

Road traffic accident cases at Bhutan's national referral hospital: A 13-Year retrospective study (2011–2023)

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ABSTRACT

Introduction: Road traffic accidents (RTAs) are among the leading causes of mortality worldwide, and Bhutan is no exception. This study is the first of its kind to analyse the RTA records maintained in the Department of Forensic Medicine and Toxicology (DFMT) of Jigme Dorji Wangchuck National Referral Hospital (JDWNRH). The objectives were to review RTA records and generate actionable insights before digitally archiving key data points and securely disposing of hard-copy records. **Methods:** This retrospective descriptive study reviewed RTA records maintained in the DFMT of JDWNRH. All RTAs recorded from January 2011 to December 2023 were included. Paper-based information was digitized using Google Form and then analysed using SPSS Version 31. **Results:** There were 3847 RTAs with 41 (1.1%) fatalities recorded during the study period. Young adults (20–29 years) accounted for the highest proportion of cases (37.7%). Individuals of Sharchop ethnicity (31.5%) and motor vehicle drivers comprised the largest group of road users (34.0%), followed by pedestrians (24.3%). The number of RTAs was higher during summer, on Sundays, within City Core area, between 15:00 and 18:00 hours. Off-road vehicular accidents (28%) were the most common type of RTA and the majority had injuries of extremities (92.4%). **Conclusion:** The study underscores the need for structured, comprehensive, and digitally integrated medico-legal documentation, particularly within the existing ePIS framework. Observed temporal fluctuations, seasonal variability, and episodic surges in RTA indicate the need for transition from reactive case documentation to proactive, data-driven road safety planning.

Keywords: *Electronic Health Records; Forensic Medicine; Traffic Accidents, Wounds and Injuries*

INTRODUCTION

Globally, road traffic accidents (RTAs) are among the top twelve causes of death and in Bhutan they rank sixteenth^{1–3}. While the increasing number of RTA-related injuries in Bhutan is concerning, data available across institutions remain fragmented^{3–12}. A reliable RTA surveillance system requires structured, timely, and accurate data, typically collected from hospital records, police reports, and forensic documentation¹³. Healthcare institutions are pivotal in producing primary data that underpin injury epidemiology and prevention planning^{14, 15}. Hospital-based RTA studies from Thailand, Sri Lanka and India have revealed key insights into risk factors, injury mechanisms, and vulnerable groups, demonstrating that even in resource-constrained settings, structured hospital documentation can effectively guide road safety policies, urban planning, and emergency response systems^{16–18}. The World Health Organization highlights that electronic health record systems enhance continuity of care, facilitate epidemiological

monitoring, reduce administrative workload, and strengthen national data infrastructures¹⁹. Digitizing forensic documentation promotes standardization, legal robustness, data security and analytical capacity for injury mapping and judicial reporting^{20,21}. However, successful digital transformation requires technological advancement and substantial organizational and behavioural change^{22–24}.

Data on RTA in Bhutan are largely reliant on police records^{6–12} and records maintained in the Department of Forensic Medicine and Toxicology (DFMT) of Jigme Dorji Wangchuck National Referral Hospital (JDWNRH) have not previously been reviewed²⁵. There is a potential gap in identification of patterns in RTA frequency, injury types, vehicle characteristics, and accident locations. Additionally, the growing volume of stored documents presents logistical and ethical challenges related to space constraints and data disposal protocols. Meanwhile, the introduction of the electronic patient information system (ePIS) in 2024 marked a significant shift towards the possibility of a more comprehensive and coordinated data management framework.

This study aims to retrospectively review RTA records

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from 2011 to 2023 to identify associated factors, injury patterns, documentation practices, and systemic gaps, thereby facilitating digital archiving of key data elements and supporting secure disposal of hard-copy records.

METHODS

Study Design and Setting

This was a retrospective descriptive record review conducted at the DFMT of JDWNRH, the apex tertiary referral hospital in Bhutan. JDWNRH provides specialized medical and medico-legal services and receives referrals from across the country. DFMT is responsible for clinical assessment and medico-legal documentation of cases referred from within JDWNRH, other health centres and law enforcement agencies. These include RTAs and other medico-legal conditions.

Study population

The study population consisted of RTA cases documented at DFMT between 2011 and 2023. Medico-legal documentation was done by DFMT personnel including a Forensic Medicine Specialist, trained Health Assistants and Nurses, after clinical examination of walk-in clients or patients referred from the Emergency Department and inpatient departments. Some cases involved postmortem examinations conducted at the site of RTA. Information was recorded on standardized forms that captured demographic characteristics, circumstances of the incident, and clinical findings related to injuries. These records were maintained as paper-based files organized chronologically within the department.

