

Determinants of road traffic accidents in Nepal

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Abstract

Purpose - The purpose of this study is to examine the relationship of poor road condition, drunk driving and weather condition on road traffic accidents in Nepal. Another purpose is to evaluate the effect of gender on over speed, poor road condition, drunk driving, weather condition and road traffic accidents.

Design/methodology/ approach – The study targeted to drivers of two-wheeled and four-wheeled vehicle as population. 100 respondents were selected through a simple random sampling technique based on the police report list during last 5 years of Kathmandu valley. Primary data was sources of information for the study. It was collected by applying a well-structured survey questionnaire. Cronbatch'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, poor road condition, drunk driving and weather condition in terms of gender. Mean standard deviation, variance, and correlation were adopted to analyze the data in a systematic way to derive the findings for the study. **Findings** - The study found that there is a relationship between poor road conditions, drunk driving, and weather conditions on road traffic accidents in Kathmandu valley. The study also found that gender has no impact on poor road conditions, weather conditions, and road traffic accidents except for drunk driving. It can be concluded that poor road conditions and weather conditions are major factors causes of road traffic accidents.

Research limitation/ implications - The study evaluated only three explanatory variables i.e., poor road conditions, drunk driving, and weather conditions in the entire study so that future researchers can study other factors impacting the road traffic accident of the general public with a larger sample size with new analytical tools.

Originality/value –The list of the drivers who had got at least one time accident was obtained from police report. The study based on domino theory developed by Heinrich in 1980 to have outputs.

Keywords: Road traffic accidents, poor road condition, drunk drive and over speed

1. Introduction

An accident is something that happens without warning and usually results in negative consequences (Gulzar, Yahya, & Zafar, 2012). The idea that speed limits have a major impact on safety, both in cities and the countryside, was developed (Fieldwick & Brown, 1987). Adolescent accidents are typically brought on by things like excessive drinking, poor traffic judgment, ignorance, a penchant for risk-taking, and a desire to impress their peers. It has a global impact but a human face (Kohli, Aathi, & Sethi, 2014). As one of the top five causes of death and disability in South and Southeast Asian countries, road traffic accidents (RTAs) are a serious problem in the region. Based on previous research (Mishra, Sinha, Sukhla, & Sinha, 2010).

As the eighth biggest cause of mortality worldwide, road traffic accidents (RTA) have an enormous public health impact, on par with communicable and non-communicable diseases. Globally, over 1.24 million people every year meet an untimely end as a result of traffic-related injuries, while another 20-50 million get injuries that do not prove fatal. By 2030, traffic accidents are projected to rise to the fifth spot as a main cause of mortality worldwide. RTA cost the world economy 518 billion dollars. From 2009 to 2012, the number of deaths per every 10,000 registered vehicles in Nepal decreased from 17 to 12, according to a status paper on road safety in the country. Reporting from 2011, the World Health Organization found that 1.7% of all deaths in Nepal were caused by injuries sustained in road traffic accidents. Also, traffic accidents have cost the country 0.8% of its GDP (Shrestha, Bhatta, Shrestha, GC, & Poudel, 2017). Several different types of road defects contribute to the possibility of accidents happening (Harith & Mahmud, 2018). Road surfaces suffer extensive damage from the elements, which wash away road markings and wear away the protective layer of pavement that aids wheel grip (Srinivasa Kumar & Srinivasan, 2013).

Injuries and deaths from automobile collisions are among the leading causes of morbidity and mortality worldwide. Human factors mainly resulted from "careless and reckless driving," followed by intoxicated driving, failing to yield, and excessive speeding (Wangdi, et al., 2018). Road traffic accidents (RTAs) have increased dramatically for many reasons, including an increase in the number of vehicles on the roads, increased speeds, reckless driving, alcohol use behind the wheel, poor road conditions, ineffective traffic management, a lack of public awareness, pervasive indiscipline, inept authorities, and a failure to enforce existing laws (Sharma, 2016).

