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Trends, Causes, Morbidity, and Mortality Analysis of Road Traffic Accidents in Karnali Province, Nepal: A Three-Year Retrospective Study

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Abstract

Globally, Road Traffic Accidents (RTA) are one of the leading causes of morbidity and mortality. Low and middle-income countries account for more than ninety per cent of the total global RTA deaths. Early response and prompt rescue can prevent mortality and morbidity. Nepal's accidents arise from substandard roads, vehicle safety, and reckless driving. This study aimed to examine trends, causes, morbidity, and mortality from RTA in Karnali province, Nepal. Secondary data analysis encompassed ten Karnali districts, utilizing records from the Province Traffic Police between July 17, 2019, and July 16, 2022. Motorcycles/scooters, constituting 77.27 per cent (13,127) of registered vehicles, dominated with 932 RTAs during the study, causing 1,200 minor injuries, 719 major injuries, and 392 fatalities. Males constituted 70.87 per cent of fatalities (6.86% <16 years), and females accounted for 21.15 per cent (1.09% <16 years). The age group 20-25 years accounted for 163 (17.19%) of the deaths, followed by 25-30 years 168(17.72%). Non-license holders were involved in 363(33.83%) of accidents within the study period. In

Karnali, the overall count of RTAs, injuries, and fatalities increased, driven mainly by high speed and mechanical errors. Surprisingly, while two-wheeler accidents were common, bus accidents resulted in a significant number of deaths, impacting individuals aged 20-30 and children.

Keywords: Karnali, Nepal, Road Traffic Accidents, Road Safety, Traffic

INTRODUCTION

Globally, road traffic accidents are one of the leading causes of morbidity and mortality which have emerged as an important public health concern. About 1.3 million deaths and 50 million injuries occur annually due to Road Traffic Accidents (RTA) in the world (United Nations, 2021). It is defined as a collision involving at least one vehicle in motion on a public or private road that results in at least one person being injured or killed (Pathak et al., 2014).

Due to RTAs, there are significant impact on the economy including losses to individuals, families and nations. It has substantial impact on Disability Adjusted Life Years (DALYs). There is economic cost associated with morbidity and mortality of RTAs in a direct and indirect way. These losses arise from the cost of treatment as well as loss of productivity for those killed or disabled by their injuries, and for family members who need to take time off from work or school to take care of the injured one. Road traffic crashes cost three per cent of their gross domestic product in most of the countries (World Health Organization, 2022). Moreover, another study reported about 1.52 per cent losses of country's gross national product due to RTAs (Banstola et al., 2020).

Nine among ten RTA associated death been reported from 125 middle- and low-income countries (World Health Organization, 2022). The Southeast Asia region has the sharp rise in morbidity and mortality due to the exponential issue of transportation and mobility which has been causing 18.5/100000 deaths annually and one-third of those deaths are due to motorized 2 wheelers. Even within high-income countries, people from lower socioeconomic backgrounds are more likely to be involved in road traffic crashes (Regional Health Forum South, 2021) (Karkee & Lee, 2016).

Most of the road accidents are preventable if an early response and prompt rescue could be done with an estimated 50 per cent reduction in death (Gopalakrishnan, 2012). In Nepal, many accidents are due to poor road and vehicle conditions and reckless driving (Karkee & Lee, 2016). Accidents on highways kill as many Nepalese every year as all-natural disasters combined. Furthermore, another study recommended establishing a community-based record system to collect the details information than police information for RTAs (A. Khadka et al., 2022). However, we strongly believe that there is a lack of analysis of information collected through the police from a scholarly viewpoint. A recently published literature showed that during the period of 82 days of COVID 19 lockdown in Nepal, a total of 256 deaths and 1824 injuries been reported. However, most of the media reports were mainly focused on fatalities however there were more accidents reporting non-fatal injuries (Sedain & Pant, 2021).

Adhering to the Road Safety Decade of Action 2021-30 of United Nation (UN) for 50 by 30 and Vision Zero and following to the Road Safety Action Plan 2021-30, Karnali Province should work for road safety (World Health Organization, 2021) (Vision Zero Network, 2023). To prepare a comprehensive policy, there should be evidence of RTAs with a holistic approach and whole of community action plans. In this regard, there is limited information available about RTAs and their associated consequences also exploring the root causes of accidents. Therefore, this study aims to fulfill the information gap in the field of RTAs in the three years period in Karnali Province of Nepal with limited human resources and road connectivity networks.