Sampling method

A census approach was adopted whereby all documented RTA cases during the study period were included. Records with incomplete or illegible information were retained where sufficient data were available for analysis, and missing variables were recorded as unavailable.

Study variables

The study variables were categorized into demographic characteristics and accident-related variables.

Demographic characteristics included age, gender, occupation, nationality and ethnicity of RTA victims. The accident-related variables included road user status (driver, passenger, or pedestrian), time and location of accident, type of offending vehicle, type of collision, nature and distribution of injuries. Potential risk factors documented in the standardized form were also included.

Data management and analysis

Relevant information was extracted from the paper-based forms using a structured data extraction format developed in Google Forms. Data extraction was performed by the primary investigator and DFMT staff. All entries were cross-checked against the original records to minimize transcription errors. The extracted data were subsequently reviewed to ensure completeness and accuracy. Details about occupation and place of injury were entered as free-text which required thorough data-cleaning and re-coding.

Data were analysed using SPSS Version 31 (IBM Corp., Armonk, NY, USA), and tables and figures were generated using Microsoft Excel. Given the small number of fatalities, RTA outcomes were classified as negligible to minor injuries or serious injuries, including fatalities.

The association between demographic characteristics of RTA victims and injury outcome was assessed using the chi-square test and p value <0.05 was considered significant. Cases with missing outcome data were excluded from chi-square tests.

The distribution of RTA cases was examined by district, neighbourhoods within Thimphu district and location type. A descriptive location-frequency analysis was conducted using boundary demarcation defined in the Thimphu Structure Plan 2023 (26).

Additionally, temporal patterns (yearly, monthly and hourly distribution), types of collision, distribution of injuries and potential contributing factors documented in the RTA records were analysed descriptively.

Using the recorded dates of occurrence, the day of the week was derived for each case. To explore temporal variation, cases were categorized by day of the occurrence (Sunday to Saturday) and by season, with months grouped into four seasons. The association between seasonal variation and day of occurrence was assessed using the chi-square test.

Ethical Considerations

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki (2013). Ethical clearance (Ref. No. REBH/Approval/2020/034) was obtained from the Research Ethics Board of Health, Ministry of Health. Personal identifiers were removed from the dataset.

RESULTS

Characteristics of the RTA victims

A total of 3847 RTA cases were recorded. Of these 425 (11%) had sustained serious injuries, including fatalities, 81.1% (3120) had negligible to minor injuries. Information was missing for 302

(7.9%) cases.

Background characteristics of RTA victims along with RTA outcomes are illustrated in Table 1. Age, ethnicity and road-user status had a significant association with RTA outcome.

Temporal distribution of RTAs seen at the DFMT

The number of RTAs varied across the study period, with fluctuations observed annually. Average yearly caseload was around 296 based on all 3847 records. This corresponds to approximately 25 RTAs per month and 6 per week. Monthly distribution demonstrated variation in case frequency, with certain months showing relatively higher number, as illustrated in Figure 1.

Analysis of weekly trends indicated that RTA occurrence varied by day of the week. This pattern differed significantly across seasons ($p < 0.001$) with Sundays recording highest number of cases (637) and summer accounting for the greatest

seasonal burden (1022).

Figure 2 illustrates the hourly distribution of RTAs recorded between 2011 and 2023. It is evident that most RTAs occurred between 15:00 and 18:00 hours.

Site of RTA seen in the DFMT

Almost 90% of RTAs recorded at DFMT occurred in Thimphu. Among cases occurring outside Thimphu, the highest numbers were recorded in Paro and Wangduephodrang. There were cases reported from all other districts except Gasa, Lhuentse, Pemagatshel and Samdrup Jongkhar.

Among the cases with available neighbourhood information within Thimphu, the maximum number of RTAs occurred in the City Core (538, 16.0%), followed by Babesa (317, 9.4%) and the Changzamtok area (256, 7.6%). When classified by location type, almost 90% of them had occurred on highways (1839, 47.8%) and streets (1545, 40.2%).

Table 1: Characteristics of RTA victims seen in the Department of Forensic Medicine and Toxicology, JDWNRH from 2011 to 2023.

