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EPIDEMIOLOGICAL PATTERNS OF ROAD TRAFFIC ACCIDENT FATALITIES: AN AUTOPSY-BASED CROSS-SECTIONAL STUDY IN A REMOTE DISTRICT OF WEST BENGAL

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Abstract

Background: Road traffic accidents (RTAs) are a leading cause of preventable mortality worldwide, with rural regions of India disproportionately affected. Despite the rising incidence, limited data are available from remote districts of West Bengal.

Objectives: To assess the epidemiological patterns of RTA-related fatalities in a rural setting of West Bengal through autopsy-based analysis.

Materials and Methods: A hospital-based cross-sectional observational study was conducted at Murshidabad Medical College and Hospital over one year (January–December 2024). All medico-legal autopsy cases attributed to RTAs were included. Data were recorded in a structured proforma and analyzed by age, sex, occupation, socioeconomic background, time, place, and road-user profile.

Results: A total of 450 RTA fatalities were studied. Males predominated (79.3%), with the highest involvement in the 21–30 years age group (28.7%). Students (23.6%) and daily wage workers (23.1%) were most affected. Two-wheelers were the leading vehicles involved (53.1%). Accidents occurred most frequently during evening hours (41.3%) and in the winter months (37.6%). Motorcyclists (39.6%) and pedestrians (35.8%) were the most common victims. Rural roads accounted for 92.2% of accidents.

Conclusion: Young males, especially two-wheeler users and pedestrians, are the most vulnerable groups in rural West Bengal. Targeted interventions such as strict enforcement of helmet laws, pedestrian safety measures, and rural road infrastructure development are urgently warranted.

Keywords: Road traffic accidents, Autopsy, Epidemiology, West Bengal, Cross-sectional study

Introduction

Road traffic accidents (RTAs) represent a global public health challenge. The World Health Organization (WHO) estimates that approximately 1.3 million people die annually due to RTAs, with low- and middle-income countries disproportionately affected despite having fewer vehicles.[1] India alone contributes to nearly 11% of global RTA deaths, ranking among the highest worldwide.[2,3] West Bengal, one of India's most densely populated states, reports a substantial burden of RTAs each year.[4] However, the majority of studies focus on urban centres, while remote and rural districts remain

understudied. These areas face unique challenges such as poor road infrastructure, limited trauma care facilities, and lack of enforcement of traffic safety laws.[5,6]
Autopsy-based studies provide reliable data on RTA mortality patterns by eliminating reporting bias and documenting medico-legal evidence.[7] Hence, this study was undertaken to analyze the epidemiological characteristics of RTA fatalities in a largely rural setting of West Bengal.

Materials and Methods

Study design and setting

This was a hospital-based cross-sectional observational study conducted in the Department of Forensic Medicine & Toxicology, Murshidabad Medical College and Hospital, West Bengal, over a period of one year (January–December 2024).

Study population

All medico-legal autopsy cases where death resulted from RTAs were included. Cases with uncertain cause of death or incomplete records were excluded. The study had clearance from Institutional Ethics and Research Committee.

Data collection

Data were collected using a structured proforma covering:

- Person profile: age, sex, occupation, socioeconomic status
- Time profile: time of day, day of week, season
- Place profile: type of road, category of road user, vehicle involved

Sample size

A total of 450 consecutive RTA fatalities were analyzed.

Statistical analysis

Data were coded, entered in Microsoft Excel, and analyzed using descriptive statistics (percentages, ratios, proportions).

Results

1. Person Profile

- Out of 450 victims, 357 (79.3%) were males and 93 (20.7%) females (M:F ratio ≈ 3.8:1).
- The 21–30 years group accounted for the largest proportion (28.7%), followed by 31–40 years (21.1%).
- Students (23.6%) and daily wage workers (23.1%) were the most affected occupational groups.
- BPL category victims formed 63.8% of cases.
- Two-wheelers (53.1%) were the most commonly involved vehicles, followed by LMVs (28.4%). A detailed explanation is provided in Table 1.