DATA AND METHODS

We conducted secondary data analysis in 10 districts of Karnali Province, Nepal. All records of districts levels were collected in a prescribed format from Province Traffic Police following the request of Province Health Service Directorate and data were extracted from hard

copy of traffic police records and entered in excel format and shared with research team from district level police officers.

Data were collected from 17th July 2019 to 16th July 2022. Characteristics of accidents including accidental area, nature of turning, reckless driving, road conditions, and violence of traffic signals were reported by traffic police during the accident time. We reviewed accident records and extracted socio-demographic information, status of victims, accident type, involved vehicle, death by vehicle type, days and months of accident, place of accident, driving licenses, status of the driver who got involved in the RTAs. For our own convenience, we abbreviated the years as Year I (17th July 2019 to 15th July 2020); Year II (16th July 2020-15th July 2021); Year III (16th July 2021 to 17th July 2022).

All information regarding the road traffic accidents that were reported to Province Traffic Police Office through their district level wings were analyzed from Feb to Aug 2022. District level verification was done for limited and inconsistent information. We also consulted with province traffic police. The observations from traffic police who were directly involved in case management in RTA have been listed in the recommendation section in this paper.

A total of 932 cases of RTAs been analyzed. All data were transferred to MS-Excel from Province Traffic Police. Descriptive statistics were performed for the analysis. The records were reviewed, and their findings been mentioned. None of the personal information has been disclosed and cited in the paper.

RESULTS

Table 1 illustrates the background information about road, registered vehicles, and human resources for vehicle management in Karnali province, Nepal. It has only 664 kilometers of pitched road where most of the roads are gravel (1407 KM). For the management of vehicles 218 persons were found to be working as traffic police. On average, each traffic police officer is responsible for patrolling and managing an area of 11.41 kilometer per day. This proportion may vary if personnel deployed in administrative and technical duties and those on leave are excluded.

Table 1

Background information about roads, registered vehicles, and human resource for vehicle management in Karnali Province, Nepal

SN	Characteristics	Distribution
1	Pitched road (Kilometers)	664
2	Bumpy road (Kilometers)	417
3	Gravel Road (Kilometers)	1407
4	Total Road length of Province (Kilometers)	2488
5	Total of Traffic police working in Province (Person)	218
6	Road length per traffic police (Kilometers)	11.41
7	Total vehicle registered in Province	13711
8	Vehicle per traffic police	62.89

Source: Province Traffic Police Office, Karnali, 17th July 2022

Vehicle registration in Karnali province is a major indicator of the total number of vehicles in the province. Table 2 shows that in the year of 2019-2020, the two-wheelers were the major registered new vehicle in the province, with 13127 (77.27%). Tempo/Auto came in the second, with 1690 (4.79%). The registration was high in the first year 491 (9.94%). Crane, Dozer Excavator had 541 registration (9.94%), Tractor had 385 (2.26%) and Pick-up van had 697

registration (4.10%) over the three years period. The table clearly illustrates an increasing trend in vehicle registration in the province over the last three years.

Table 2

Vehicles registered for the last three fiscal years in Karnali Province, Nepal

Vehicle Type	Year I	Year II	Year III	3 Years' Total
	Number (%)	Number (%)	Number (%)	Number (%)
Bus	54(1.17)	43 (0.73)	30 (0.45)	127 (0.74)
Mini Truck, Minibus	98 (2.13)	85 (1.45)	61 (0.93)	244(1.43)
Crane, Dozer, Excavator	167(3.64)	267 (4.56)	107 (1.64)	541(3.18)
Car, Jeep, Van	43 (0.98)	55 (0.94)	64 (0.98)	162(0.95)
Pick Up	156(3.40)	404 (6.90)	137(2.09)	697(4.10)
Microbus	3 (0.06)	5 (0.08)	6 (0.09)	14 (0.08)
Tempo/ Auto	491 (10.71)	680(11.62)	519 (7.95)	1690 (9.94)
Motorcycle/ Scooter	3465(75.42)	4215 (72.03)	5447 (85.49)	13127 (77.27)
Tractor	105 (2.29)	127 (2.17)	153(2.34)	385(2.26)
Total	4582 (100.00)	5851(100.00)	6524 (100.00)	16987 (100.00)