Characteristics	Total n (%),	RTA Outcome			p value
		Negligible to minor injuries, n (%)	Serious injuries, including fatalities, n (%)	Missing, n (%)	
Age (years)	0-9	338 (8.8)	279 (82.5)	42 (12.4)	<0.001
	10-19	415 (10.8)	350 (84.3)	36 (8.7)	
	20-29	1450 (37.7)	1198 (82.6)	115 (7.9)	
	30-39	884 (22.9)	715 (80.9)	107 (12.1)	
	40-49	393 (10.2)	301 (76.6)	61 (15.5)	
	50-59	199 (5.2)	154 (77.4)	31 (15.6)	
	60 and above	168 (4.4)	123 (73.2)	33 (19.6)	
Gender	Male	2542 (66.1)	2052 (80.7)	293 (11.5)	0.41
	Female	1305 (33.9)	1068 (81.8)	132 (10.1)	
Nationality	Bhutanese	3734 (97.1)	3026 (81.0)	413 (11.1)	0.148
	Non-Bhutanese	81 (2.1)	71 (87.6)	5 (6.2)	
	Missing	32 (0.80)		5 (6.2)	
Ethnicity	Sharchop	1177 (31.5)	985 (83.7)	119 (10.1)	0.034
	Ngalop	1118 (29.9)	926 (82.8)	113 (10.1)	
	Lhotshampa	678 (18.2)	548 (80.8)	75 (11.1)	
	Khengpa	212 (5.7)	177 (83.5)	21 (9.9)	
	Mixed	26 (0.7)	15 (57.7)	5 (19.2)	
	Missing	523 (14.0)		6 (23.1)	

Occupation	Business/corporate or private employee/ farmers	1419 (36.9)	1142 (80.5)	161 (11.3)	116 (8.2)	0.104
	Dependent/ housewife/ student/ trainee/unemployed	1279 (33.3)	1041 (81.4)	136 (10.6)	102 (8.0)	
	Government employee (including armed forces personnel)	443 (11.5)	367 (82.8)	37 (8.4)	39 (8.8)	
	Driver	269 (7.0)	233 (86.6)	22 (8.2)	14 (5.2)	
	Monk/nun/ Gomchen	70 (1.8)	52 (74.3)	13 (18.6)	5 (7.1)	
	Missing	367 (9.5)				
	Driver of motor vehicle	1309 (34.0)	1096 (83.7)	115 (8.8)	98 (7.5)	
Road-user status	Front seat passenger	674 (17.5)	550 (81.6)	65 (9.6)	59 (8.8)	<0.001
	Rear-seat passenger	527 (13.7)	440 (83.5)	44 (8.3)	43 (8.2)	
	Passenger of heavy vehicle	86 (2.2)	69 (80.2)	13 (15.1)	4 (4.7)	
	Pedestrian	935 (24.3)	744 (79.6)	131 (14.0)	60 (6.4)	
	Motor cyclist	175 (4.5)	119 (68.0)	35 (20.0)	21 (12.0)	
	Bi-cyclist	66 (1.7)	47 (71.2)	7 (10.6)	12 (18.2)	
	Pillion Rider	50 (1.3)	40 (80.0)	7 (14.0)	3 (6.0)	
	Missing	25 (0.6)				

Note: Percentages for individual ethnic groups are based on the total number of Bhutanese cases (n=3734)

