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# Epidemiology of Road Traffic Accidents in Nepal from 2009/10 to 2019/20: A 10 Year Study

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## ABSTRACT

**Background:** Road traffic accidents are the leading cause of deaths worldwide among children and young adults aged between 5 to 29 years. The risk of road traffic accident-related death is higher in low-income countries. Thus, we aim to evaluate the epidemiology of road traffic accidents in Nepal during the fiscal years from 2009/10 to 2019/20.

**Methods:** This study is a secondary data analysis of the published police records publicly available on the official webpage of Nepal Police. A study was carried out after written permission from Nepal Police. The data obtained were analysed using Microsoft Excel-13.

**Results:** Analysing available data about reported road traffic accidents events showed an increasing trend in road traffic accidents from the fiscal years 2011/12 till 2019/20, with a steeper increase in the number of road traffic accidents in fiscal years 2017/18 and 2019/20. In fiscal years 2009/10, 11,747 vehicles collided; which rose to 25,788 in the fiscal years 2019/20. More cases of road traffic accidents were reported to occur from 12 noon-6 pm in a day. Among reported road traffic accidents commonest predispositions behind road traffic accidents was the negligence of driver followed by over speed. Among those individuals who died due to road traffic accidents, most of them were male.

**Conclusions:** We found an increasing trend of road traffic accidents, vehicle collisions, and injuries in Nepal over the past ten years especially among two-wheelers and four-wheelers like the car, bus, and autorickshaw.

**Keywords:** Accidents; automobiles; Nepal; traffic

## INTRODUCTION

Road traffic accident (RTA) is a leading cause of death worldwide accounting for 1.35 million deaths in 2016.<sup>1</sup> It is the most common cause of deaths for children and young adult aged 5-29 years.<sup>1</sup> Road traffic accidents ranked 7th among the leading cause of death in 2017 and 5th among the most common causes of premature deaths in Nepal.<sup>2</sup> According to traffic police record over the period 2001-2013, a total of 95,902 crashes, 100,499 injuries, and 14,512 deaths were recorded accounting for a mortality rate of 4/100000 in 2001/02 to 7/100000 in 2011/12.<sup>3</sup> However, there are limited studies analysing the epidemiology of road traffic accidents in Nepal over the past ten years at a national level. Thus, we aim to evaluate the epidemiology of road traffic accidents in Nepal between the fiscal years (FY) 2009/10 to 2019/20.

## METHODS

This study was a secondary data analysis of the published police records publicly available on the official webpage

of Nepal Police [www.nepalpolice.gov.np](http://www.nepalpolice.gov.np). We conducted a descriptive study during January 2021 to assess the trend of RTA in Nepal in the past 10 years during the FY between 2009/10 and 2019/20 of the Nepalese calendar. The Nepalese FY usually ends on the 15th of July every year. As the present study considered only the published data and did not conduct any experimental study, the current research project was exempt from institutional review board approval (Protocol No: IRC-LMC 05-A/021). However, written permission from Nepal Police was obtained prior to data collection. The data obtained was analysed using Microsoft Excel-13.

## RESULTS

Analysing available data about reported RTA events from the Nepal police webpage showed an increasing trend in RTA from the fiscal year 2011/12 to 2019/20, with a steeper increase in the number of RTA in FY 2017/18 to 2019/20 (Figure 1). There was a total of 8,890 RTA reported in the year 2011/12 which rose to 15,554 in FY 2019/20 ([Supplementary file](#), Table 1). Similarly, the

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number of RTA with two-wheelers increased from 4,363 reported cases in FY 2009/10 to 10,867 in FY 2019/20. The number of cars and other 4x4 auto accidents showed increasing trends from FY 2011/12 to 2019/20 with 7,564 incidents reported in 2019/20.

RTA incident related with tractor, tempo (other three-wheelers), and manually driven carts/ cycle were relatively static or decreasing in trend from FY 2011/12 to 2019/20 in comparison to bus and tanker/truck which has an increasing trend from FY 2011/12 to 2019/20 (Figure 2).