Source: Province Traffic Police Karnali, 17th July 2022

Table 3 presents the total accidents, which accounted to 932, resulting 392 fatalities, 1200 minor injuries, and 710 major injuries. The three-year trend analysis reveals an increasing pattern of accidents, minor injuries, and major injuries from 17th July 2019 to 16th July 2022. When comparing Year, I with Year III, we observed that the number of minor injuries (year I-293, Year III-362), major injuries (year I-179, Year III-262), and death (year I-97, Year III-197) from RTAs to be doubled. Similarly, over the three years, 70.87 per cent males lost their lives from RTAs, while 21.15 per cent females. Additionally, 6.86 per cent boys (<16 years) and, 1.09 per cent girls (<16 years) perished in road traffic accidents. A similar trend was observed for major and minor injuries, with male being primary victims in the both cases. Cattle were also reported to obstruct road traffic management, with the data showing that 85.71 per cent cattle died and 14.28 per cent injured during the three years period.

Young individuals were consistently reported as victims throughout this period, with 20-30 years age group being the most affected. However, there was a decreasing trend among the 25-30 years, which showed a decrease from 20.73 per cent in year I to 14.35 per cent in year III, totaling 17.72 per cent over the three year's period.

Table 3

Distribution of RTA, deaths and injured for the last three fiscal years in Karnali Province, Nepal

Characteristics	Year I	Year II	Year III	3 Years' Total
	Number (%)	Number (%)	Number (%)	Number (%)
Total RTA*†	236 (25.40)	291 (31.32)	402 (43.27)	929 (100)
Minor Injury†	293 (24.41)	319 (26.58)	588 (49.00)	1200 (100)
Major Injury†	179 (25.21)	169 (23.80)	362 (50.98)	710 (100)
Total Death †	97 (24.74)	98 (35.00)	197 (50.25)	392 (100)
Sex distribution of Death				
Male	66 (68.04)	65 (73.86)	127 (70.94)	258 (70.87)
Female	23 (23.71)	15 (17.04)	39 (21.78)	77 (21.15)

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Boy (Child<16 Years)	7 (7.21)	7 (7.95)	11 (6.14)	25 (6.86)
Girl (Child<16 years)	1 (1.03)	1 (1.13)	2 (1.11)	4 (1.09)
Major Injured				
Male	113 (66.47)	124 (73.37)	219 (60.33)	456 (64.95)
Female	26 (15.29)	23 (13.60)	104 (28.65)	153 (21.79)
Boy (Child<16 Years)	22 (12.94)	15 (8.87)	25 (6.88)	62 (8.83)
Girl (Child<16 years)	9 (5.29)	7 (4.14)	15 (4.13)	31 (4.41)
Minor Injured				
Male	184 (62.58)	220 (69.62)	368 (62.58)	772 (64.44)
Female	71 (24.14)	67 (21.20)	138 (23.46)	276 (23.03)
Boy (Child<16 Years)	25 (8.50)	19 (6.01)	54 (9.18)	98 (8.18)
Girl (Child<16 years)	14 (4.76)	10 (3.16)	28 (4.74)	52 (4.34)
Cattles				
Death	7 (77.77)	6 (100.00)	5 (83.33)	18 (85.71)
Injured	2 (22.22)	0 (0.00)	1 (16.66)	3 (14.28)
Age (involved in RTA)				
<16 Years	10 (4.06)	12 (4.12)	24 (5.83)	46 (4.85)
16-20	28 (11.38)	43 (14.77)	68 (16.54)	139 (14.66)
20-25	43 (17.47)	53 (18.21)	67 (16.30)	163 (17.19)
25-30	51 (20.73)	58 (19.93)	59 (14.35)	168 (17.72)
30-35	34 (13.82)	31 (10.65)	49 (11.92)	114 (12.02)
35-40	21 (8.53)	28 (9.62)	51 (12.40)	100 (10.54)
40-45	32 (13.08)	26 (8.93)	39 (9.48)	97 (10.23)
45-50	18 (7.31)	27 (9.27)	29 (7.05)	74 (7.80)
50-55	6 (2.43)	10 (3.43)	17 (4.13)	33 (3.48)
55+ all	3 (1.21)	3(1.03)	8 (1.94)	14 (1.47)

Source: Province Traffic Police Karnali, 17th July 2022, † implies to row, total= 100%, * indicates total RTA where at least one being injured.

