



# Impacting Factors of Road Traffic Accidents in Kathmandu Valley

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## Abstracts

The major objective of the study is to investigate the relationship and impact of over speed, negligence, and poor vehicle conditions on road traffic accidents in Nepal. The study targeted drivers of two-wheeled and four-wheeled vehicles as a population. 100 respondents were selected through a simple random sampling technique based on the police report list during the last 5 years of Kathmandu Valley. Primary data was the source of information and was collected using a well-structured, five-point Likert scale survey. Cronbach's Alpha coefficients were used to examine the internal consistency of the factors and an independent sample t-test was adopted to analyze differences in road traffic accidents, over speed, overload, and poor vehicle condition in terms of gender. Mean, standard deviation, variance, and correlation were adopted to analyze the data systematically to derive the findings. The study found a relationship between speed and negligence in road traffic accidents in Kathmandu Valley. However, a strong relationship exists between poor vehicle conditions a road traffic accidents. The study also found that gender has no impact on overload, poor vehicle conditions, and road traffic accidents, except negligence. The future researcher can study the impact of other independent variables on road traffic accidents targeting drivers of two-wheelers and four-wheelers with a large sample size in a broad area.

**Keywords:** *Road traffic accidents, over speed, negligence, and poor vehicle condition.*

## Introduction

Accidents originated that speed limits substantially affect security equally in urban and rural areas (Fieldwick & Brown, 1987). Drinking, less traffic sense, lack of knowledge, and a tendency to be adventurous and show off are the main leading causes of accidents among adolescents. It affects the world and human beings (Kohli, Aathi, & Sethi, 2014). Road Traffic Accident (RTA) is among the top five causes of morbidity and mortality in South-East Asian countries. (Mishra, Sinha, Sukhla, & Sinha, 2010).

Globally, road traffic accidents (RTA) are a common public health problem and are established as the eighth leading cause of death with a similar impact as other communicable and non-communicable diseases. Around 1.24 million people have unnatural deaths, and 20 to 50 million people suffer from non-fatal injuries due to road traffic injuries worldwide. The global trends of road traffic accidents become the fifth leading cause of death by 2030. The global economic burden caused by RTA was 518 billion USD. However, a status paper on road safety in Nepal depicts that the fatality rate has dropped from 17 to 12 per 10,000 registered vehicles from 2009 to 2012. According to a WHO report in 2011, injuries due to RTA in Nepal constitute 1.7% of total mortality. Similarly, the country has lost 0.8% of its GDP due to road traffic accidents (Shrestha, Bhatta, Shrestha, GC, & Poudel, 2017). There are several technical roads faulty that could in the occurrences of a road accident (Harith & Mahmud, 2018). The weather causes all sorts of wear and tear to road surfaces by wiping away road makings and wearing away the top layer of the road, which helps with the traction of tires (Srinivasa Kumar & Srinivasan, 2013).

Road Traffic Accidents (RTAs) are a global cause of death and injury. Careless and reckless driving is the major cause of human factors, followed by drunk driving, not giving the right way and over speeding (Wangd et al., 2018). There is a tremendous rise in RTAs due to an increase in vehicular volume on roads,

incredible speeding of vehicles, poor driving skills, drunk driving, bad roads, poor traffic control, lack of public awareness, rampant indiscipline, incompetent authorities and lack of implementation of existing law to tackle the menace of disrespect to law and rules (Sharma, 2016). (Elvik, Christensen, & Amundsen, 2004), concluded that there is a strong statistical relationship between speed and road safety. Similarly, in the four potential sources of accidents (driver, pedestrian, driving conditions, fate), the pedestrian victim was usually considered the main cause (Kouabenan & Guyot, 2004). There is a significant relationship between alcohol consumption and road traffic accident. Speed violations and bad condition of roads are the major causes of RTA on the Bauchi – Potiskum – Maiduguri road of the northeast highway (Yero, Ahmed, & Hainin, 2015).