It has been determined statistically (Elvik, Christensen, & Amundsen, 2004) that there is a high correlation between speed and road danger. Similarly, out of the four possible causes of accidents (driver, pedestrian, driving circumstances, fate), pedestrian victims are typically blamed as the primary culprits (Kouabenan & Guyot, 2004). Alcohol use significantly correlates with the likelihood of being involved in a car crash. On the north-east highway connecting Bauchi and Potiskum to Maiduguri, speeding and poor road conditions are the leading causes of RTA (Yero, Ahmed, & Hainin, 2015).

When all the pieces of the system—roads, environment, vehicles, and drivers—interact in an unsafe fashion, the consequence is a traffic collision (Shantajit, Kumar, & Zahiruddin, 2018). The effects of weather conditions such sandstorms, high temperatures, and heavy rainfall on automobile accidents were studied by Islam, Alam, and Alharthi (2019).

Most collisions occur because drivers are unprepared for the roads, they are careless, and the roads themselves are in poor shape (Dhakal, 2018). There has been a lack of openness in the issuance of drivers'

licenses, and traffic laws and regulations have not been successfully implemented. Overcrowding on buses is a leading cause of accidents. There has been a dearth of studies focusing on the causes of traffic accidents in Nepal, making our research all the more crucial. To that end, this study seeks to investigate the following

1. What is the relationship of poor road condition, drunk driving, weather condition, and poor vehicles conditions on road traffic accidents in Nepal?
2. What is the impact of gender on poor road condition, drunk driving, weather condition, poor vehicles conditions and road traffic accidents in Nepal?

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

To examine the relationship of poor road condition, drunk driving and weather condition on road traffic accidents in Nepal.

To evaluate the effect of gender on over speed, poor road condition, drunk driving, weather condition and road traffic accidents in Nepal.

The domino theory:

According to Heinrich's (1980) domino hypothesis, accidents occur when a series of factors come together and topple one another. One domino's fall sets off another, and so on. Unsafe human behavior accounts for 88% of accident causes, while unsafe activities account for 10% and acts of God account for 2%. The workers' personalities, attributes, and the root causes of accidents are all discussed in the social environment and ancestry domino. According to Heinrich (1980), an injury that could have been avoided occurs as a result of a chain of causal events that follow a specific and predictable pattern. Accidents are "events such as falls of humans, strikes of persons by flying items are typical accidents that cause injuries," he says. When all of these things come together to make a bad situation, that's when an accident happens. In his "Explanation of Factors," Heinrich explains that accidents cause injuries like wounds and shattered bones. It has been pointed out that the domino model only accounts for one dimension. Most accidents involve several contributing factors and unfold over a lengthy chain of deviations and missteps. According to the idea presented here, all accidents, no matter how slight, have an underlying cause; there is no such thing as a lucky accident. In huge businesses and with complicated technologies, it is unusual to find a single cause for an accident. Most accidents have multiple factors working together to cause them.

More accidents occur when roads are ruined by rain and when there is heavy daytime traffic, as discovered by Srinivasa Kumar and Srinivasan (2013). Negligence, excessive speed, intoxicated driving, poor vehicle maintenance, overtaking, and other factors were identified by Sherstha (2013) as primary causes of RTAs and fatalities. Research also shows that drunk driving plays a major role in both RTAs and fatalities. Wangdi et al. (2018) found that careless driving and drunk driving were major contributors. Eighty-six percent of the fatalities were automobile occupants, mostly drivers and passengers. It was not possible to obtain information about patients who died while still in the hospital or those who died after they were released. RTA causes a loss of productivity equal to about one percent of national GDP.