The causes of accidents and their trend are reported in Table 4. High speed was identified as one of the major causes of accidents, accounting for 57.83 per cent of them; it showed an increasing trend from 54.93 per cent in 2019 to 61.23 per cent in 2022. The second major cause of accidents was mechanical defects of vehicle, contributing to 21.35 per cent of the incidents, with a consistent trend of 20-22 per cent throughout the study period. Some preventable causes of accidents included carelessness 2.75 per cent, overtaking 3.11 per cent, and violation of traffic rules 4.07 per cent. Furthermore, road condition was responsible for 5.04 per cent of accidents. However, accidents attributed to road condition exhibited a decreasing trend, with a number of 5.08 per cent in Year I to 4.19 per cent in Year III. Additionally, during this period, 33.83 per cent of driver involved in the accident did not hold a driving license. Despite a high number of accidents involving motorcycles, the fatalities resulting from these accidents were relatively low at 13.52 per cent. In contrast, the fatalities from the accidents involving public transport, such as buses, were notably high 32.65 per cent, despite their lower frequency.

Table 4

Causes of Accidents and death by vehicle types in Karnali Province, Nepal

Characteristics	Year I	Year II	Year III	3 Years' Total
	Number (%)	Number (%)	Number (%)	Number (%)
Causes of Accidents	49 (20.76)	64 (21.99)	86 (21.23)	199 (21.35)

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Mechanical defects				
Weather condition	6 (2.54)	9 (3.92)	10 (2.46)	25 (2.68)
Road Condition	12 (5.08)	18 (6.18)	17 (4.19)	47 (5.04)
Carelessness	9 (3.81)	12 (4.12)	14 (3.45)	35 (3.75)
High Speed	132 (54.93)	159 (54.63)	248 (61.23)	539 (57.83)
Overtake	9 (3.81)	9 (3.09)	11 (2.71)	29 (3.11)
Violation of traffic Rules	14 (5.93)	13 (4.46)	11 (2.71)	38 (4.07)
Others	5 (2.11)	7 (2.40)	8 (1.97)	20 (2.14)
Total	236 (100)	291 (100)	405 (100)	932 (100)
Accident by driving license holder \$				
Yes	154 (54.55)	207 (62.91)	349 (72.55)	710 (66.16)
No	109 (41.44)	122 (37.08)	132 (27.44)	363 (33.83)
Total	263 (100.00)	329 (100.00)	481 (100.00)	1073 (100.00)
Death by Vehicle type				
Truck, Tractor	10 (1.03)	7 (6.54)	9 (4.78)	26 (6.63)
Tipper	4 (4.12)	2 (1.87)	1 (0.53)	7 (1.79)
Bus	25 (25.77)	35 (32.71)	68 (36.17)	128 (32.65)
Microbus/Force	1 (1.03)	5 (4.67)	0 (0.00)	6 (1.53)
Car/ Jeep	20 (2.06)	26 (24.30)	36 (19.14)	93 (20.92)
Tractor	15 (1.55)	11 (10.28)	29 (15.42)	55 (14.03)
Motorcycle/Scooter	17 (1.75)	19 (17.76)	17 (9.04)	53 (13.52)
Auto	5 (5.15)	2 (1.87)	5 (2.65)	92 (3.06)
Others	0 (0.00)	0 (0.00)	23 (12.23)	23 (5.87)
Total	97 (100.00)	107 (1.00)	188 (100.00)	392 (100.00)

Source: Province Traffic Police Karnali, 17th July 2022, † implies to row, total= 100%, \$ indicates the information of both drivers if collision occurred

Figure 1 depicts the trend of various types of vehicles responsible for accidents in Karnali province. Motorcycle consistently had the highest number of accidents, primarily due to high speed. Additionally, car/jeep were the second highest category of vehicle responsible for accidents, followed by tractors and autos. However, despite of higher number of accidents involving motorbikes, it's important to note that a greater number of lives were lost in accidents involving public transport in Karnali, as indicated in table 4.