Road traffic accidents result from a combination of factors related to the components of the system, comprising roads, the environment, vehicles, and road users, and the way they interact (Shantajit, Kumar, & Zahiruddin, 2018). Islam, Alam, & Alharthi (2019) investigated the impacts of sandstorms, temperature, and rainfall on road traffic accidents.

The maximum number of accidents occur due to the lack of traffic knowledge, negligence of drivers, and the vulnerable condition of roads (Dhakal, 2018). The distribution of driving licenses has not been transparent, and traffic rules and regulations have been ineffective. Maximum bus accidents occur due to being overloaded. In the Nepalese context, there is little research on the factor affecting road traffic accidents in Nepal, so this study will be important to fill this gap. The research is directed toward answering the following question

1. What is the relationship between speed, negligence, and poor vehicle conditions in road traffic accidents in Nepal?
2. What is the impact of gender on road traffic accidents in Nepal?

The main objective of this study is to measure the relationship between factors in road traffic accidents in Nepal. The specific objectives of the studies are as follows:

To explore the relationship between speed, negligence, and poor vehicles condition in road traffic accidents in Nepal

To examine the effect of gender on over speed, negligence, poor vehicles condition, and road traffic accidents in Nepal.

## Literature Review

### The domino theory:

Heinrich (1980) proposed the domino theory that states that accidents result from a chain of sequential events, metaphorically like a line of dominoes falling over. When one of the dominoes falls, it triggers the next one, and the next... 88% of all accidents are caused by unsafe acts of people, 10% by unsafe actions, and 2% by acts of God. Social environment and ancestry domino deal with worker personality, worker personality traits, and direct causes of incidents. Heinrich (1980) states that a preventable injury is the natural culmination of a series of events that invariably occur in a fixed and logical order. The accident occurs when the above events conspire to cause something wrong. Injury results from accidents, and some types of injuries Heinrich specifies in his "Explanation of Factors" are cuts and broken bones. Accidents are usually multi-factor and develop through relatively extensive sequences of changes and errors. This theory discussed the following causes of accidents may be concluded; all accidents, whether major or minor, are caused; there is no such thing as an accidental accident. Very few accidents, particularly in large organizations and complex technologies, are associated with a single cause.

Srinivasa Kumar & Srinivasan (2013) found more accidents because of the spoiling of roads due to rains and the density of traffic in daylight, respectively. Shrestha (2013) explored causes of RTAs and deaths due to negligence, over speed, drunk driving, poor condition of the vehicles, and overtaking as major causes. Wangdi et al. (2018) investigated the main causes of careless and drunk driving. Drivers and passengers constituted 86% of the deaths, with few pedestrian deaths. Data for in-hospital deaths or after-discharge were not available. Productivity loss due to RTA is around 1% of the national GDP. Dhakal (2018) stated the driver's negligence to the weather condition and the condition of the road. Despite the dense presence of the government and its bodies, the study also showed that a maximum number of road traffic accidents occur in Kathmandu Valley. Youngsters riding bikes and driving cars involved in accidents are found to be the maximum in number. Shantajit, Kumar, & Zahiruddin (2018) resulted that road traffic accident is the cause of road traffic accidents in India mainly due to careless of the driver. Other causes include weather conditions, defective motor vehicles, poor roads, etc. Islam, Alam, & Alharthi (2019) examined that temperature, rainfall, sandstorms, and the number of vehicles were statistically and significantly responsible for RTAs in Saudi Arabia during the study period. The findings will assist policymakers in taking the right courses of action to mitigate the negative impacts of climate change through understanding climate influence on RTAs.

### Conceptual Framework

Based on the literature review, the road traffic accidents is affected by several variables. Over speed, poor road condition, drunk driving and weather condition, have been taken as independent variables and road traffic accidents as depended variable of the study.