The total vehicle collided, injured (total, serious, and minor), and died due to RTA were increasing in trend from FY 2009/10 to 2019/20 with a steeper rise in the number of a vehicle collision in the last three FY (2017/18-2019/20) (Figure 3). In FY 2009/10, 11,747 vehicles collided; which rose to 25,788 in the year

2019/20 (Supplementary file, Table 2). Though there is a steep rise in cases of RTA and total injuries recently the number of individuals dying due to RTA is not increasing in the same proportion.

Morning, afternoon, evening, and night time occurrence of RTA was increasing in trend from FY 2011/12 to 2019/20. More cases of RTA were reported to occur from 12 noon-6 pm during the day, this may be attributed to the fact that most individuals commute during this hour for their work, etc. (Figure 4, Supplementary file, Table 3).

Among reported RTA commonest predispositions behind RTA was the negligence of driver followed by over speed. Other reported predisposition was a mechanical failure, passengers' fault, road condition overtakes, etc. (Figure 5, Supplementary file, Table 4).

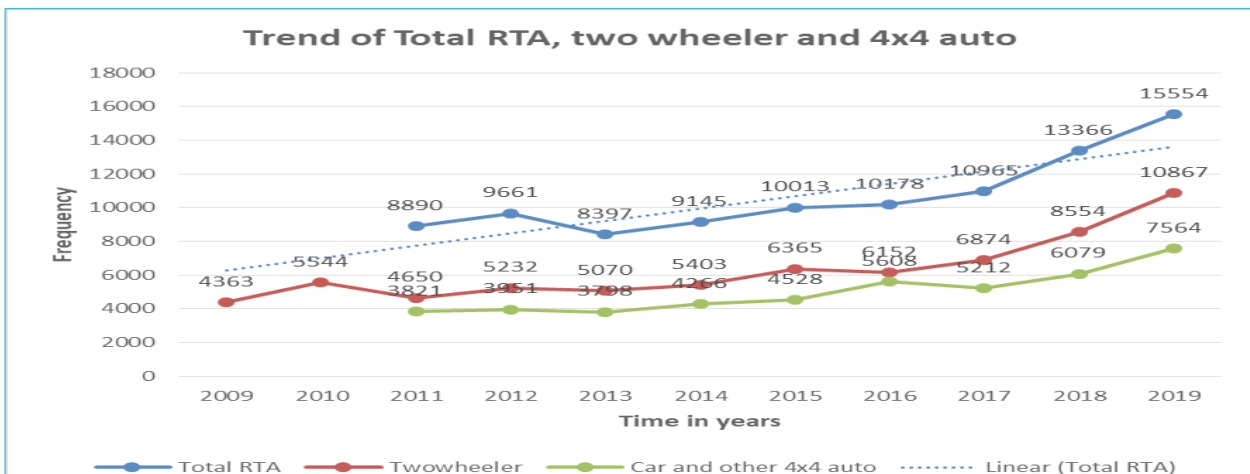


Figure 1. Trend of total RTA, two-wheeler, and car and 4x4 automobiles.

