

Road Traffic Injuries and Contributing Factors Among Emergency Patients at a Tertiary Hospital in Eastern Nepal

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Abstract: Road traffic injuries (RTIs) remain a serious public health concern in Nepal, contributing to both high morbidity and mortality. Despite increasing urbanisation and motorisation, road safety remains a critical yet often overlooked issue. This cross-sectional study, conducted at BPKIHS in 2019, aimed to assess the prevalence and severity of RTIs and identify associated risk factors. Among 298 patients, 37% had sustained RTIs; moderate to severe injuries were observed in 82.1% of male patients, in contrast to 59.4% among female patients. Data were collected using a structured questionnaire, covering demographic characteristics, history of RTIs, severity of injuries, and adherence to traffic regulations. Statistical analyses were performed to determine key associations between RTI occurrence and variables such as age, mode of transport, and safety measures. The study highlights the alarming burden of RTIs and the urgent need for evidence-based interventions, including stricter enforcement of traffic laws, improved road infrastructure, and comprehensive public awareness campaigns to promote safer transportation practices and reduce the incidence of RTIs in Nepal.

Keywords: Road traffic injuries, Nepal, emergency medicine, helmet use, alcohol and driving

1. Background

Road traffic accidents (RTAs) are a leading cause of global morbidity and mortality, resulting in approximately 1.19 million deaths and 20 to 50 million injuries annually. [1] Despite their significant impact, RTAs often receive less media attention compared to other major public health issues. According to the World Health Organisation (WHO), road traffic deaths were projected to increase by 80% by 2020. RTAs have been ranked as the ninth leading cause of disability-adjusted life years (DALYs) lost, with a projected rise to the third place by 2020. [2]

RTAs are defined as collisions involving at least one vehicle in motion on a public or private road, resulting in injury or death. The global impact on DALYs is substantial, with a predicted 67% increase in global death rates from RTAs by 2020, driven by rapid population growth, industrialisation, and an increase in road vehicles. The WHO further projected that road traffic injuries would become the seventh leading cause of death by 2030.

A study conducted at a teaching hospital's emergency department revealed that RTAs accounted for 6.66% of all emergency cases, with pedestrians being the most common victims (56.54%) and motorcycles the most frequently involved vehicles (55.09%). Additionally, 44.65% of accidents occurred in the evening (12-6 pm), with the majority occurring between April and June. [3]

Statement of the Problem and Rationale

The global burden of road traffic injuries continues to rise, particularly in low- and middle-income countries, while high-income countries have seen a decline since the 1970s. Deaths related to RTAs are expected to increase by 83% in low- and middle-income countries, while high-income countries are projected to see a 27% decrease. [2] At present, 90% of road traffic injuries and deaths occur in low- and middle-income countries, which house 81% of the world's population. [4]

In Nepal, the burden of RTAs and injuries remains significant, with motorcycle crashes being the predominant mechanism, accounting for nearly half of all road traffic injuries, followed by car, truck, bus, and pedestrian/bicycle incidents. [5]

This burden is especially pronounced in remote and hilly regions, where fatality rates are higher, often due to bus crashes and poor road infrastructure. [6]

RTAs are the leading cause of injury in the community, yet there is a lack of literature on the incidence and factors contributing to RTAs in eastern Nepal. This study attempts to address this gap by identifying the key factors associated with road traffic injuries in the region. This study aims to identify the prevalence, severity, and key demographic and behavioural risk factors associated with road traffic injuries among patients visiting the emergency room at BPKIHS. The study's findings offer vital evidence for policymakers and

healthcare professionals to develop targeted interventions that address behavioural risk factors and improve road safety strategies in Nepal.

2. Methods

This was a cross-sectional study conducted among patients visiting the Emergency Ward of BPKIHS. A total of 298 patients were enrolled in the study, which took place in 2019. Data were collected using a proforma questionnaire, which included demographic, health, and injury-related questions. Data collection was done once the patients had received the necessary treatment and were either discharged or transferred from the Emergency Ward.

The study was approved by the Institutional Ethical Committee of BPKIHS (IRC/0940). The sample size was calculated based on injury data from a previous study by Ghimire et al. (2009). Using an allowable error of 10%, the sample size was determined to be 298 participants.

All patients who visited the Emergency Ward of BPKIHS following a road traffic accident and met the study's inclusion criteria were approached. Written informed consent was obtained from all participants willing to participate in the study. Data analysis was performed using SPSS version 13.5, with descriptive statistics (frequency, percentage, mean) and inferential statistics (chi-square test) used for data interpretation.