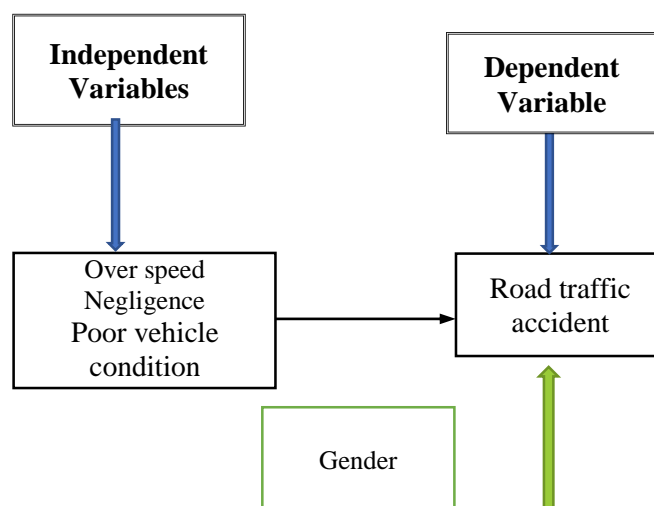


Figure 1: Conceptual Framework

**H1:** There is a relationship between over speed and road traffic accidents in Nepal.

**H2:** There is a relationship between negligence and road traffic accidents in Nepal.

**H3:** there is relationship between poor vehicle conditions and road traffic accidents in Nepal.

**H4:** There is the effect of gender on over speed, poor vehicle conditions, and road traffic accidents in Nepal.

### Defining the variables

**Over speed:** It is the vehicle crossing the defined speed limit. It is one of the main factors that cause serious road traffic accidents. Driving a vehicle at high speed over the speed limit is called speeding. It is driving a motor vehicle faster than is safe or legal. Excess and inappropriate speed is responsible for a high proportion of the mortality and morbidity that result from road crashes (World Health Organization, 2004).

**Negligence:** It is a failure to exercise appropriate and ethical ruled care expected to be exercised amongst specified circumstances. The meaning of negligence is the quality or state of being negligent. Negligence is "the failure to use such care as a reasonably prudent and careful person would use under similar circumstances" (Black, 1990, p. 1032). Another driver's negligence causes most car accidents. Negligence happens when people behave in a careless or reckless manner and can occur in two different forms. First, it is possible to be negligent by taking unsafe action behind the wheel. Second, it can be negligent in failing to take an important action while driving.

**Poor vehicle conditions:** Poor vehicles condition includes various issues that cause accidents, such as cracked windshields, lights and wipers, faulty brakes and worn-out brake pads, bald tires, and so forth. Nepal Police Mirror 2022 shows that 635 road accidents in the fiscal year 2021/22 were because of the vehicles' poor condition. The poor condition of the vehicles was identified as another major factor in road accidents after the negligence of the drivers and the passengers, and poor road condition.

**Road Traffic Accidents:** It is defined as an accident that took place on the road between two or more objects, one of which must be any kind of moving vehicle (Jha, Srinivasa, Roy, & Jagdish, 2004). It is among the top five causes of morbidity and

mortality in South-East Asian countries. (Mishra, Sukhla, &

Age Group			
Below 20	13	18.1	18.1
20-25	44	61.1	61.1
Above 25	15	20.8	100
Total	72	100	

Sinha, 2010). Globally, road traffic accidents are a common public health problem and are established as the eighth leading cause of death, which have a similar impact as other communicable and non-communicable diseases. It is a major cause of death and injury globally.

### 1. RESEARCH METHODS

This study was designed in descriptive and explanatory. The population of this study was all the drivers of two-wheeled and four-wheeled vehicles in Nepal. However, considering the population was impossible, the convenience sampling method was used to select the sample for the convenience of the study. Quantitative data as nature and primary data as sources of information for the study. Primary data was collected and analyzed systematically to derive the findings. A well-structured questionnaire was administered to collect the data. The 5-point Likert scale questionnaire was used to gather the respondents' views on the study analysis, where point 1 strongly disagreed and 5 strongly agreed. In this survey, 100 questionnaires were distributed. Out of them, 79 questionnaires have been returned, of which 72 were completed, reflecting a response rate of 72 percent. The questionnaires have been entered in the spreadsheet SPSS 26 version. The study applied statistical tools like median, standard deviation, and correlation to analyze and interpret the collected data to find the result.

