and preventive measures, is mandatory, since mortality from RTCs now surpasses that from major chronic diseases like HIV, TB, and cancer. With the help of this study, eventually we can be able to appreciate the presence of a life-saving emergency service that could respond in the golden time period to save precious lives, produce relief, and reduce grief.

Authors' Contribution

Conceptualization: SGS
Methodology: IUH, AZ
Formal analysis: AZ, SS, YK
Writing and Drafting: IUH, SGS, SS
Review and Editing: IUH, SGS, SS, AZ, SS, YK

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] George D, Haddow, Jane A, Bullock, Damon P, Coppola. Introduction to Emergency Management. Oxford; Butterworth-Heinemann; Seventh Edition. 2020. doi: 10.1016/C2018-0-00417-. 10.1016/B978-0-12-817139-4.00006-3.

[2] Ahmed SK, Mohammed MG, Abdulqadir SO, El - Kader RG, El - Shall NA, Chandran D *et al.* Road Traffic Accidental Injuries and Deaths: A Neglected Global Health Issue. Health Science Reports. 2023 May; 6(5): 1240. doi: 10.1002/hsr2.1240.

[3] World Health Organization. Global Status Report on Road Safety 2018. World Health Organization. 2019 Jan.

[4] World Health Organization. Global Status Report on Road Safety: Time for Action. World Health Organization. 2009 Jun.

[5] Casanova G, Martarelli R, Belletti F, Moreno-Castro C, Lamura G. The Impact of Long-Term Care Needs on the Socioeconomic Deprivation of Older People and Their Families: Results from Mixed-Methods Scoping Review. In Healthcare 2023 Sep; 11 (18): 2593. doi: 10.3390/healthcare11182593.

[6] Islamabad: National Institute of Population Studies 2013.

[7] Popa Ș, Ciongradi CI, Sârbu I, Bîcă O, Popa IP, Bulgaru-Iliescu D. Traffic Accidents in Children and Adolescents: A Complex Orthopedic and Medico-Legal Approach. Children. 2023 Aug; 10(9): 1446. doi: 10.3390/children10091446.

[8] Wang Y, Zhai H, Cao X, Geng X. Cause Analysis and Accident Classification of Road Traffic Accidents Based on Complex Networks. Applied Sciences. 2023 Dec; 13(23): 12963. doi: 10.3390/app132312963.

DOI: https://doi.org/10.54393/pjhs.v7i5.3671

[9] Dandona R, Kumar GA, Gururaj G, James S, Chakma JK, Thakur JS *et al.* Mortality Due To Road Injuries in the States of India: The Global Burden of Disease Study 1990–2017. The Lancet Public Health. 2020 Feb; 5(2): 86-98. doi: 10.1016/S2468-2667(19)30246-4.

[10] Barbour V, Clark J, Jones S, Peiperl L, Veitch E. Preventing Road Deaths: Time for Data. Plos Medicine. 2010 Mar; 7(3). doi: 10.1371/journal.pmed.1000257.

[11] Keller ME, Ledesma RD, Poó FM, Peden M. Newspaper Framing of Motor Vehicle Crashes and Road Safety in Argentina. International Journal of Injury Control and Safety Promotion. 2024 Jan; 31(1): 86-95. doi: 10.1080/17457300.2023.2266810.

[12] Ayuurebobi K, Masanja H, Kellerman R, Owusu-Agyei S. Risk Factors for Injury Mortality in Rural Tanzania: A Secondary Data Analysis. Biomedical Journal Open. 2012 Jan; 2(6): 1721. doi: 10.1136/bmjopen-2012-001721.

[13] Yousefifard M, Toloui A, Ahmadzadeh K, Gubari MI, Neishaboori AM, Amraei F *et al.* Risk Factors for Road Traffic Injury-Related Mortality in Iran: a Systematic Review and Meta-Analysis. Archives of Academic Emergency Medicine. 2021 Sep; 9(1): 61.

[14] Bodalal Z, Bendardaf R, Ambarek M. A Study of a Decade of Road Traffic Accidents in Benghazi-Libya: 2001 to 2010. PloS One. 2012 Jul; 7(7): 40454. doi: 10.1371/journal.pone.0040454.

[15] Elvik R, Høye A, Vaa T, Sørensen M. The Handbook of Road Safety Measures. Emerald Group Publishing Limited. 2009 Oct: 1-20. doi: 10.1108/9781848552517.

[16] Peden M. Global Collaboration on Road Traffic Injury Prevention. International Journal of Injury Control and Safety Promotion. 2005 Jun; 12(2): 85-91. doi: 10.1080/15660970500086130.

[17] Adams JS, Raju R, Solomon V, Samuel P, Dutta AK, Rose JS *et al.* Increasing Compliance with Protective Eyewear to Reduce Ocular Injuries in Stone-Quarry Workers in Tamil Nadu, India: A Pragmatic, Cluster Randomised Trial of a Single Education Session Versus an Enhanced Education Package Delivered Over Six Months. Injury. 2013 Jan; 44(1): 118-125. doi: 10.1016/j.injury.2011.10.001.

[18] Hareru HE, Negassa B, Kassa Abebe R, Ashenafi E, Zenebe GA *et al.* The Epidemiology of Road Traffic Accidents and Associated Factors Among Drivers in Dilla Town, Southern Ethiopia. Frontiers In Public Health. 2022 Nov; 10: 1007308. doi: 10.3389/fpubh.2022.1007308.

[19] Marri MZ, Qayyum SA, Iqbal S, Zainab S, Yousuf K. Study on Unnatural Death Pattern in Mardan, Pakistan. Journal of Muhammad Medical College. 2020; 11: 118-123. doi: 10.62118/jmmc.v11i2.171.

[20] Saukko P, Knight B. Knight's forensic pathology. CRC Press. 2015 Nov: 1-633 doi: 10.1201/b13266.

[21] DiMaio VJ, Molina DK. DiMaio's forensic pathology. CRC Press. 2021 Sep. 1-53. doi: 10.4324/9780429318764-1.

[22] Farhat HI, El-Faramawy AM, Ragheb AM. Forensic Assessment of Road Traffic Fatalities: Pattern and Implications. Egypt J Forensic Sci. 2016; 6(3): 276–283.

[23] Karakasi MV, Nikova AS, Valsamidou C, Pavlidis P, Birbilis TA. Anatomical Localization of Traumatic Brain Injury Cases in Eastern Macedonia and Thrace, Greece: a 10-Year Retrospective Observational Study. Korean Journal of Neurotrauma. 2020 Apr; 16(1): 38. doi: 10.13004/kjnt.2020.16.e6.

[24] Tabatabaei MS, Baigi V, Zafarghandi M, Rahimi-Movaghar V, Hasanloei MA, Piri SM *et al.* Epidemiology of injuries among patients admitted to Imam Khomeini Hospital, Urmia, affiliated with the national trauma registry of Iran. Frontiers in Emergency Medicine. 2024; 8(1): 5.

[25] Davceva N and Balažic J. Forensic Medical Analysis of Closed Head Acceleration–Deceleration Injuries: A Narrative Review. Legal Medicine. 2026 Jan: 102778. doi: 10.1016/j.legalmed.2026.102778.

[26] Gautam B. Review of Forensic Medicine and Toxicology: Including Clinical and Pathological Aspects. Jaypee Brothers Pvt. Limited. 2012.

[27] Sacco MA, Gualtieri S, Spiliopoulou C, Tarallo AP, Aquila I. The Contribution of Forensic Medical Investigations in Road Accident Deaths. Cureus. 2025 Mar; 17(3): 1-7. doi: 10.7759/cureus.81166.