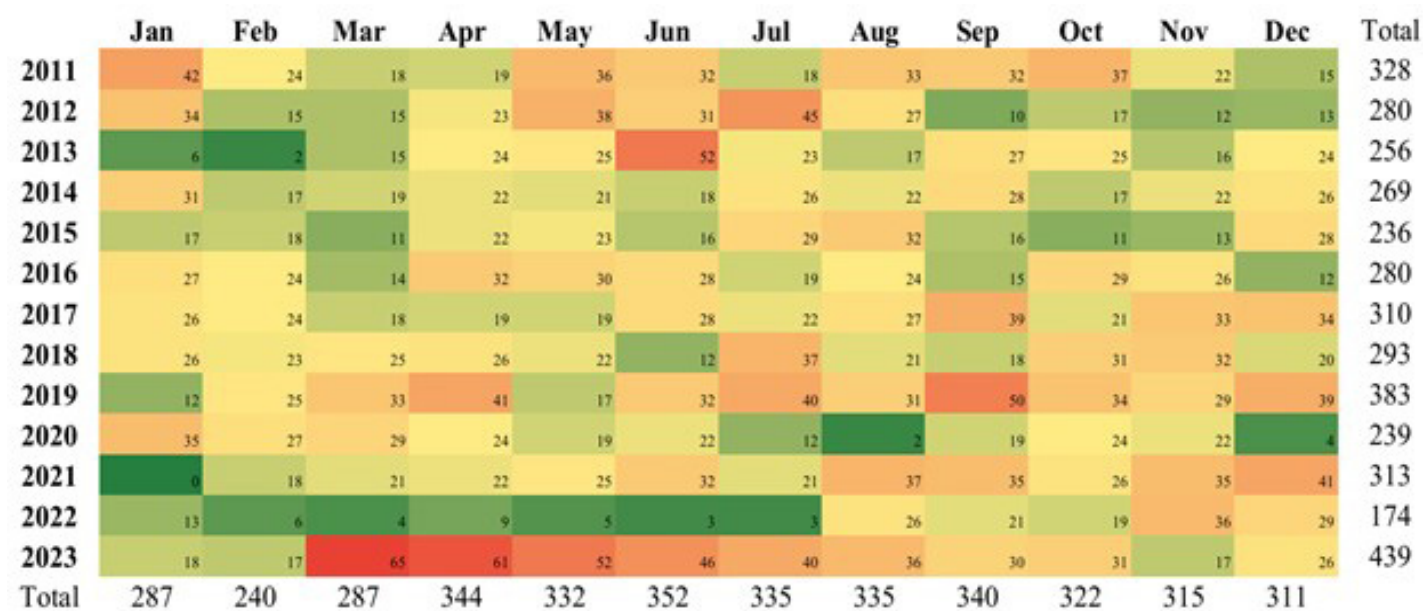


Figure 1: Monthly RTA cases seen at Department of Forensic Medicine and Toxicology from 2011 to 2023.

Note: This three-coloured heatmap shows the monthly distribution of RTA cases seen at DFMT, JDWNRH from 2011–2023. Of the 3847 RTA cases, 3800 had complete date information and were included in the temporal analysis.