### 2. RESULTS

#### Reliability Analysis

Cronbach's alpha was used to analyze the reliability and validity of each question in the data set (Gliem & Gliem, 2003). The constructs comprising variables such as over speed, poor road conditions, drunk driving, weather condition, and road traffic accidents had been distinctly verified to make confidence for reliable items. The reliability of the items indicates that the scale has well in the following table.

**Table 1: Reliability of the study variables**

S.N.	Variables	Cronbach's Alpha
1	Over speed	0.857
2	Negligence	0.797
3	Poor vehicle condition	0.772
4	Road traffic accident	0.713

Source: Field Survey, 2021

Table 1 presents the values of Cronbach's alpha of 0.857, 0.797, 0.772, and 0.713 for over speed, negligence, poor vehicle condition, and road traffic accident, respectively. Cronbach's Alpha is larger than 0.700 for all variables in the table. This demonstrated the consistency of all of the study's components.

## RESPONDENTS PROFILE

### Demographic Status

**Table 2: Gender and Age group of the respondents**

Gender	Frequency	Percentage	Cum %
Male	50	69.4	69.4
Female	22	30.6	100
Total	72	100	

Source: Survey, 2021

Table 2 showed that 50 were male and the remaining 22 were female. The result showed that there were less number of females than males in the sample. Among all the respondents, the majority, 69.40% of respondents were female, while the rest, 30.60% of the respondents were male. It also showed that the majority of respondents were age group of 20-25, covering 61.10% of the total respondent, followed by the participants aged above 25 carrying 20.80%, and the least percent of the respondent were from the age group below 20 representing only 18.10% of the total respondent.

**Table 3: Preference of type of vehicle**

Vehicle Type	Frequency	Percentage	Cumulative Percent
Two-wheeler	54	75%	75%
Four-wheeler	18	25%	100%
Total	72	100%	

Source: Survey, 2021

Table 3 presented that a large portion of the respondent was two-wheeler user, with 75% of the respondents followed by a user of two-wheelers covering 25% of the participants. Therefore, it can be concluded that the people of Kathmandu Valley use two-wheeled vehicles more than four-wheeled ones.

#### 5.2 Descriptive Statistics Analysis

This study's mean and standard deviation were employed as descriptive statistics to show the sample's responses.

**Table 4: Descriptive statistics for the whole sample**

Table 4 shows the descriptive statistics of the variables under investigation for the entire sample. The table displays the mean, standard deviation, and variance for all variables based on the replies supplied by respondents in the Likert scale question.

Variables	Mean	Standard deviation	Variance
Over speed	3.01	0.511	0.37
Poor vehicle condition	3.58	0.6421	0.43

Road traffic accident	3.15	0.535	0.19
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Source: Survey, 2021

Table 3 showed the variables' mean, standard deviation, and variance. The mean of all the variables is bigger than 3.00, except for weather conditions. This means that the majority of people agree with the comments.

**Table 5: Independent sample t-test**

The findings of a correlation analysis of the study's variables, which is used to examine the relationship between the dependent and independent variables, are shown in this table.

Variable	Gender	Number	Mean	Std deviation	P value
Over speed	Male	37	2.9	0.436	0.062
	Female	43	3.03	0.527	
Negligence	Male	37	3.72	0.436	0.032
	Female	43	3.04	0.527	
Poor vehicle condition	Male	37	3.78	0.653	0.070
	Female	43	3.91	0.633	
Road traffic accident	Male	37	3.12	0.671	0.056
	Female	43	3.18	0.522	

Source: Survey, 2021

Table 5 revealed no over-speed difference between males and females because the p-value is greater than 0.05, i.e., 0.062. Similarly, there is no difference in the poor vehicle condition between males and females because the p-value is 0.097, larger than 0.05. There is no difference in road traffic accidents between males and females because the p-value is greater than 0.05, i.e., 0.056. However, there is a difference in negligence between males and females because the p-value is less than 0.05, i.e., 0.032.