3. Result

The study included 298 patients, with a mean age of 43.9 years (± 18.3). The majority of participants were male (62.1%) and married (74.5%), with a slight majority residing in urban areas (53.7%). Among the 110 injured patients, 42.7% were motorbike riders, with most injuries occurring during the afternoon and evening hours. Severity ranged from minor (23.6%) to moderate (57.3%) and severe injuries (18.2%). Alcohol consumption was significantly associated with moderate/severe injuries ($p = 0.007$), and males had a higher incidence of moderate/severe injuries compared to females ($p = 0.012$).

While 80.4% of patients with motorised transport held a driving license, only 29.5% wore helmets correctly. Other factors, such as age, occupation, and smoking, did not show significant associations with injury severity. Mental health issues were rare (4.5%), and comorbidities were present in 23.6% of injured individuals, with hypertension being the most common.

Table 1: Distribution of background characteristics of the patients (n = 298)

Characteristics		Number	Percent
Age group	15 - <25 years	48	16.1
	25 - <40 years	93	31.2
	40 - <60 years	92	30.9
	60 years and above	65	21.8
Mean $\pm$ SD (min, max) years		43.9 $\pm$ 18.3 (15, 90)	
Sex	female	113	37.9
	male	185	62.1
Marital status	Divorced/ separated	1	0.3
	Married	222	74.5
	Single/ unmarried	64	21.5
	Widowed	11	3.7
Occupation	Farmer	82	27.5
	Homemaker	86	28.9
	Office Jobs	101	33.9
	Student	29	9.7
Education	Illiterate/Informal	90	30.2
	Elementary	82	27.5
	Secondary	91	30.5
	Bachelor	34	11.4
	Master and above	1	0.3
Residence	Rural	138	46.3
	Urban	160	53.7

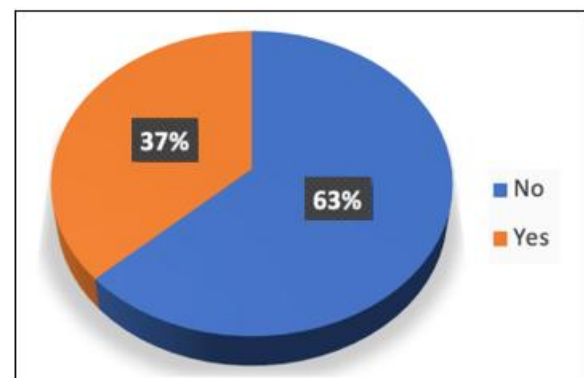


Figure 1: Proportion of Road Traffic Injuries among a sample of patients visiting the ER of BPKIHS (n=298)

Table 2: Distribution of behavioural and other characteristics among the injured (n = 110)

Characteristics		Number	Percent
Current Smoking	No	57	51.8
	Yes	53	48.2
Current Alcohol	No	61	55.5
	Yes	49	44.5
Financial Problem in the Preceding Year	No	74	67.3
	Yes	36	32.7
Psychiatric/ psychological problem	No	105	95.5
	Yes	5	4.5
Family conflict in the previous month	No	103	93.6
	Yes	7	6.4
Comorbidities	No	84	76.4
	Yes	26	23.6
Type of comorbidities* (n = 26)	Hypertension	17	65.4
	Diabetes	10	38.5
	Thyroid problems	5	19.2
	others	5	19.2

*multiple responses

Table 3: Distribution of injury characteristics among the injured (n= 110)

Characteristics		Number	Percent
Mode of transport	pedestrian	14	12.7
	bicycle	9	8.2
	auto rickshaw/ rickshaw	9	8.2
	scooter	20	18.2
	motorbike	47	42.7
	cat/taxi	6	5.5
	bus/ambulance	5	4.5
Timing of injury	Morning	34	30.9
	Afternoon	33	30
	Evening	31	28.2
	Night	12	10.9
Severity of injury	no apparent injury	1	0.9
	minor or superficial, requiring first aid	26	23.6
	moderate, requiring outpatient treatment	63	57.3
	severe, requiring inpatient treatment	20	18.2
Have a driving licence (n=87)	Yes	70	80.4
	No	17	19.6
Wore helmet correctly (n= 67)	Yes	20	29.5
	No	47	71.5

Table 4: Association of severity of injury with patients' characteristics (n=110)