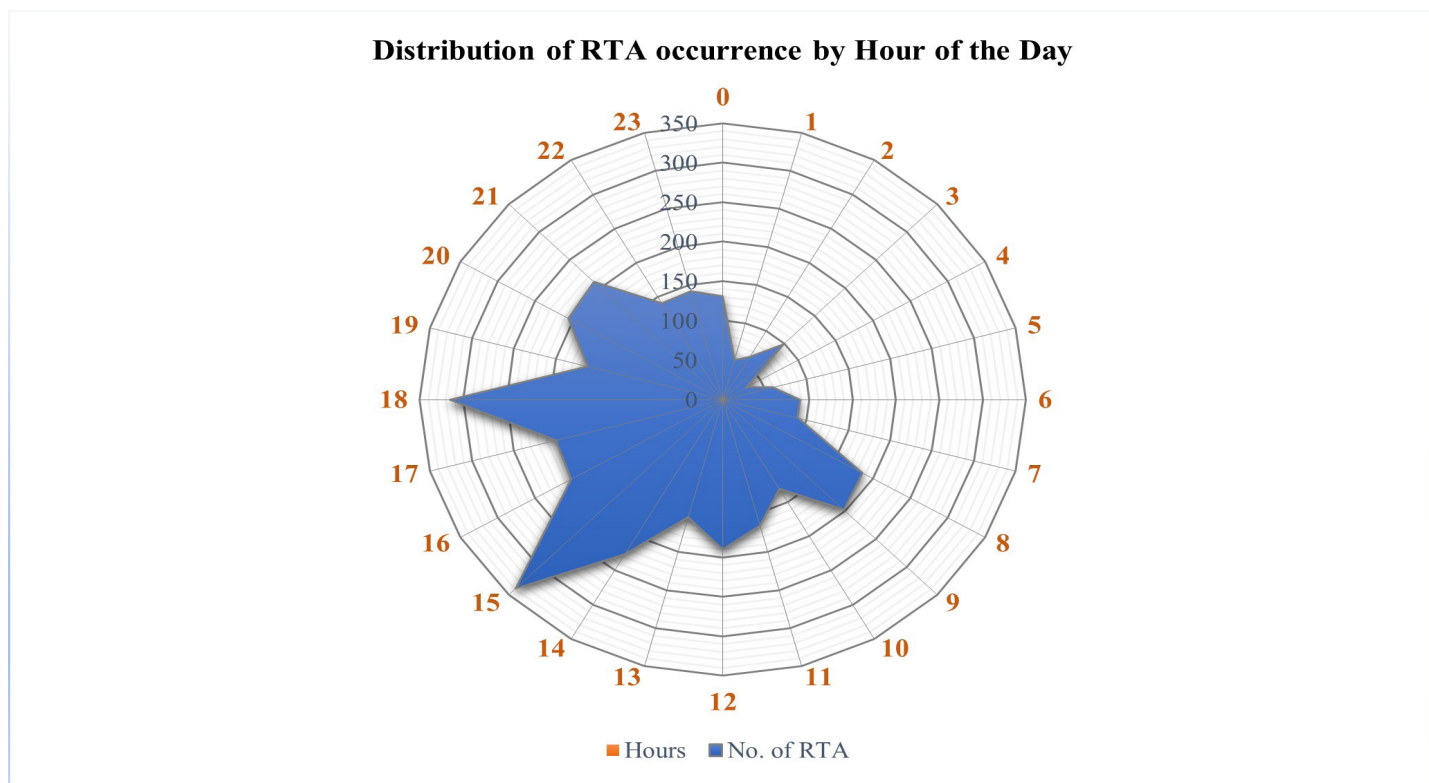


Figure 2: Total number of RTAs by hour of day, 2011 to 2023.

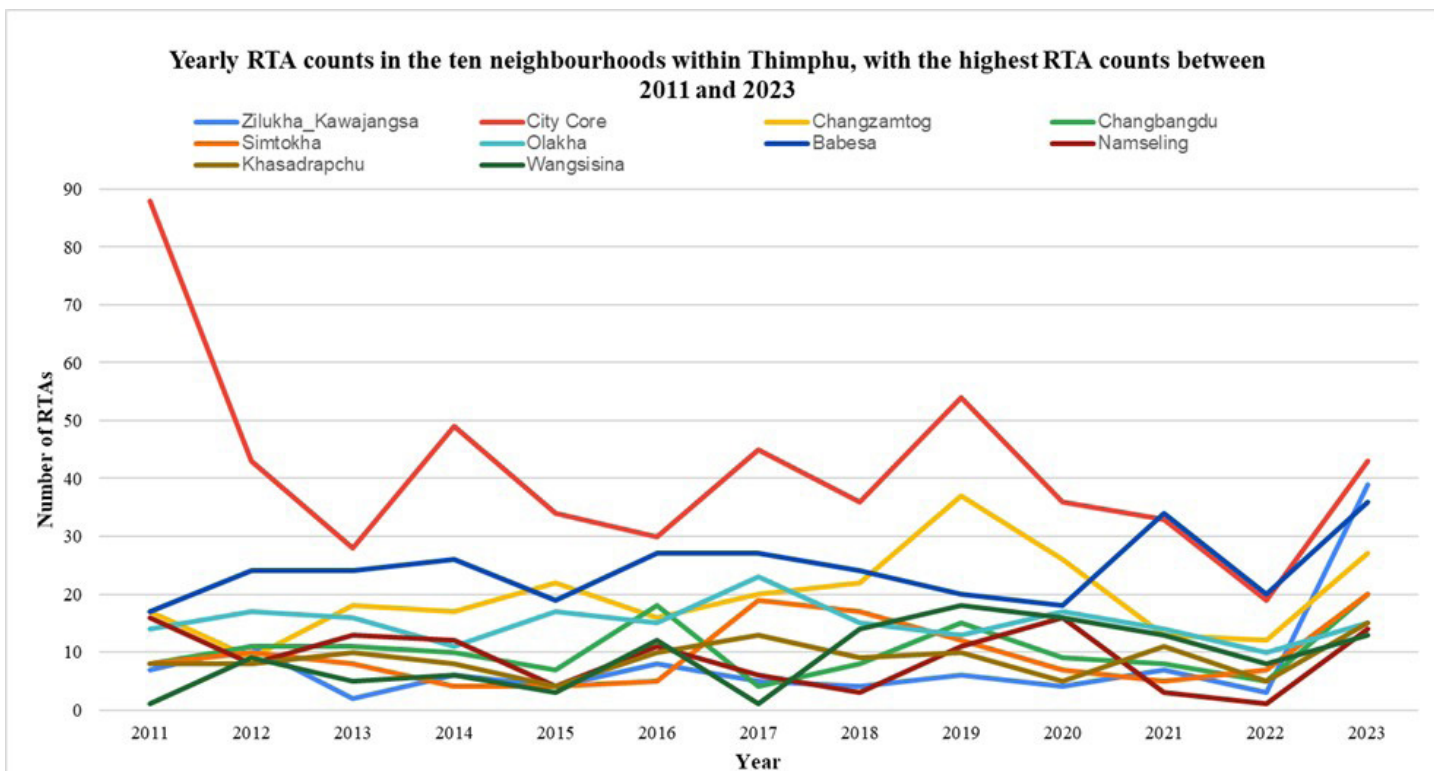


Figure 3: Yearly RTA counts in the ten neighbourhoods within Thimphu, with the highest RTA counts between 2011 and 2023

The annual distribution of RTAs across the ten most common locations is illustrated in Figure 3. The City Core area was the single largest contributor to RTAs across 2011-2023. A drop in RTAs was observed across most neighbourhoods in 2020 and 2022, followed by a sharp rise.