Figure 1

Distribution of Accidents by vehicle type in Karnali Province, Nepal

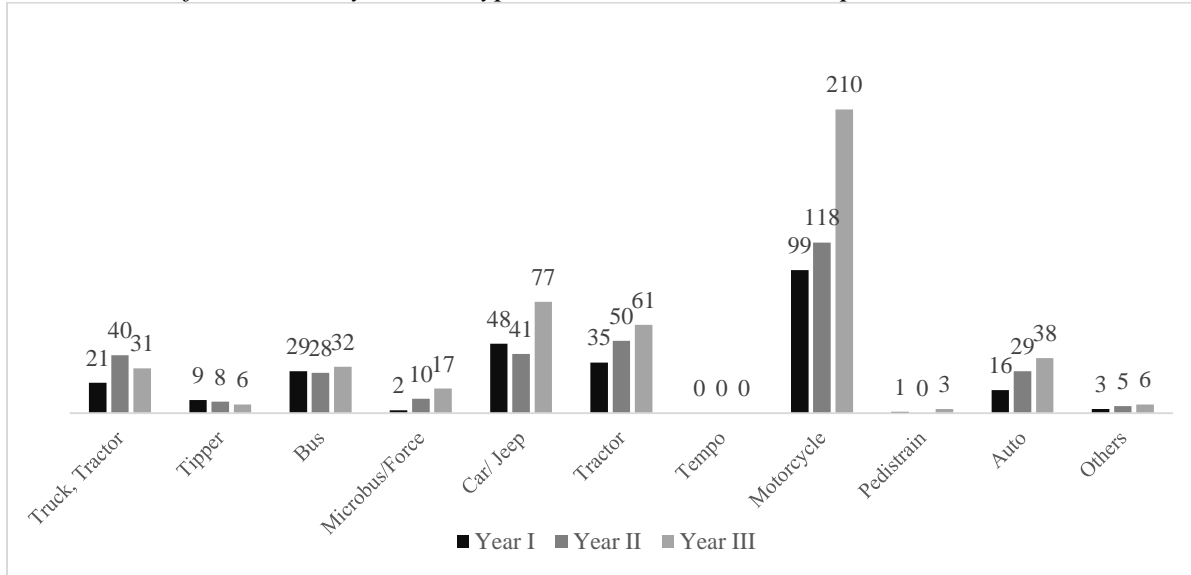


Figure 2 illustrates that highest number of accidents was reported in Surkhet over the last three years, from 2019 to 2022. The trend of accidents is on the rise in all the remaining districts. In contrast, Humla, Dolpa, and Mugu reported the lowest number of accidents each year. Similarly, Salyan and Dailekh each reported more than 40 accidents in each year during the same period.

Figure 2

Distribution of number of accidents by Districts of Karnali Province, Nepal

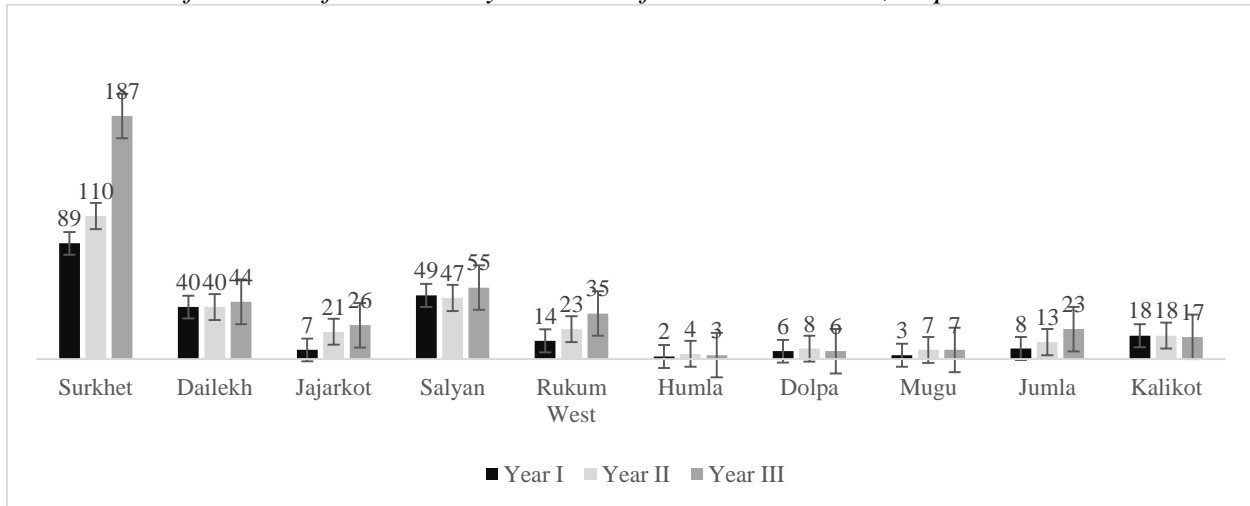
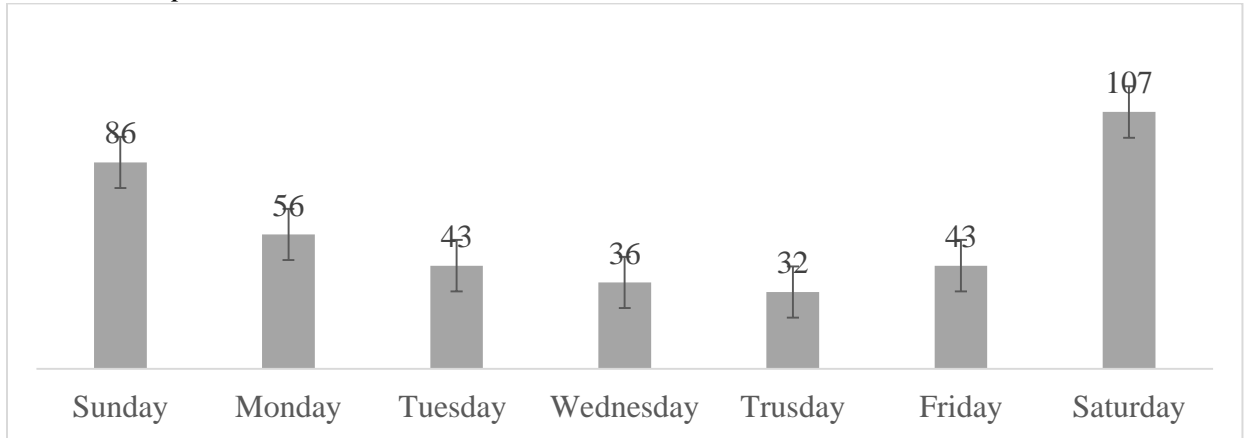


