

Death Due to Road Traffic Accidents: A Forensic Study in Bangladesh

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Abstract

Road traffic accidents (RTA) are a major cause of preventable death globally and a serious public health challenge in Bangladesh. Rapid urbanization, expanding motorization, inadequate infrastructure, and weak traffic law enforcement all contribute to increased fatalities. Forensic analysis identifies injury patterns and risk factors, providing guidance for effective prevention strategies. The objective of this study was to determine the demographic characteristics, circumstances, and injury patterns associated with deaths due to road traffic accidents. This retrospective cohort study was conducted at Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh, from January 2025 to December 2025. A total of 125 autopsy cases of RTA-related deaths were selected using purposive sampling. Data were collected from autopsy reports, inquest findings, and hospital records. Statistical analysis was performed using SPSS version 23.0. Among 125 cases, 92 (73.6%) were male, and 33 (26.4%) were female, with a male-to-female ratio of 2.8:1. The highest incidence (34.4%) occurred in the 21–40-year age group. Pedestrians constituted 48.0% of victims, followed by motorcyclists (28.8%). Heavy vehicles were implicated in 41.6% of cases. Head injury was the most common fatal injury (56.8%), followed by multiple injuries (24.0%). Most accidents (62.4%) occurred during evening and nighttime hours. Young adult males and pedestrians were disproportionately affected by fatal RTAs. Head injury was the leading cause of death. Strengthened traffic law enforcement, public awareness, and road safety interventions are urgently needed to reduce preventable mortality.

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Introduction

Road traffic accidents (RTAs) remain one of the foremost causes of preventable mortality and disability worldwide, posing a significant public health and socioeconomic challenge, particularly in low- and middle-income countries (LMICs).^{1,2} According to recent global estimates published by the World Health Organization, approximately 1.19 million people die annually due to road traffic injuries, with millions more sustaining non-fatal injuries that often result in long-term disability.¹ Notably, over 90% of these deaths occur in LMICs, where rapid urbanization, expanding motorization, and inadequate road safety systems exacerbate vulnerability.^{2,3} Bangladesh, one of the most densely populated countries in South Asia, has experienced rapid economic growth and urban expansion over the past decade. This development has been accompanied by a substantial increase in the number of registered motor vehicles, especially motorcycles and commercial transport vehicles.⁴ However, road infrastructure development, traffic management, and

enforcement of safety regulations have not progressed proportionately, contributing to a persistent rise in road traffic fatalities.⁵ Studies have consistently identified pedestrians, motorcyclists, and public transport users as the most vulnerable road users in Bangladesh.^{6,7} Demographically, young adult males constitute the majority of RTA victims,

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reflecting higher exposure to outdoor activities, occupational travel, and risk-taking behaviors.^{3,8} In many cases, poor compliance with helmet and seatbelt use, over-speeding, reckless driving, and inadequate driver training further compound the risk.⁹ Environmental factors such as poor road design, insufficient lighting, and mixed traffic patterns involving motorized and non-motorized vehicles also significantly contribute to accident occurrence.¹⁰ From a medico-legal perspective, forensic investigation of RTA-related deaths plays a pivotal role in determining the exact cause and mechanism of death. Autopsy findings provide objective documentation of injury patterns, including head injuries, thoracoabdominal trauma, spinal injuries, and multiple organ damage.¹¹ Head injury remains the leading cause of death in fatal RTAs globally, largely due to high-impact collisions and limited protective measures.^{2,12} Comprehensive forensic evaluation not only assists in legal adjudication but also generates epidemiological evidence necessary for targeted prevention strategies. Recent literature emphasizes the importance of hospital- and morgue-based studies in understanding local patterns of injury and mortality.^{7,11} Such retrospective analyses help identify high-risk groups, temporal trends, and vehicle categories most frequently involved in fatal incidents. Evidence from South Asian countries indicates that evening and nighttime periods are associated with increased accident severity, potentially due to reduced visibility, driver fatigue, and substance use.^{3,13} Despite the growing burden of RTAs in Bangladesh, there remains a relative paucity of updated, institution-based forensic research focusing specifically on fatal outcomes. Most available data derive from police records or national reports, which may underreport or misclassify cases.^{5,6} Autopsy-based studies provide more accurate and clinically

relevant information regarding injury distribution and immediate causes of death. Given the urgent need for evidence-based road safety interventions, a detailed forensic assessment of RTA-related deaths is essential. Understanding demographic characteristics, victim profiles, vehicle involvement, and patterns of fatal injuries can inform policymakers, public health authorities, and law enforcement agencies. Therefore, this study aims to analyze deaths due to road traffic accidents at Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh, to generate updated epidemiological and forensic insights that may contribute to improved preventive strategies and reduced mortality.

Methodology

This retrospective cohort study was conducted at Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh, from January 2025 to December 2025. The study population comprised all medico-legal autopsy cases of deaths resulting from road traffic accidents (RTAs) brought to the Department of Forensic Medicine during the study period. A total of 125 cases were included using purposive sampling based on the availability of complete medico-legal records.