According to Dhakal (2018), the driver's disregard for the weather and road conditions was to blame. The survey confirmed what many people already knew: that the Kathmandu valley has the highest rate of road traffic accidents in the country. Most people who die in vehicle accidents or bicycle accidents are young people. According to research conducted by Shantajit, Kumar, and Zahiruddin (2018), the primary contributor to road traffic accidents in India is the negligence of the driver. The weather, faulty automobiles, deteriorating roads, and other factors also have a role. Temperature, precipitation, sandstorms, and vehicle density were found to be statistically and significantly responsible for RTAs in Saudi Arabia during the study period by Islam, Alam, & Alharthi (2019). Understanding the effects of climate change on RTAs, as revealed by the results, would aid policymakers in implementing effective measures to reduce the risks posed by climate change.

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.

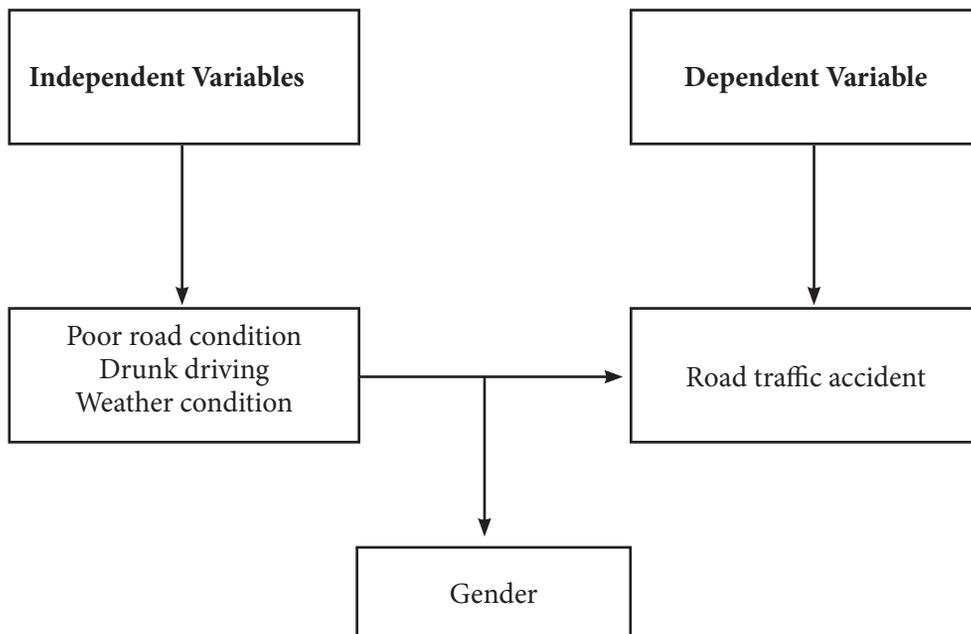


Figure 1: Conceptual Framework

H1: There is relationship of poor road condition on road traffic accidents in Nepal.

H2: There is relationship of drunk driving on road traffic accidents in Nepal.

H3: There is relationship of weather condition on road traffic accidents in Nepal.

H4: There is the effect of gender on poor road condition, drunk driving, weather and road traffic accidents in Nepal.

Defining the variables

Poor road condition: The potholes, faulty design, eroding and narrow roads, deep ridges caused by extreme weather, and blind curves are defined as poor road condition. A poor road condition is regarded as major cause for road accident. This poorly maintained can cause serious crashes resulting in serious injuries. The vehicle coming behind may dash on it resulting in an accident.

Drunk driving: Drunk driving is defined as driving under the influence of alcohol. Drivers drive carelessly and recklessly after the consumption of alcohol which often leads to road accidents. It is the offense of driving a vehicle after having amount of alcohol that is legally allowed. It is also defined as the crime of driving while classified as under the influence of alcohol because the quantity of alcohol in your blood exceeds legally permitted levels.

Weather condition: A weather-related accident is one that occurs in any adverse weather situation, such as sleet, snow, rain, fog, winds, or on slick pavement. When the roads are wet after a downpour, more accidents occur than in any other sort of poor weather. Roadway capacity may be reduced owing to snow accumulation, debris driven onto the road by severe winds, or road closures due to hazardous circumstances.