Characteristics	Categories	Injury		Total	p-value
		No apparent / Minor Injury	Moderate/ Severe Injury		
Age group	15 - <25 years	3 (15.8%)	16 (84.2%)	19 (100%)	0.456
	25 - <40 years	11 (25%)	33 (75%)	44 (100%)	
	40 - <60 years	11 (33.3%)	22 (66.7%)	33 (100%)	
	60 years and above	2 (14.3%)	12 (85.7%)	14 (100%)	
Sex	female	13 (40.6%)	19 (59.4%)	32 (100%)	0.012*
	male	14 (17.9%)	64 (82.1%)	78 (100%)	
Marital status	Divorced/ separated	1 (100%)	0 (0%)	1 (100%)	0.252
	Married	20 (24.4%)	62 (75.6%)	82 (100%)	
	Single/ unmarried	5 (20%)	20 (80%)	25 (100%)	
	Widowed	1 (50%)	1 (50%)	2 (100%)	
Occupation	Farmer	4 (30.8%)	9 (69.2%)	13 (100%)	0.199
	Homemaker	9 (39.1%)	14 (60.9%)	23 (100%)	
	Office Jobs	11 (17.7%)	51 (82.3%)	62 (100%)	
	Student	3 (25%)	9 (75%)	12 (100%)	
Education	Illiterate/Informal	7 (29.2%)	17 (70.8%)	24 (100%)	0.048*
	Elementary	2 (7.7%)	24 (92.3%)	26 (100%)	
	Secondary	10 (25%)	30 (75%)	40 (100%)	
	Bachelor	7 (36.8%)	12 (63.2%)	19 (100%)	
	Master and above	1 (100%)	0 (0%)	1 (100%)	
Residence	Rural	10 (27.8%)	26 (72.2%)	36 (100%)	0.583
	Urban	17 (23%)	57 (77%)	74 (100%)	
Current smoker	No	16 (28.1%)	41 (71.9%)	57 (100%)	0.373
	Yes	11 (20.8%)	42 (79.2%)	53 (100%)	
Alcohol consumption	No	21 (34.4%)	40 (65.5%)	61 (100%)	0.007*
	Yes	6 (12.2%)	43 (87.8%)	49 (100%)	
Financial hardships	No	21 (28.4%)	53 (71.6%)	74 (100%)	0.18
	Yes	6 (16.7%)	30 (83.3%)	36 (100%)	
Mental health issues	No	25 (23.8%)	80 (76.2%)	105 (100%)	0.595
	Yes	2 (40%)	3 (60%)	5 (100%)	
Conflicts in Family	No	26 (25.2%)	77 (74.8%)	103 (100%)	0.514
	Yes	1 (14.3%)	6 (85.7%)	7 (100%)	
Pre-existing health problems	No	21 (25%)	63 (75%)	84 (100%)	0.842
	Yes	6 (23.1%)	20 (76.9%)	26 (100%)	
Mode of transportation	Pedestrian	4 (28.6%)	10 (71.4%)	14 (100%)	0.586
	Bicycle	2 (22.2%)	7 (77.8%)	9 (100%)	
	Auto Rickshaw/rickshaw	1 (11.1%)	8 (88.9%)	9 (100%)	
	Scooter	8 (40%)	12 (60%)	20 (100%)	
	Motorbike	9 (19.1%)	38 (80.9%)	47 (100%)	
	Car/taxi	2 (33.3%)	4 (66.7%)	6 (100%)	
Time of injury	Bus/ambulance	1 (20%)	4 (80%)	5 (100%)	0.945
	Morning	8 (23.5%)	26 (76.5%)	34 (100%)	

	Afternoon	9 (27.3%)	24 (72.7%)	33 (100%)	
	Evening	8 (25.8%)	23 (74.2%)	31 (100%)	
	Night	2 (16.7%)	10 (83.3%)	12 (100%)	
Have a driving licence (n=87)	Yes	11 (15.7%)	59 (84.3%)	70 (100%)	0.001*
	No	10 (58.9%)	7 (41.1%)	17 (100%)	
Wore helmet correctly (n=)	Yes	10 (50.0%)	10 (50.0%)	20 (100%)	0.002*
	No	7 (14.9%)	40 (85.1%)	47 (100%)	

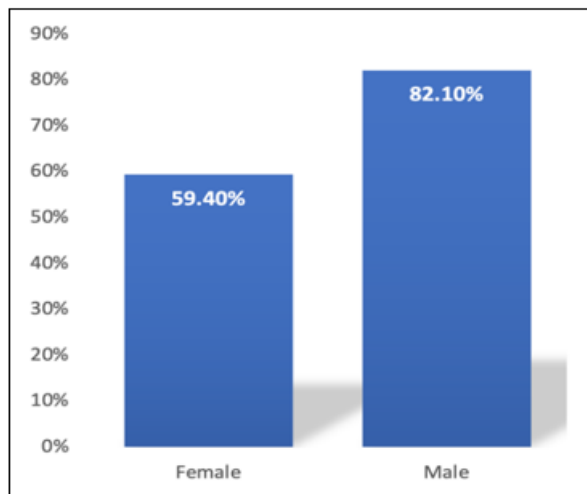


Figure 2: Comparison of the proportion of moderate/severe injury by sex

4. Discussion

Conducted in 2019, this study examined road traffic injuries (RTIs) among patients at the emergency ward of BPKIHS. Of the 298 patients included, 37% reported injuries from road traffic incidents, and a notable 82.1% of male patients sustained moderate or severe injuries, compared to 59.4% of female patients.