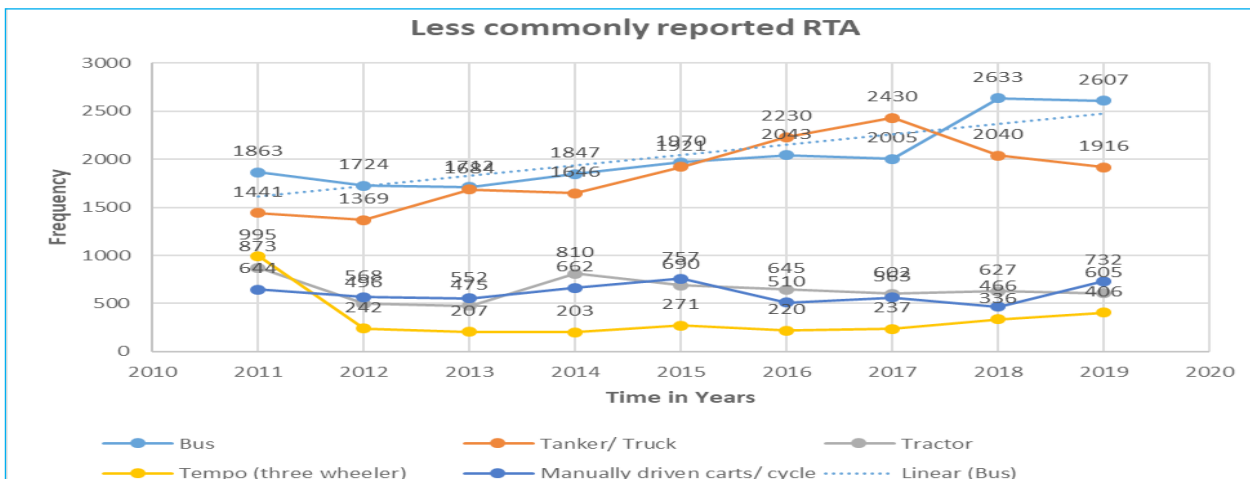


Figure 2. Trend of less commonly reported RTA (bus, tanker/truck, tractor, tempo, manually driven cart/cycle).

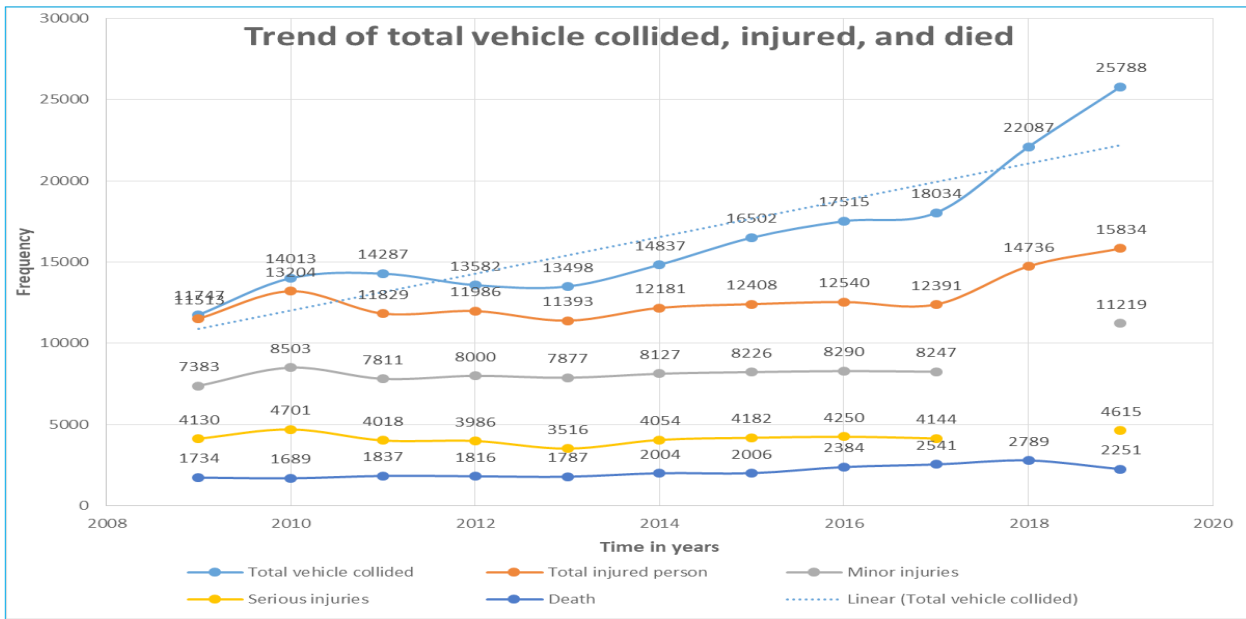


Figure 3. Trend of total vehicle collided, individuals injured, and died.