Table 2: Types of vehicles used by the RTA victims seen at DFMT between 2011 and 2023

Vehicle used by RTA victim, n=2866	n (%)
Car	1873 (65.35)
Motorcycle	225 (7.85)
Bolero/Jeep	187 (6.52)
Truck	172 (6.00)
Van	110 (3.84)
Hilux	100 (3.49)
Bicycle/Cycle	66 (2.30)
Landcruiser	55 (1.92)
Bus	41 (1.43)
Tractor	23 (0.80)
Excavator	9 (0.31)
Tanker	4 (0.14)
Power tiller	1 (0.03)

Note: Percentages are based on the 2866 cases with available information on vehicle used.

Types of vehicles involved in RTA

As indicated in Table 2, cars were the most common type of vehicle used by RTA victims. Cars were also the most common offending vehicles (Table 3).

Types of Collision

As depicted in Table 4, off-road vehicular accidents were the most common (28.0%) type of RTA, followed by pedestrians being hit by the front of the vehicle (16.7%). Other notable collisions included head-on collisions (11.7%) and vehicles being struck with objects (10.3%).

Anatomical distribution of injuries following RTA

Among the 2793 cases with documented injuries, 92.4% (2581) had injuries of extremities, followed by head and neck injuries (56.9%). Lower limb injuries (48.9%) were slightly more frequent than upper limb injuries (43.5%). Injuries affecting chest (7.8%), back (4.4%), pelvis (3.2%), and abdomen (1.0%) were relatively uncommon. Since individuals could sustain injuries involving multiple body regions, injury-site percentages were not

Table 3: Offending agents involved in the RTA seen at DFMT between 2011 and 2023

Offending agents, n=2407	n (%)
Car	1294 (53.76)
Truck	195 (8.10)
Hilux	143 (5.94)
Side railings	121 (5.03)
Jeep/ Bolero	106 (4.40)
Van	97 (4.03)
Landcruiser	93 (3.86)
Culverts	85 (3.53)
Lamp/telephones post	69 (2.87)
Bike	58 (2.41)
Bus	47 (1.95)
Animals like dogs and cows	26 (1.08)
Scooter	23 (0.96)
human	17 (0.71)
Tree	15 (0.62)
Bi-cycle	7 (0.29)
Buildings	6 (0.25)
Tanker	4 (0.17)
Excavator	1 (0.04)

Note: Percentages are based on the 2407 cases with available information on the offending agent.

mutually exclusive.

In terms of medical intervention, 58.1% (2234) of the cases were managed conservatively, 7.5% (290) required major procedures, 24.2% (930) underwent minor procedures and information was missing for 10.2% (393) of the cases.

Documented Contributing Factors

Over-speeding (18.1%) and alcohol use (17.0%) were the most frequently reported risk factors. Other notable factors included mechanical failure (8.3%), unsafe overtaking or yielding (7.6%), driving without a license (5.6%) and drowsiness (5.3%). Drug use documentation was rare (0.6%).

DISCUSSION

Interpretation of findings and comparison with existing literature

A total of 3847 RTAs were documented in DFMT during the

Table 4: Mechanism of collisions documented for RTAs seen in DFMT from 2011 to 2023

Type of Collision or Crash		n (%)
Vehicle-vehicle collision	Head-on collision	449 (11.7)
	Head-side collision	295 (7.7)
	Head-rear collision	243 (6.3)
	Rear-side collision	4 (0.1)
	Side-side collision	73 (1.9)
Vehicle-Pedestrian collision	Hit by the front of vehicle	642 (16.7)
	Hit by side of vehicle	198 (5.1)
	Hit by rear of vehicle	68 (1.8)
	Off-road vehicular accident	1077 (28.0)
Other types of crashes	Vehicle struck an object	396 (10.3)
	Overtaken on road	157 (4.1)
	Fall from moving vehicle	21 (0.5)
	Objects fell/thrown on Vehicle	19 (0.5)
	Vehicle collided with animal	10 (0.3)
	Other types	12 (0.3)
Missing		183 (4.8)

years 2011 to 2023. There were 41 deaths.