The most prominent observation was the high rate of moderate to severe injuries, particularly among males. This aligns with studies from other countries, which report a higher incidence of severe RTIs among males, potentially due to higher exposure to risk factors, such as increased involvement in road traffic activities and riskier behaviours (e.g., speeding, alcohol consumption). [7] Our study found a similar trend, suggesting that males are not only more exposed to road traffic accidents but also face a greater risk of sustaining severe injuries.

Our analysis also revealed a significant relationship between educational level and injury severity ($p=0.048$). Lower educational attainment—such as illiteracy or informal schooling—has been identified as a major risk factor for increased road traffic accidents, higher injury severity, and mortality, with persistent and in some cases widening disparities documented in multiple settings. [8] This may be linked to a lack of awareness regarding road safety, as individuals with higher education levels might have better access to road safety information.

Interestingly, our study did not find a significant association between rural or urban residence and the severity of injuries ($p=0.583$), contrary to previous studies that suggest rural areas may have worse outcomes due to factors like poor road conditions and lower traffic enforcement. [9] According to

spatial analyses, urban centres such as Kathmandu, Lalitpur, and Bhaktapur are high-risk zones, but remote and rural districts experience higher fatality rates. [10]

According to a prospective descriptive study, pedestrians were the most vulnerable group sustaining injuries. [11] However, we noted that a significant portion of the injured patients were motorbike users (42.7%), followed by pedestrians (12.7%). Motorcycles are the most commonly involved vehicles in road traffic injuries in many countries, including Nepal. [12]

Moreover, the relationship between injury severity and certain behavioural factors was evident. For example, alcohol consumption was significantly associated with a higher rate of severe injuries, with 87.8% of alcohol-consuming individuals experiencing moderate or severe injuries. This finding resonates with global literature, which consistently links alcohol consumption with a higher risk of traffic accidents and more severe injuries. [13] Similarly, the data showed that a higher proportion of individuals without a valid driving license (41.1%) experienced severe injuries, further emphasising the importance of road safety education and enforcement.

Correct helmet use was identified as a key protective factor against injury severity ($p=0.002$). Among motorbike users, those who wore helmets correctly had a much lower incidence of severe injuries, supporting the well-established role of helmets in reducing head injuries and preventing fatalities in road traffic accidents. [14]

In terms of comorbidities, while there was no significant association between pre-existing health conditions and injury severity, it is worth noting that individuals with comorbidities, such as hypertension and diabetes, were more likely to experience complications after an injury. This has been further suggested by multiple studies claiming pre-existing comorbidities are associated with worse health outcomes, and higher healthcare utilisation and costs. [15]

5. Study Limitations

This study is limited by its cross-sectional design, which restricts the ability to establish causal relationships between risk factors and the severity of road traffic injuries. Data were collected using self-reported questionnaires, which may be subject to recall bias or inaccuracies in reporting. Additionally, the study was conducted at a single tertiary care centre, which may limit the generalizability of the findings to other regions or healthcare settings in Nepal. Finally, while the study focused on a broad range of demographic and behavioural factors, other potential confounders, such as environmental factors or road conditions, were not assessed.

6. Recommendations

To reduce the severity of road traffic injuries, public awareness campaigns targeting alcohol consumption and driving should be prioritised, especially among young adults and male drivers.

Road safety education should be implemented in schools and communities, particularly focusing on proper helmet usage and obtaining valid driving licenses. Stricter enforcement of helmet laws and traffic regulations is essential to reduce injury severity. Additionally, improving emergency response systems and healthcare access, particularly in rural areas, can mitigate injury outcomes. Finally, further research across multiple centres is needed to validate these findings and explore additional contributing factors, such as road conditions.

7. Conclusion

This study highlights the significant burden of road traffic injuries (RTIs) among patients visiting the emergency ward at BPKIHS. Our findings emphasise the role of gender, education, alcohol consumption, helmet use, and driving licensure in determining the severity of injuries sustained. Males, individuals with lower education levels, alcohol users, and those not wearing helmets correctly were found to be at higher risk of severe injuries. These results underscore the importance of understanding the demographic and behavioural factors associated with RTAs in Nepal. These insights should inform public health planning, resource allocation, and future research on injury prevention in Nepal's evolving transport landscape.

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