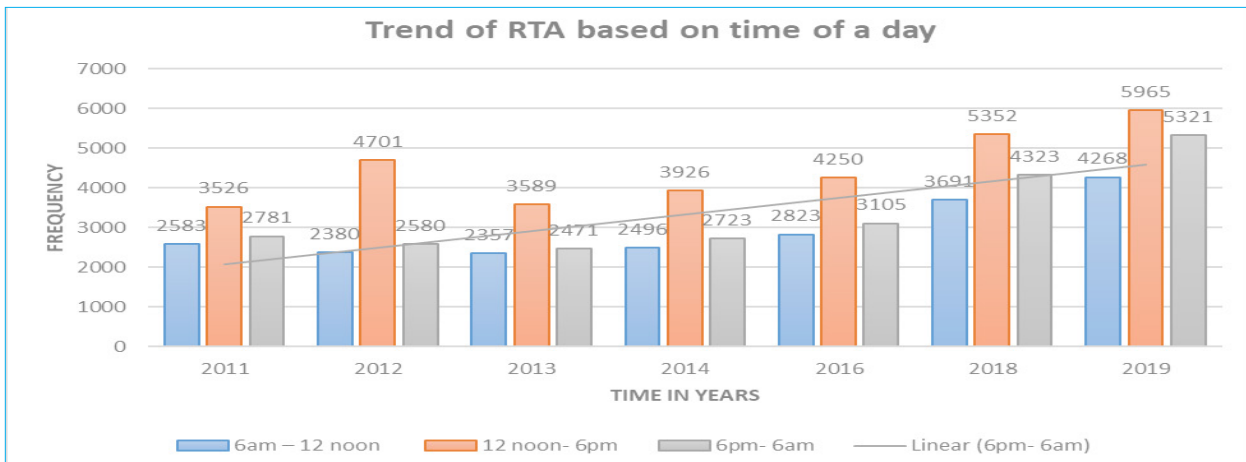


Figure 4. Trend of RTA based on time of a day.

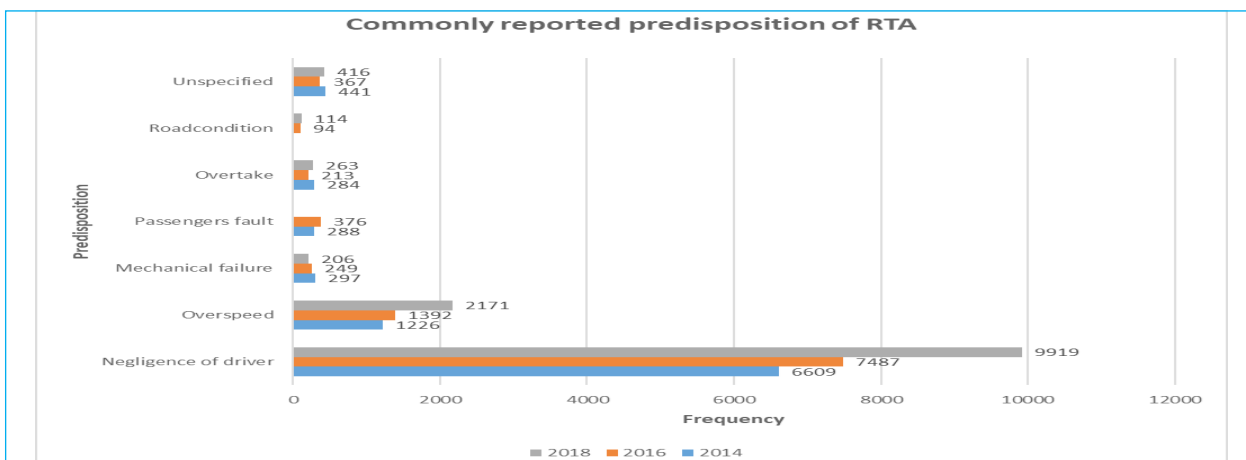


Figure 5. Commonly reported predisposition of RTA.