Road Traffic Accident: It is described as an accident that occurred on the road between two or more items, one of which must be a moving vehicle (Jha, Srinivasa, Roy, & Jagdish, 2004). In South-East Asian countries, it is one of the top five causes of morbidity and mortality. Mishra, Sukhla, and Sinha (2010) Road traffic accidents are a common public health hazard worldwide, and have been identified as the eighth biggest cause of mortality, with similar consequences to other communicable and non-communicable diseases. It is a leading cause of death and injury worldwide.

2. Methods

The design of this study was descriptive and explanatory. All drivers of two-wheeled and four-wheeled vehicles who had at least one time accident inside the Kathmandu valley made up the study's population. The 643 drivers who had got at least one time accident that were obtained from police report list of during 4 years. However, it was impossible to take into account the entire population, so 100 respondents were chosen using the simple random sampling technique and distributed questionnaire them to have responses for the study. Out of them, 79 questionnaires were returned, and 72 of them had responses, representing a response rate of 72%. Primary data was the study's main sources of information. Data was gathered using a well-structured questionnaire. The questionnaire was developed in 5-point Likert scale, where point 1 indicates a strong disagreement and point 5 indicates a strong agreement. The data have been entered into an SPSS 26 version spreadsheet. The study employed statistical tools such mean, standard deviation, variance, independent sample t test, and correlation were employed to analyze and interpret the data and information to have outputs.

3. Results

Reliability Analysis

Each question in the data set was examined for validity and reliability using Cronbach's alpha (Gliem & Gliem, 2003). The constructions, which included variables including excessive speed, bad road conditions, drunk driving, weather, and traffic accidents, had been carefully validated to ensure the accuracy of the results. The items' reliability suggests that the scale in the following table is accurate.

Table 1: Reliability of the study variables

S.N.	Variables	Cronbach's Alpha
1	Poor road condition	0.745
2	Drunk driving	0.693
3	Weather condition	0.721
4	Road traffic accident	0.713

Source: Field Survey, 2021

Table 1 presented the values of a Cronbach's alpha have of 0.745, 0.693, 0.721, and 0.713 of over speed, poor road condition, drunk driving, and weather condition and road traffic accident respectively. Cronbach's Alpha is larger than 0.700 for all variables in the table exception of drunk drinking. 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	
Age Group	Frequency	Percentage	Cum %
Below 20	13	18.1	18.1
20-25	44	61.1	61.1
Above 25	15	20.8	100
Total	72	100	

Source: Survey, 2021

Table 2 included 50 men and 22 women. The sample had fewer women than men. 69% of responders were female and 30% were male. It also showed that the bulk of respondents were 20-25 years old (61.10%), followed by those over 25 (20.80%), and those under 20 (18.10%).

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 showed that 75% of respondents used two-wheelers, followed by 25% who used four-wheelers. Kathmandu valley residents prefer two-wheeled over four-wheeled vehicles.

5.2 Descriptive Statistics Analysis

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

Table 4: Descriptive statistics for the whole sample

The 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
Poor road condition	3.89	0.642	0.48
Drunk driving	3.65	0.572	0.67
Weather condition	2.97	0.613	0.36
Road traffic accident	3.15	0.535	0.19

Source: Survey, 2021

Table 3 showed the mean, standard deviation, and variance of the variables. The mean of all the variables is bigger than 3.00 exception of weather condition. 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
Poor road condition P- Value = 0.097	Male	37	3.78	0.613
	Female	43	3.91	0.671
Drunk driving P- Value = 0.047	Male	37	3.47	0.642
	Female	43	3.84	0.593
Weather condition P- Value = 0.097	Male	37	2.88	0.587
	Female	43	3.08	0.622
Road traffic accident P - Value = 0.056	Male	37	3.12	0.671
	Female	43	3.18	0.522

Source: Survey, 2021

The table 5 revealed that there is no difference in the poor road condition across male and female because the p-value is 0.097, which is larger than 0.05. Similarly, there is difference in drunk driving between male and female because the p-value is 0.047 lower than 0.05. There is no difference in weather condition between male and female because the p-value is 0.097 which is greater than 0.05. There is no difference in road traffic accident between male and female because the p-value is greater than 0.05, i.e. 0.056.