Figure 3 presents the day wise accidents trends in Karnali province from July 2021 to 2022. The data clearly indicates that the highest number of accidents was reported on Saturday (107) and Sunday (86). In Nepal, Saturday is the holiday, and on Sunday, many people return to work, requiring them to commute from their home to duty stations.

Figure 3

Distribution of accidents by day on 16th July 2021-16th July 2022 (Year-III) in Karnali Province, Nepal

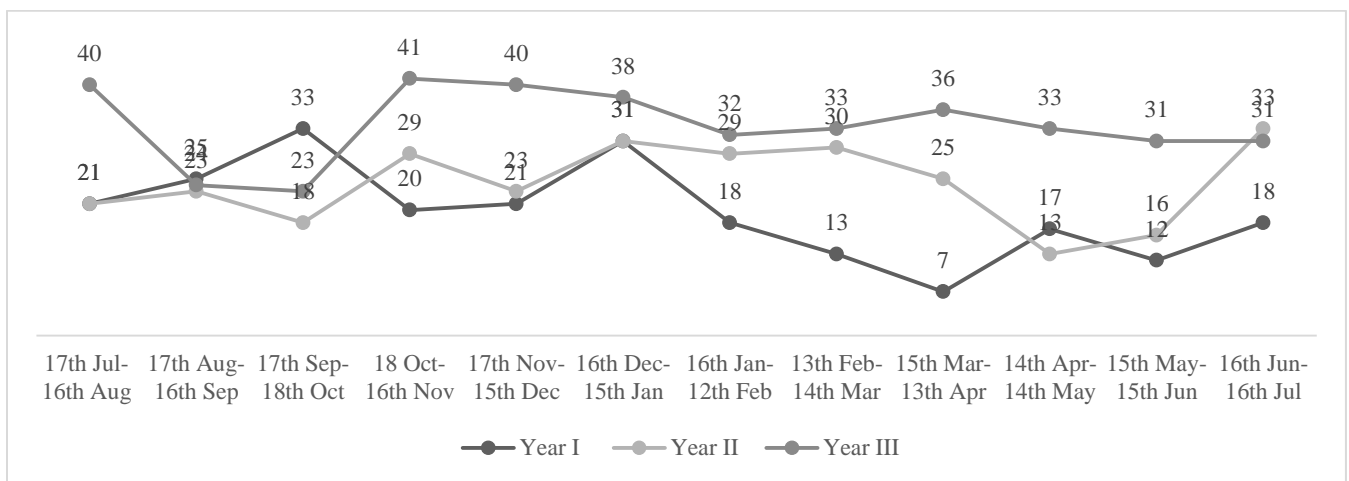


Source: Province Traffic Police Karnali, 17th July 2022

Figure 4 shows the month-wise trend of accidents over the last three fiscal years, from 2019 to 2022. In year III, the highest number of accidents was reported from 18th Oct- 15th Dec. This increase may be attributed to heightened mobility following the release of COVID-19 lockdown measures and the occurrence of festive seasons in Nepal during this period. Additionally, June and July consistently reported higher numbers of accidents over the past three years due to the rainy season. Furthermore, Year One showed a clear impact of the lockdown, resulting in lower road traffic accidents (RTAs) due to the lockdown measures enforced in Karnali Province in response to the increasing number of COVID-19 cases (R. Khadka et al., 2021).