Table 1: Person Profile of RTA Victims (N = 450)

Variable	Category
Age (years)	<10 = 15 (3.3%), 10–20 = 68 (15.1%), 21–30 = 129 (28.7%), 31–40 = 95 (21.1%), 41–50 = 64 (14.2%), 51–60 = 46 (10.2%), >60 = 33 (7.3%)
Sex	Male = 357 (79.3%), Female = 93 (20.7%)
Occupation	Student = 106 (23.6%), Daily wage worker = 104 (23.1%), Govt/Private employees = 98 (21.8%), Farmers = 61 (13.6%), Homemakers = 51 (11.3%), Others = 30 (6.6%)
Socioeconomic status	BPL = 287 (63.8%), APL = 163 (36.2%)
Vehicle involved	Two-wheeler = 239 (53.1%), LMV = 128 (28.4%), HMV = 51 (11.3%), Bicycle = 32 (7.2%)

2. Time Profile

- Maximum accidents occurred during evening hours (6:00 pm–11:59 pm, 41.3%), followed by morning hours (6:00 am–11:59 am, 29.3%).
- Sundays (17.3%) recorded the highest frequency of accidents.
- Winter (Nov–Feb) showed peak incidence (37.6%).

A detailed observation is provided in Table 2.

Table 2: Time Profile of RTA Occurrence

Variable	Category
Day of week	Mon = 69 (15.3%), Tue = 56 (12.4%), Wed = 62 (13.8%), Thu = 64 (14.2%), Fri = 56 (12.4%), Sat = 65 (14.4%), Sun = 78 (17.3%)
Time of day	6am–12pm = 132 (29.3%), 12pm–6pm = 102 (22.7%), 6pm–12am = 186 (41.3%), 12am–6am = 30 (6.7%)
Season	Winter (Nov–Feb) = 169 (37.6%), Summer (Mar–Jun) = 150 (33.3%), Monsoon (Jul–Aug) = 54 (12.0%), Autumn (Sep–Oct) = 77 (17.1%)

3. Place Profile

- Rural roads (92.2%) were far more common than highways/urban roads (7.8%).
- Motorcyclists (39.6%) and pedestrians (35.8%) were most frequently affected.
- Public transport passengers comprised 7.6% of cases.

The details are shown in Table 3.

Table 3: Place Profile of RTA Victims (N = 450)

Road User Type	n (%)
Pedestrian	161 (35.8%)
Motorcyclist	178 (39.6%)
Pedal cyclist	25 (5.6%)
Passenger (LMV/HMV)	51 (11.4%)
Public transport passenger	35 (7.6%)

Discussion

This autopsy-based cross-sectional study highlights the epidemiological burden of RTAs in rural West Bengal. Consistent with national and international studies, we found a male predominance, particularly among **young adults (21–30 years)**, who are most exposed to outdoor travel, employment stress, and risk-taking behaviors.[8-13] Students and daily wage workers were disproportionately represented, reflecting the socioeconomic vulnerability of rural populations. Two-wheelers were the most common vehicles implicated, aligning with studies from India and Southeast Asia.[14-16] Helmet non-compliance and poor road safety measures contribute significantly to such fatalities.[17] Evening hours and weekends showed higher accident frequencies, possibly linked to reduced visibility, fatigue, and increased social travel.[18-19] Seasonal variation with winter peaks has been attributed to poor visibility, fog, and festive mobility patterns.[20-21] Pedestrians and motorcyclists together accounted for **>75%** of deaths, underlining their extreme vulnerability in rural traffic environments.[22-23]

Limitations

The major limitation is that being a single-center study, findings may not be generalizable to the entire state. Additionally, lack of data on alcohol/drug influence, helmet/seatbelt use, and speed limited risk factor analysis. As only fatal autopsy cases were included, non-fatal RTA burden could not be

assessed. Despite these limitations, the study provides valuable baseline data for rural road safety interventions in West Bengal.

Conclusion

RTA fatalities in rural West Bengal predominantly affect young males, students, daily wage earners, pedestrians, and motorcyclists. Most accidents occur on rural roads, in evening hours, and during winter months. Strengthening enforcement of helmet and traffic laws, improving pedestrian facilities, and upgrading rural road infrastructure are essential to reduce preventable deaths.

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