Correlation Analysis

Person's correlation has been adopted to measure the relationship between dependent variable and independent variables. Table 4 demonstrated the correlation analysis of the variables under investigation, which is used to see how dependent and independent variables are related. Here, PRC = Poor road condition, DD = Drunk driving, WC= Weather condition and RTA= Road traffic accident.

Table 6: Correlation table

	PRC	DD	WC	RTA
PRC	1			
DD	0.465**	1		
WC	0.362**	0.535**	1	
RTA	0.429**	0.656**	0.399**	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 PRS and RTA is 0.429, DD and RTA is 0656 and WC and RTA is 0.399 respectively. The study showed that demonstrated a positive liner relationship of independent variables on dependent variable.

Test of Hypothesis

Table 7: Summary of Hypothesis Testing

	Relationship/ Impact	Outcome
H1	Poor road condition - Road traffic accident	Supported
H2	Drunk driving - Road traffic accident	Supported
H3	Weather condition - Road traffic accident	Supported
H4	Gender -- poor road condition, drunk driving, weather condition and Road traffic accident	Supported except of drunk driving

Table 5 revealed that there is relationship of poor road condition, drunk driving and weather condition on road traffic accident. Finally, study found that gender has no impact exception of drunk driving.

4. Discussion and Conclusion, implication and scope for future research

Discussion

There is a link between poor road conditions and traffic accidents. The findings are consistent with Sriniva Kumar and Srinivasan's (2013) conclusion that bad road conditions are an external factor influencing traffic accidents. According to Mishra, Sinha, Sukhla, and Sinha (2010), non-collision incidents like as running off the road, overturning, and pedestrian knocking down were found to be substantially associated with narrow and faulty road conditions. According to Shantajit, Kumar, and Zahiruddin

(2018), the cause of road traffic accidents in India is primarily due to the fault of the driver, defective motor vehicles, poor road conditions, and so on.

Similarly, there is a link between intoxicated driving and road traffic accidents. The findings are consistent with (Wangdi et al., 2018), as the study found that the impact of alcohol and reckless and careless driving while driving were the leading causes of road traffic accidents. According to Sherstha (2013), the top causes of RTAs and deaths include negligence, overspeeding, intoxicated driving, poor vehicle condition, and overtaking.

There is a link between weather conditions and road traffic accidents. According to Shantajit, Kumar, and Zahiruddin (2018), the cause of road traffic accidents in India includes weather conditions, malfunctioning motor vehicles, and so on. According to Alharthi (2019), temperature, rainfall, sandstorms, and the number of cars were statistically and significantly responsible for RTAs in Saudi Arabia during the study period. The findings are comparable to those of Srinivasa Kumar and Srinivasan (2013), who discovered that more accidents occur owing to road deterioration caused by rainfall and high traffic density throughout the day.

Conclusion

According to the findings of an analysis of the data and an examination of the factors that determine road traffic accidents based on a comprehensive set of characteristics, it has been concluded that there is a positive relation between drunk driving and road accidents. On the other hand, poor road conditions and improper driving skills are the two primary causes of road traffic accidents.

Implication and scope for future research

Vehicle users are expected to be aware of the causes of road accidents and to analyze all elements that influence road safety. Drunk driving should be discouraged among drivers in order to lessen the severity of road accidents. Similarly, the government should be aware of incidents caused by poor road conditions and take steps to improve road quality. Future study can be conducted on other factors influencing road traffic accidents among the general population with a larger sample size and new analytical tools. In the entire study, only three explanatory variables were addressed, namely poor road conditions, intoxicated driving, and weather conditions, so that future researchers might study other factors influencing general public road traffic accidents with a bigger sample size and new analytical methods.

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