Figure 4

Distribution of number of accidents by month in Karnali Province, Nepal



Source: Province Traffic Police Karnali, 17th July 2022

DISCUSSION

Our analysis of secondary data of RTAs in this remote province of Nepal, characterized by a mere 664 kilometers of paved roads and a workforce of 218 traffic police officers, unveiled several noteworthy insights. Each traffic police officer, on average, is responsible for overseeing nearly 12 kilometers of road, handling the traffic load of 62 vehicles daily. We observed an upward trajectory in vehicle registrations across Karnali, with the majority being two-wheelers. Out of the 932 RTAs we investigated, 392 resulted in fatalities, and the overall trend was on the rise. Male adults and male adolescents (<16 years) were disproportionately involved in these accidents within Karnali province, with the age group of 20-30 being particularly susceptible to fatal incidents. High speed emerged as the leading cause of accidents, followed closely by mechanical errors. Motorcycles were frequently implicated in accidents, yet public transport, notably buses, accounted for a higher number of fatalities. Surkhet stood out with an increasing number of accidents paralleling the surge in vehicle registrations. Weekends, particularly Saturdays and Sundays, exhibited a significant spike in accident occurrences. Furthermore, seasonal trends were apparent, with June-July marked by an increase in accidents due to the rainy season and September-October being associated with an uptick in accidents during the festival season. Of note, one in every three accidents involved a driver without a valid license, although the trend involving non-license holders decreased over the three-year period.

Similar to the findings in this study, there is compelling evidence that low-income countries experience a higher number of accidents compared to developed countries. Globally, one in every five deaths occurs in South Asia, with Road Traffic Accidents (RTAs) ranking as the 11th leading cause of disability-adjusted life years (DALYs) lost in the region in 2010 (Atreya et al., 2021) (Sapkota et al., 2016). The increased urbanization, motorization, and economic growth in the South Asian region have been linked to this surge in mortality (Atreya et al., 2021). Recent evidence from Nepal showed that even during the COVID 19 lock down, there is 256 deaths and 1824 injuries during 82 days. Media reports were mainly focused on crashes where death occurred which less emphasized about reporting of accident and minor injuries (Sedain & Pant, 2021).

Our study reveals a significant surge in vehicle registrations in Karnali over the past three years, resulting in an increased number of RTAs. The study highlights that young and productive age groups are more vulnerable to RTAs, a trend consistent with other studies that have shown that individuals aged 18-30 years are more prone to accidents (Mishra et al., 2010) (Poudel-Tandukar et al., 2007). Male dominance and the maximum involvement of younger age groups have also been a consistent finding in prior research (Pathak et al., 2014) (Sapkota et al., 2016) (Mishra et al., 2010) (Yadav & Shrestha, 2017) (Jha et al., 2021).

Our study underscores that one in three accidents over the past three years in Karnali involved non-license holders. This aligns with a study by Pant et al. (2015), which found that 16.24 per cent of drivers did not possess a valid driving license. Driving motor vehicle without a valid license is considered as health risk behavior among students. Among such unlicensed driver drinking and driving were found significant (Christian L. et al., 2013). Though, we did not segregate them based on their profession however they might be both students and driver without license who involved in accidents. Furthermore, the unlicensed driver can be representation of coming from low socio-economic status as many driver coming from low socio-economic status don't possess license (Hanna et al., 2010). Such unlicensed driver can be of young age group and likely to have unsafe driving (Boulagouas et al., 2020) (Fu et al., 2012).

Additionally, we report that vehicle collisions played a significant role in accidents, surpassing other causes. Over the past decade, vehicle collisions have more than doubled from 2011 to 2021 (Karkee & Lee, 2016). Our study points to various contributing factors, such as mechanical errors, traffic rule violations, adverse weather conditions, high speed, overtaking, and road conditions. These findings align with a systematic review conducted in Nepal, which highlighted bus accidents as a leading cause of accidents in the Kathmandu Valley (Karkee & Lee, 2016). Over the past three years, we have observed an increasing trend in accidents and a corresponding rise in the number of deaths.