Inclusion criteria: All confirmed cases of death due to road traffic accidents subjected to autopsy during the study period were included. Cases of both sexes and all age groups were considered. Only cases with complete autopsy findings, police inquest reports, and relevant hospital records were selected for analysis.

Exclusion criteria: Cases with decomposed bodies where the cause of death could not be determined conclusively were excluded. Deaths due to non-vehicular trauma, railway accidents, or suspected homicidal vehicular injuries were also excluded. Incomplete records or missing documentation led to

exclusion from the study.

Study procedure: Data were collected retrospectively from autopsy reports, inquest documents, and hospital case files using a structured data collection sheet. Variables recorded included age, sex, type of road user, vehicle involved, time of accident, nature of injuries, and cause of death. Confidentiality and anonymity were strictly maintained throughout the study.

Data analysis: Collected data were coded and entered into SPSS version 23.0 for statistical analysis. Descriptive statistics such as frequency, percentage, mean, and standard deviation were calculated. Results were presented in tables and charts where appropriate.

Result

A total of 125 fatal road traffic accident (RTA) cases were analyzed. The mean age of the victims was 34.8 ± 15.6 years (range: 4–78 years). The highest proportion of deaths occurred in the 21–40-year age group (34.4%), followed by 41–60 years (24.8%) and 11–20 years (20.8%). Children (≤ 10 years) constituted 8.0% of cases, while elderly individuals (>60 years) accounted for 12.0%. Age distribution showed a statistically significant variation in frequency across groups ($p = 0.032$) (Fig. I). Male victims predominated, comprising 73.6% ($n=92$) of cases, whereas females accounted for 26.4% ($n=33$), yielding a male-to-female ratio of 2.8:1. The association between sex and type of road user was statistically significant ($p = 0.021$), with males more frequently involved as motorcyclists and drivers (Fig. II). Regarding the victim profile, pedestrians represented the largest group (48.0%), followed by motorcyclists (28.8%), passengers (14.4%), and drivers (8.8%) (Fig. III). Heavy vehicles, including buses and trucks, were implicated in 41.6% of

Fatal incidents, while motorcycles accounted for 30.4% and private cars for 16.8%. Other vehicles (e.g., auto-rickshaws, vans) contributed 11.2% of cases. The distribution of vehicle type was statistically significant ($p = 0.015$) (Table I). Analysis of temporal patterns revealed that most fatal accidents occurred during evening and nighttime hours (62.4%), compared to daytime incidents (37.6%), which was statistically significant ($p = 0.008$) (Table II). Injury pattern analysis demonstrated that head injury was the leading cause of death (56.8%), followed by multiple injuries (24.0%), thoracoabdominal injuries (12.8%), and spinal injuries (6.4%). A significant association was observed between type of road user and pattern of fatal injury ($p = 0.027$), with pedestrians and motorcyclists more likely to sustain severe head trauma (Table III).

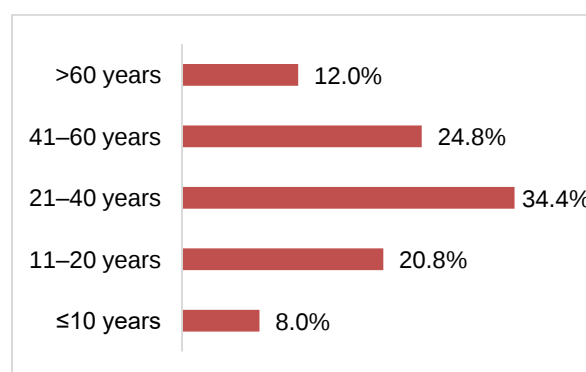


Figure I: Age distribution of the victims (N=125)

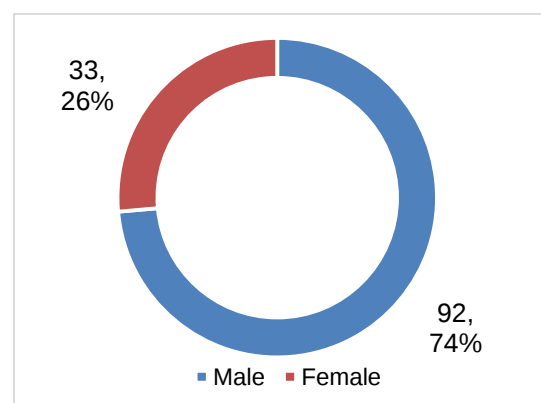


Figure II: Sex distribution of the victims

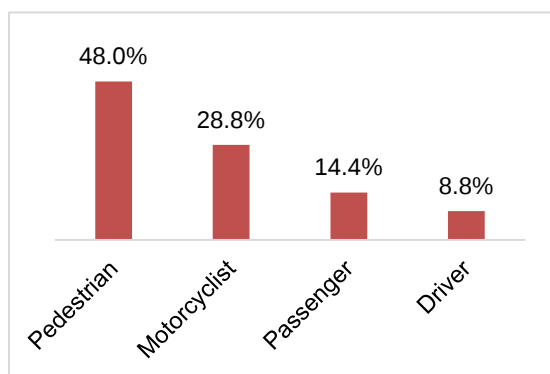


Figure III: Type of road user

Table I: Type of vehicle involved

Vehicle type	n	%
Heavy vehicle	52	41.6
Motorcycle	38	30.4
Private car	21	16.8
Others	14	11.2
Total	125	100.0