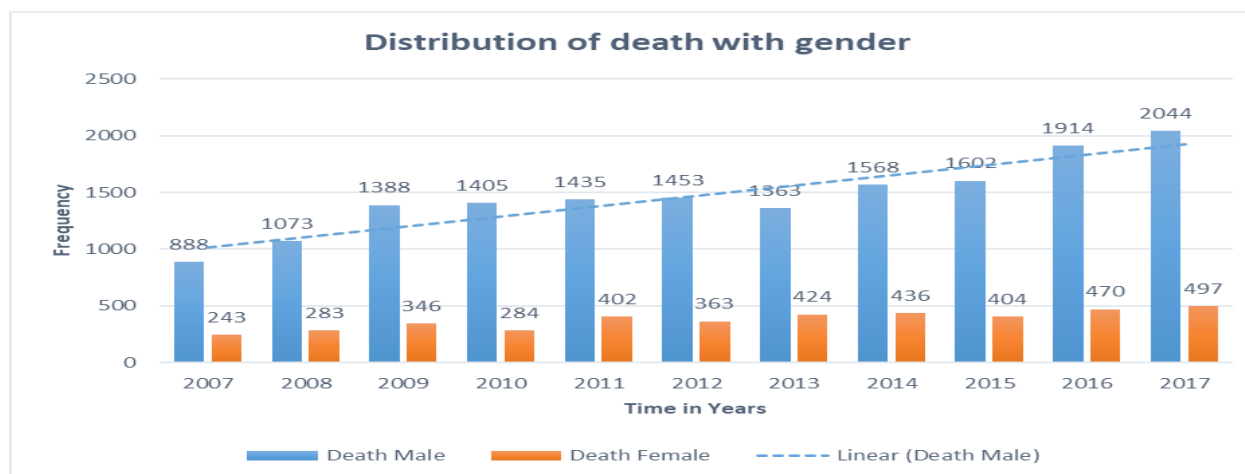


Figure 6. Distribution of reported death with gender.

Among those individuals who died due to RTA, most of them were male. Also, the trend of death cases rose significantly with time from FY 2009/10-2019/20 among both genders though much higher in males (Figure 6).

There were 61,564 cases booked under drink and drive during the FY 2013/14. There were 52,693 cases in FY 2014/15, 41,720 cases in FY 2015/16, 38,297 cases in FY 2016/17, and 42,873 cases in FY 2017/18 respectively ([Supplementary file](#), Figure 1). Reported cases of drink and drive decreased progressively from FY 2013/14 to 2017/18. A plausible reason could be strict legislation of law.

## DISCUSSION

The risk of road traffic death is three times higher in low-income countries (8.3 deaths per 100,000 population) when compared to high-income countries (27.5 deaths per 100,000 population).<sup>4</sup> About one-fifth of these deaths occurred in South Asia with RTA ranking 11<sup>th</sup> leading cause of disability-adjusted life years (DALYs) lost in the region in 2010.<sup>4</sup> The rates of road traffic death are highest in Africa (26.6/100,000 people) followed by south-east Asia (20.7/100,000 people).<sup>1</sup> The increased mortality in low-income countries especially in South Asia is linked to the rapid urbanization and increased motorization coupled with economic growth in this region.<sup>5</sup> In the context of Nepal, the registration of vehicles has increased from 1,348,995 in 2011/12 to nearly three times at 3,53,9519 in 2018/19.<sup>6</sup> There has been a rapid increase in the road networks in Nepal in recent years including both the strategic roads and local roads.<sup>7</sup> The length of the road in 2013 was 50,943 km among which 34,766 km (68%) was earthen or gravelled.<sup>7</sup> RTA is a common cause of injury and trauma in Nepal. We found an increase in the trend of total road traffic accidents in the last ten years

with a steep increase from 2017 to 2019. Similarly, a sharp increase was seen among both the two-wheelers and four-wheel vehicles from 2017 to 2019 and the number of two-wheelers road traffic accidents exceeded other forms of transportation. Similarly, in India, two-wheelers accounted for the highest number of road traffic accidents followed by trucks and lorry.<sup>8</sup> Our finding of increased two-wheeler accidents in the past two years is significant because according to WHO Global status on Road Safety 2018, the majority of deaths were seen among riders of two-wheelers and three-wheelers accounting for a staggering 43% of total deaths.<sup>1</sup> The increase in two-wheeler accidents can be explained by the tremendous increase in the use of motorcycles as primary means of transportation with reckless driving by riders without considering road safety.<sup>9</sup> As our analysis showed negligence and over speeding are the prime causes of RTA, reckless driving of the two-wheeler is very prone to accidents and fatalities. About 1,96,383 motorcycles were registered in 2014 which increased to 3,41,623 in 2017 and 2,49,581 in 2018 explaining the increased amount of RTA from 2017 to 2019.<sup>6</sup> The increased use of motorcycles, taxi, and buses led to decreased RTA incident related to tanker/truck, tractor, tempo (other three-wheelers), and manually driven carts/bicycles which were relatively static or decreasing in trend from 2009/10 to 2019/20.