Furthermore, the study highlights that a total of 53 (13.52%) deaths occurred in bike accidents during the last three years, with two-wheelers being the most frequently involved vehicles in accidents. Road traffic accidents impose a significant economic burden on households in developing countries, resulting in a substantial increase in catastrophic out-of-pocket health expenditure (Pant et al., 2015)(Alam & Mahal, 2016)(Eiko et al., 2014). Although our findings do not directly attribute this economic burden, it is evident that morbidity and mortality due to RTAs come with substantial direct and indirect healthcare costs. Access to healthcare facilities, immediate rescue mechanisms, and educational programs can save lives during such incidents. Moreover, another study from Nepal emphasized the further priority issues, institution involved in road safety research in Nepal. Among the WHO five pillars for road safety, road safety management, safe roads, safer vehicle, safer road user and effective post-crash response (Pant et al., 2022). In this study, we mostly explored the basic information yielding road safety, cause of accidents and status of victims after accident i.e. post-crash response.

Moreover, our study reported that despite of high number of accidents from two-wheeler vehicle, there is higher number of fatalities in public transport in Karnali province. The facts been further supported by the Nepal police. The police officer stated that the recurring cause of accidents in long route with public transport is due to relying on a single driver (New Business Age, 2019). As reported by other studies, the higher number of fatalities is in public vehicle. The initiation from Nepal police might work well for reduction of accidents. There might have geographic variation in the nature of accidents. Another study done in Kathmandu showed that more than fifty percent of the RTAs were done by two wheelers(Jha et al., 2021) but we found in Karnali, only 13.52 percent of two wheelers were responsible for accidents. The results from our investigation clearly revealed parallels in terms of injuries, fatalities, and the types of vehicles involved, aligning with findings from other relevant studies (Jha et al., 2021)(Farooqui et al., 2013).

CONCLUSION

This study concludes that the trends in Road Traffic Accidents (RTAs) in Karnali reveal alarming needs. The scarcity of paved roads and the inadequate allocation of traffic police pose major challenges. The high mortality and morbidity among young adults necessitate targeted interventions tailored to this demographic. Public transportation is primarily responsible for mass casualties. However, the increasing number of two-wheelers in the province, coupled with high speed and mechanical defects, may shift the trend from public transport to two-wheelers in the near future. Saturdays and Sundays were predominantly responsible for a higher number of accidents in Karnali. While unlicensed drivers have been prevalent in Karnali, the trend has reduced in recent years.

This study advocates for the establishment of a comprehensive and standardized database addressing road traffic accidents (RTAs) throughout Nepal. It emphasizes the need for improved healthcare facilities, enhanced road conditions, educational initiatives for drivers, and the replacement of mechanically flawed vehicles in the Karnali region. We strongly recommend stringent enforcement of speed limits and licensed driving. Additionally, it underscores the promotion of impactful social campaigns such as Love 30, Motorcycle Helmet Campaign, and Impaired Driving Prevention. Recognizing the cross-cutting nature of RTAs, the study proposes a well-defined mechanism for coordination among civil society, traffic police, health centers, and ambulance networks. Notably, the study insists on early response strategies and extensive information sharing, extending to provincial emergency operation centers for heightened efficacy in managing road safety. Further research should clearly adhere on WHO five pillars for road safety: road safety management, safe road, safe vehicle, safer road user and effective post-crash response. Therefore, further research should focus on multidisciplinary approach with researcher on public health, road safety, transport management and other relevant policy makers.

LIMITATIONS

Our study is not without limitations. Amid the COVID-19 pandemic with reduced mobility, our study couldn't gather data on its effects. Previous research in existing literature underscores that the decrease in deaths during lockdown was not as substantial as expected (Sedain & Pant, 2021). The study could not delve into medical aspects or explore certain critical information. We relied on data collected by district traffic police over three years, limiting our insights to factors of importance for police records. Moreover, there are already literature stating that community based local recording system can provide more detail information rather than routinely collected police data (Khadka et al., 2022). Moreover, we sought to investigate in-depth details concerning the World Health Organization's five pillars of road safety and the primary organ affected leading to fatalities in road traffic accidents (RTAs). However, analyzing this information proved impractical due to its derivation from secondary sources.

AUTHOR CONTRIBUTIONS

All authors have equal contribution in conceptualizing, designing, writing manuscript, data collection, analysis and interpretation, incorporating peer reviewer's comments and finalization of the manuscript.

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