**Correlation Analysis**

Person's correlation has been adopted to measure the relationship between dependent and independent variables. Table 4 demonstrates the correlation analysis of the variables under investigation, which is used to see how dependent and independent variables are related. Here, OS = Overspeed, N=Negligence, PVC = Poor vehicle condition, and RTA= Road traffic accident.

**Table 6: Correlation table**

	OS	N	PVC	RTA
OS	1			
N		1		
PVC	0.323*	0.236*	1	
RTA	0.593**	0.53488	0.429**	1

Source: Survey 2021

Table 7 displays the results of correlation analysis, which is used to examine the mutual relationship between the dependent and independent variables. The relationship coefficient between OS and RTA is 0.593, N and RTA are 0.534, PVS and RTA are 0.429, OS and PVC are 0.323, and N and PVC are 0.236, respectively. The study demonstrated a positive linear relationship between the independent variables on the dependent variable.

**Test of Hypothesis**

**Table 7: Summary of Hypothesis Testing**

	Relationship/ Impact	Outcome
H1	Overspeed - Road traffic accident	Supported
H2	Negligence - Road traffic accident	Supported
H2	Poor vehicle condition - Road traffic accident	Supported
H3	Gender -- over speed, Negligence, poor vehicle condition, and Road traffic accident	Not supported exception of negligence

Table 5 revealed the relationship between speed, negligence, and poor vehicle condition in road traffic accidents. Finally, the study found that gender has no impact on speed and poor vehicle conditions, and road traffic accidents, whereas gender has an impact on negligence.

**Discussion and Conclusion, implication and Scope for future research**

**Discussion**

The study showed a relationship between speeds in road traffic accidents. The result is consistent with Shrestha's (2013) explored causes of RTAs and deaths due to over speed, overtaking as major causes.

The study also showed a relationship of negligence on a road traffic accident. The result is consistent with Shrestha's (2013) explored causes of RTAs and deaths due to negligence, over speed, and overtaking as major causes. It is also similar to Shrestha's (2013) explored causes of RTA and deaths due to negligence overtaking as major causes. It is also consistent with Shantajit, Kumar, & Zahiruddin's (2018) results that the cause of road traffic accidents in India is mainly due to the fault of the driver's defective motor vehicles, poor condition of the roads, etc. (Dhakal (2018) observed that the vehicle factor and overloaded cause the road accident.

The study also showed a relationship between poor vehicle conditions and road traffic accidents. The result aligns with Srinivas Kumar & Srinivasan (2013) concluded that poor vehicle condition is attributed to an external factor influencing road accidents. It is also similar to Shrestha (2013) explored causes of RTAs and deaths due to poor condition of the vehicles, with overtaking as major causes. It is also consistent with Shantajit, Kumar, & Zahiruddin (2018) resulted that the cause of road traffic accidents in India is mainly due to defective vehicles, poor condition of the roads, etc. (Dhakal (2018) observed that the vehicle factor and overloaded cause the road accident.

## Conclusion

Based on data analysis and examining the determinants of road traffic accidents on a comprehensive set of characteristics, it has been concluded that there is a positive relation between speed and negligence in road traffic accidents. In contrast, poor vehicle condition is a major cause in the context of Nepal. The result is supported by previous research. Hence, vehicles should be checked from time to time, maintained, and repaired as per required. Moreover, there should be the provision of pretending negligence of divers and discouraging over speed to minimize road traffic accidents.