When compared with the police records available from 2017 onwards, RTA fatality rate derived from DFMT for the same period (2017-2023) was 10 times lower than national level estimates (27). Similarly, the fatality rate observed in DFMT records was substantially lower than estimates in police records for Thimphu district. These differences likely reflect variations in case capture and reporting mechanisms. Moreover, minor or non-fatal RTAs may not present for medico-legal evaluation. This highlights the importance of integrating multiple data sources to better understand the true burden of RTA. In addition to hospital and police records, insurance claims data may serve as a valuable complementary source, particularly for capturing less severe incidents. A triangulated approach incorporating hospital, police and insurance data may provide more comprehensive and accurate representation of RTA burden. Additionally, establishing a non-punitive, digital reporting system for minor RTAs may enhance surveillance, reduce under-reporting, and facilitate data-driven road safety policy.

In line with the global trend, young adults were disproportionately affected in the present study (1). Studies from several South and Southeast Asian countries have also identified young adults as the most affected population (28-30). However, unlike these reports, which found males to be at higher risk, the current study did not demonstrate a male predominance. Although young adults accounted for the highest number of RTAs, older

adults aged 60 years and above showed proportionally greater vulnerability to severe outcomes.

Sharchop individuals accounted for the largest number of recorded cases. However, because population and road-use exposure denominators were unavailable, these findings should not be interpreted as ethnicity-specific risk. The Mixed ethnicity group had a higher proportion of severe injuries including fatalities; this observation should be interpreted cautiously due to the small number of cases.

The majority of RTAs involved motor-vehicle drivers and pedestrians, highlighting the dual need for pedestrian protection and improved driver safety. The identification of pedestrians as vulnerable road users (VRU) was consistent with several other studies that also identified older adults as VRU (16, 28, 31).

In this study, motorcycles were used in 7.85% (225) of RTA cases. However, they had the highest proportion of severe injuries including fatalities and were more frequently involved in vehicle-vehicle collisions, especially with cars. In fact, cars emerged as a major contributor to RTA, both as offending vehicles and as the vehicle in which the RTA victims were travelling/driving. Similarly, a study done in a metropolitan city in India identified light motor vehicles as the second most frequently involved vehicle in accidents after two-wheelers (17). In a Sri Lankan study, two-wheelers were the most frequently involved vehicle (28). The second highest RTA contributor in Sri Lanka was three-wheelers. These differences likely reflect variations in vehicle ownership patterns and transport systems between countries.

The predominance of off-road vehicular accidents and pedestrian-related collisions suggests that loss of vehicle control and pedestrians' vulnerability are major contributors to RTA. These patterns may reflect factors such as road conditions, driver behaviour, and limited pedestrian safety infrastructure. The prominence of over-speeding and alcohol use further highlights the role of behavioural risk factors and underscores the need for strengthened enforcement and targeted interventions. Although potholes, poor visibility, medical or physiological conditions were noted as risk factors in the remarks section in a few cases, these variables were not included in the data collection form. Therefore, systemic identification of obstacles, road defects and poor street lighting, as examined by Hadaye et al., was not possible (17). Additionally, the absence of precise geocoding data precluded spatial hotspot analysis, limiting the ability to examine the influence of infrastructure and environment on RTA occurrence. Geospatial information has been shown to provide important insights into RTA determinants; for instance, Hosseinur et al. demonstrated that horizontal curvature, terrain type, heavy-vehicle traffic, and access points were positively associated with head-on collisions, whereas posted speed limits and shoulder

width were associated with lower crash frequency (32). For the current study, the availability of geocoded data could have enabled more detailed evaluation of contextual risk factors such as road width, street lighting, traffic junctions and presence of pedestrian pathways.

Between 2011 and 2019, the annual number of RTAs varied from a low of 236 to high of 383 (Figure 1). A notable decline was observed between 2020 and 2022, coinciding with mobility restrictions during the COVID-19 pandemic, consistent with the global trend (1). While no clear linear trend was observed over time, the monthly distribution of RTAs showed relatively lower counts during the colder months (December to March), suggesting seasonal variation.

Further analysis demonstrated that the temporal distribution of RTA varied significantly by day of the week across seasons, indicating that accident patterns are influenced by both seasonal factors and day-specific variations. Higher frequency of cases during weekends and certain seasons may reflect differences in travel behaviour, traffic exposure, and recreational mobility. This highlights the importance of considering both seasonal and weekly temporal patterns in understanding RTA occurrence.

Hourly distribution of RTA cases illustrated in Figure 2 indicated that most of the RTAs occurred between 15:00 and 18:00 hours, corresponding to the period when schools and workplaces generally close. To mitigate such situations, Staton et al. found that multifaceted interventions combining legislation, enforcement, and education were most effective in reducing road traffic injuries in low and middle-income countries (33).