Vehicle collisions have increased more than two folds from 11,747 vehicles in the year 2009/10 to 25,788 in the year 2019/20. The total number of people injured has also increased. This can be attributed to the increase in vehicle numbers and road tracks most of which are earthen or gravel roads. In addition, the hilly and mountainous regions have roads that are of poor condition especially affected in summer accounting for increased risk of collisions. However, we found no

such increase in mortality from road traffic accidents which can be attributed to improved health facilities, an increase in nonfatal injuries, and quicker access to treatment with methods like heli-lift. However, the people from low-socioeconomic background, who are not able to own their own vehicle, mostly commute in a public transport. These people if met with an accident cannot afford for better treatment due to out-of-pocket expenses.<sup>10</sup> In a study conducted on traumatic injuries including RTA at Emergency Department of Dhulikhel Hospital, Nepal, it was found that minor injuries accounted for 63.1% and major injuries only in 8.1% of cases and the remaining 27.6% had sustained injuries of moderate severity.<sup>11</sup> We found an increased number of road traffic accidents from 12 noon to 6 pm over the last ten years could be due to poor visibility and scarcely distributed functioning road lights. Our findings are in accordance with Mishra et al. who found an increased number of accidents from 3 pm to 7 pm.<sup>12</sup> This may be explained by the fact that most people return from their jobs during 4 to 6 pm leading to increased traffic and the possibility of accidents. We found increased mortality among males compared to females which is consistent with Mishra et al. and a study in India that showed 6:1 fatality of males compared to females.<sup>8,12</sup> This is explained by the fact that women generally have decreased access to vehicles and outdoor activities.<sup>8</sup>

We found driver negligence to be the most common cause predisposing to road traffic accidents followed by over speeding. In this regard, it is important to ensure adherence and increased use of measures like proper use of helmet, use of seat belt, use of child restraint, improved condition of road and vehicle safety. Helmet safety measures are important because two-wheeler accidents were the most common type of accident in Nepal and correct helmet use can lead to a reduction in fatality rates and risk of head injuries.<sup>13</sup> Both riders and passengers need to wear a helmet while riding in a two-wheeler, fasten the helmets properly and make sure the helmets have a specific reference.<sup>1</sup> Although 5 to 35% of all road deaths are reported as alcohol related globally as per the WHO, reported cases of drink and drive have decreased dramatically in Nepal from 2013/14 to 2018 due to strict legislation of anti-drink and drive legislation “*Mapase*”. There is a strict deployment of traffic police during the night in major cities like Kathmandu and people driving under alcohol influence is fined, given tickets, and forced to attend an hour-long class regarding traffic regulations.<sup>14</sup> The improved awareness has led to a decrease in drunk driving in Nepal.

Our study has few limitations. Our study was based on

the secondary analysis of nationwide police data on road traffic accidents. Police data has been found to under-represent the incidence of road traffic accidents as we found few missing and incomplete data for several years and provinces. We did not include individual hospital-based studies because they do not provide complete data of Nepal and are confined to a particular region. The concept of a federal system and provincial government and lack of updates in the traffic police website across few provinces like Province 6 might have interfered with our analysis.

## CONCLUSIONS

We found an increasing trend of road traffic accidents, vehicle collisions, and injuries in Nepal over the past ten years especially among two-wheelers and four-wheelers like a car, bus, and auto. The common predisposing factors for road traffic accidents were negligence of drivers, over speeding based on analysis of available data. This urges the necessity of regulating vehicle density for the limited road in dense cities and more emphasis need to be given to better public vehicles. Additionally, road safety measures need to be kept in priority by governing bodies to maintain road and road lights and riders must consider vehicle speeds and caution in residency areas and accident-prone roads.

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**Competing interests:** None declared

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