## Implication and Scope for future research

The vehicle users are implied to be conscious regarding the causes of road accidents and drive safely to prevent themselves from road traffic accidents. The drivers must drive under the directed speed limit and follow the rules and regulations of the government related to road safety. They should be conscious and evaluate all the factors affecting road accidents. Similarly, vehicle owners and drivers should be aware of accidents caused by poor vehicle conditions and take care occasionally to improve vehicle quality. Likewise, the government needs to strictly regulate and monitor negligence and over speed of vehicles to control road traffic accidents in Nepal. Future research can study other impacting factors on the road traffic accident of the general public with a larger sample size with new analytical tools. The future researcher can study the impact of other independent variables on road traffic accidents in a broad area.

## References:

- Dhakal, K. P. (2018). Road Traffic Accidents in Kathmandu Valley. *Journal of Health Promotion*, 6, 37-44.
- Elvik, R., Christensen, P., & Amundsen, A. (2004). Speed and road accidents: An evaluation of the power model. *The Institute of Transport Economics TOI*.
- Fieldwick, R., & Brown, R. J. (1987). The effect of speed limits on road casualties. *Traffic Engineering and Control*, 28, 635-640.
- Gliem, J. A. & Gliem, R. R. (2003). *Meta-analysis of alpha Cronbach's coefficient*. Midwest Research to Practice Conference in Adult, Continuing, and Community Education *Social Science and Humanities*, 3.
- Harith, S. H., & Mahmud, N. (2018). Technical Determinant of Road Accident: A Systematic Review. *International Journal of Engineering and Technology*, 7(3.36), 34-39.
- Heinrich, W. (1980). Application of Domino Theory to Justify and Prevent Accident Occurance in Construction Sites. *IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)*, 6.
- Islam, M., Alam, M., & Alharthi, M. (2019). The Impact of Climate Change on Road Traffic Accidents in Saudi Arabia. *Climate*, 7(103), 90-103.
- Jha, N., Srinivasa, D. K., Roy, G., & Jagdish, S. (2004). Epidemiological Study of Road Traffic Accident Cases: A Study from South India. *Indian journal of Community Medicine*, 29(1), 20-24.
- Kohli, G., Aathi, M. K., & Sethi, M. (2014). Road Accidents among Adolescents. *Research & Reviews: A Journal of Health Professions*, 4(1), 15-21.
- Kouabenan, D. R., & Guyot, J. M. (2004). Study of the causes of pedestrian accidents by severity. *Journal of Psychology in Africa*, 14(1), 119-126.
- Mishra, B., Sinha, N. D., Sukhla, S. K., & Sinha, A. K. (2010). Epidemiological Study of Road Traffic Accident Cases from Western Nepal. *Indian Journal of Community Medicine*, 35(1), 115-121.
- Shantajit, T., Kumar, C. R., & Zahiruddin, Q. S. (2018). Road Traffic Accident in India: An Overview. *International Journal of Clinical and Biomedical Research*, 4(4), 36-38.
- Sharma, S. M. (2016). Road Traffic Accidents in India. *International Journal of Advanced and integrated medical sciences*, 5(12), 57-64.
- Sherstha, B. K. (2013). Road Traffic Accidents in Kathmandu Valley. *The Third Pole: Journal of Geography Education*, 13, 54-56.
- Shrestha, V. L., Bhatta, D. N., Shrestha, K. M., GC, K. B., & Poudel, S. (2017). Factors and Pattern of Injuries Associated with Road Traffic Accidents in Hilly District of Nepal. *Journal of Biosciences and Medicines*, 5(12), 88-100.
- Srinivasa Kumar, P. V., & Srinivasan, K. (2013). A study on environmental factors influencing road traffic accident victims in the district hospital, Karimnagar. *International Journal of Research in Health Sciences*, 1(2), 80-83.
- Wangdi, C., Gurung, M. S., Duba, T., Wikinson, E., Tun, Z. M., & Tripathy, J. P. (2018). Burden, pattern, and causes of road traffic accidents in Bhutan, 2013-2014: a police record review. *International Journal of Injury and Safety Promotion*, 25(1), 65-69.
- Yero, A. S., Ahmed, T. Y., & Hainin, M. R. (2015). Evaluation of major causes of road accidents along North-East Highway. *Journal Technology*, 73(4), 39-43.