Ninety percent of RTAs recorded at DFMT had occurred within Thimphu district and less than 5% were from other districts, indicating that accidents in other districts are mostly managed and recorded by local healthcare centres. This emphasizes the continued need for capacity building for healthcare workers in settings without Forensic Medicine Specialists.

The notably high number of cases observed in City Core in 2011 (Figure 3) was verified against the original records and may reflect year-specific variations in traffic volume and urban activity. The consistently higher burden of RTA in City Core likely reflects higher traffic density, pedestrian activity and urban congestion compared to other neighbourhoods. However, the number of RTAs in City Core had decreased substantially from 88 RTAs in 2011 to 43 in 2023. This reduction may reflect changes in traffic volume, road infrastructure, enforcement, mobility patterns or other factors.

Challenges encountered

Digitizing the paper-based information was challenging due to issues like illegibility and incomplete forms. Such gaps reduce medico-legal and public health utility and mirror challenges

reported in other paper-based systems (15). Also, the data collection format was based on an RTA form developed in 2010. The form underwent several amendments over the years and the introduction of ePIS substantially changed the way the data were extracted. Additionally, the fatal cases and postmortem examination reports (PMR) were not filed in RTA files. Fatal cases were identified through review of the PMR files.

Strengths and Limitations

DFMT is the principal centre of forensic medicine services in Bhutan with three Forensic Medicine specialists. The department has one of the most comprehensive medico-legal documentation processes in the country and the current study is the first to examine RTA records from DFMT. Therefore, the findings from the study could be used as a baseline to build a robust medico-legal documentation framework in ePIS. Effective digitization could improve completeness, timeliness, and analytical capacity.

While the methodology allowed for a comprehensive understanding of the existing documentation landscape, a few limitations are acknowledged. The manual nature of data extraction may have introduced transcription errors despite rigorous checks. Inconsistent data fields across years reduced the scope for certain longitudinal comparisons. Some data fields were difficult to interpret because of illegible handwriting or non-standard medical terminology. Nevertheless, these limitations further justify the need for digitization and reinforce the rationale for the recommendations arising from this study.

Future direction

This retrospective analysis of 13 years of RTA data highlights the strategic importance of aligning historical medico-legal records with the hospital's recent transition to ePIS. Integrating improved forensic RTA data into ePIS would enable longitudinal analysis. This could be done by standardizing diagnosis coding, including appropriate ICD-11 diagnostic coding for RTA, creating built-in validation rules, drop-down menus, and standardized medical terminologies to reduce missing data, illegibility and inconsistencies observed in paper-based records. A well-designed ePIS framework would enable real-time reporting, and improved interoperability between clinical, forensic, and administrative systems. ePIS could be used to establish a unified forensic data pathway that improves case traceability, strengthens injury mortality surveillance and legal processes, and supports injury burden estimation.

The incorporation of geocoding into RTA documentation would further enhance the analytical value of these records by allowing precise spatial mapping of accident locations, identification of high-risk corridors and hotspots, and correlation with road infrastructure and traffic patterns. Such spatial intelligence would support targeted road safety interventions and urban planning decisions.

Additionally, it is imperative to design a clear data governance structure to ensure digitized forensic RTA records are actively used for decision-making rather than remaining as passive repositories. In future, forensic data from ePIS could be integrated into a national RTA surveillance system where data from insurance, road infrastructure, police and other relevant agencies could be monitored, analysed and used for better policy decisions.

Realizing these benefits, however, depends on organizational change for readiness and development of appropriate human resource capabilities, including digital literacy, geospatial data interpretation skills, and cross-sector collaboration with traffic and urban planning agencies. By integrating technology, people, and process change, JDWNRH can transform forensic RTA records from static archives into dynamic decision-support tools that strengthen public health planning, legal accountability, and institutional performance.

CONCLUSIONS

This study highlights the value of historical medico-legal records in understanding RTAs and informing road safety planning. The observed temporal and seasonal patterns support a shift from reactive case documentation to proactive, data-driven prevention. Standardized and complete digital documentation, integrated within the existing ePIS framework, is needed to improve data quality, accessibility and RTA surveillance. Strengthening collaboration between health services, traffic authorities, and urban planners can further support evidence-based road safety measures. Sustainable data governance is essential to ensure that medico-legal records are preserved and used to support public health, quality improvement and legal accountability.

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Following authors have made substantial contributions to the manuscript as under:

CW: Conceptualization, data collection, data analysis, manuscript writing and review

GG: Data collection, data analysis, manuscript writing and review

TP: Conceptualization, data collection and review

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Authors agree to be accountable for all respects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

None

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