Chi-square test; $p = 0.015$

Table II: Time of accident

Time period	n	%
Daytime	47	37.6
Evening/Night	78	62.4
Total	125	100.0

Chi-square test; $p = 0.008$

Table III: Pattern of fatal injuries

Type of injury	n	%
Head injury	71	56.8
Multiple injuries	30	24.0
Thoracoabdominal injury	16	12.8
Spinal injury	8	6.4
Total	125	100.0

Chi-square test; $p = 0.027$

Discussion

The present study highlights the persistent burden of fatal road traffic accidents (RTAs) in Bangladesh, with young adults and males disproportionately affected. The predominance of victims in the 21–40-year age group (34.4%) is consistent with previous findings reported globally and in South Asia, where economically productive age groups are at greater risk due to occupational exposure, mobility demands, and risk-taking behaviors.^{14,15} This pattern reinforces earlier observations that road traffic mortality significantly affects the workforce, thereby contributing to profound socioeconomic consequences in low- and middle-income countries (LMICs).¹⁶ Male predominance (73.6%) observed in this study aligns with prior regional and international studies.^{17,18} Increased outdoor activity, occupational travel, and a greater likelihood of engaging in high-risk driving behaviors such as speeding and non-use of protective devices have been cited as contributing factors.¹⁹ Sociocultural norms in Bangladesh, where males are more frequently engaged in transport-related occupations, may further explain this disparity. Pedestrians constituted nearly half (48.0%) of all fatalities, making them the most vulnerable road users in this cohort. This finding is comparable to reports from other LMICs where inadequate pedestrian infrastructure, absence of designated crossings, and mixed traffic flow elevate pedestrian risk.^{20,21} Rapid urban expansion in Dhaka without proportionate improvements in road safety engineering likely exacerbates pedestrian vulnerability. Furthermore, limited enforcement of traffic regulations and poor driver compliance with speed restrictions contribute to severe pedestrian injuries. Heavy vehicles were implicated in 41.6% of fatal incidents, demonstrating a statistically significant

association with mortality distribution. Similar trends have been documented in South Asian metropolitan settings, where buses and trucks are frequently involved in high-impact collisions.²² The large mass and momentum of heavy vehicles increase the probability of fatal outcomes, particularly for pedestrians and motorcyclists. The rising involvement of motorcycles (30.4%) also reflects increasing motorization and affordability of two-wheelers in Bangladesh, paralleling trends noted in comparable economies.²³ Temporal analysis revealed that 62.4% of fatal accidents occurred during evening and nighttime hours, which is consistent with earlier studies indicating higher crash severity during low-visibility periods.^{18,24} Reduced lighting, driver fatigue, and increased likelihood of reckless driving during nighttime contribute to this pattern. Additionally, limited road surveillance and enforcement during these hours may further elevate risk. Head injury emerged as the leading cause of death (56.8%), followed by multiple injuries (24.0%). This finding corroborates global evidence identifying traumatic brain injury as the primary cause of mortality in fatal RTAs.²⁵ The high frequency of head injuries among pedestrians and motorcyclists in the present study underscores the critical importance of helmet use, speed control, and improved trauma care systems. Inadequate pre-hospital emergency response and delays in transportation to tertiary facilities may also influence mortality outcomes. The statistically significant associations observed between age group, vehicle type, time of accident, and injury pattern highlight the multifactorial nature of road traffic fatalities. These findings emphasize the need for integrated interventions encompassing stricter law enforcement, infrastructural modifications, public awareness campaigns, and improved emergency medical services. Overall, the present study

contributes updated forensic-based evidence from a tertiary care center in Bangladesh. Unlike police-based records, autopsy findings provide precise determination of injury patterns and causes of death, enhancing reliability. However, as a single-center retrospective study with purposive sampling, generalizability may be limited. Nevertheless, the results are consistent with regional and global trends and underscore the urgent necessity of comprehensive road safety policies to reduce preventable mortality in Bangladesh.

Limitations

This study was limited by its single-center, retrospective design and relatively small sample size. Purposive sampling may introduce selection bias, and findings may not be generalizable nationwide. Additionally, lack of detailed behavioral and pre-hospital data restricted comprehensive risk factor analysis.

Conclusion

Fatal road traffic accidents in this study predominantly affected young adult males and pedestrians, with head injury identified as the leading cause of death. Heavy vehicles and nighttime incidents significantly contributed to mortality. These findings emphasize the urgent need for strengthened traffic law enforcement, improved road infrastructure, promotion of helmet use, and enhanced emergency trauma care to reduce preventable deaths and improve road safety outcomes in Bangladesh.

Recommendation

Implementation of stricter traffic law enforcement, mandatory helmet and seatbelt compliance, improved pedestrian infrastructure, and enhanced road lighting is strongly recommended. Public awareness campaigns and strengthening pre-hospital emergency

services should be prioritized to reduce fatal road traffic injuries in Bangladesh.

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