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Road traffic deaths and injuries in Kathmandu

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Abstract

Road accidents account for the eighth leading cause of death for all ages in the world. The roads in Nepal are one of the most dangerous in the world, putting road users at greater risk, due to geographical and human causes. Pedestrians, motorbikes, and cyclists are the most vulnerable road users in the Kathmandu Valley. This paper aims to describe the trend of road traffic deaths and injuries in Kathmandu from the perspective of a safer road user policy. A descriptive retrospective study was done based on the information provided by the Metropolitan Traffic Police on road traffic crashes. In the study, the data on road traffic crashes, injuries, and deaths from all types of vehicles over five successive years were obtained from Traffic Police Office, Kathmandu in March-November, 2020 whereas, all the existing national road safety policies and strategies were collected from secondary data. The collected data were analyzed through MS Excel and represented in tables, bar diagrams, and pie charts. From the five successive years' trend on road traffic injuries and deaths in Kathmandu, it was analyzed that the number of road traffic accidents in FY 2019/20 was 1.5 times higher than in 2018/19. The fatality rate increased to 0.4 per 100,000 population in FY 2019/20 where the fatality of the male population was higher than that of females and the majority of them were of the age group 16-35 years. The death and injury ratio was calculated which showed that the ratio was higher in FY 2019/20 indicating mild injuries and 2 severe injuries. The main causes of traffic accidents were road user negligence, speeding, and overtaking operations. In conclusion, the majority of the young population is prone to be at risk of road traffic accidents and deaths which are preventable.

Keywords: Kathmandu, road accident, road death, road injuries, road safety

Introduction

Background

Road users are those individuals using roads (International Road Federation [IRF], 2019; British English Dictionary, 2017), who are non-motorized road users that include pedestrians, cyclists, horse riders, passengers of public as well as private vehicles; and motorized road users

such as bike and scooter riders, car drivers, bus/taxi/truck/tipper drivers, and tempo-drivers. Vulnerable road users are those who are highly at risk of getting injured or killed in traffic crashes and these vulnerable road users represent more than half of road traffic fatalities (World Health Organization [WHO], 2020).

Road safety is one of the most serious public health and development challenges in the world (National Council for Educational Research and Training [NCERT], 2019). Approximately, 1.35 million people die and 20-50 million get injured each year as a result of road traffic crashes (RTCs) (WHO, 2018c). Roads can be made safe if road traffic injuries and deaths are controlled. Road traffic crashes and injuries involve massive costs to often overburdened healthcare systems, occupy scarce hospital beds, consume resources and result in significant losses of productivity and prosperity with deep social and economic consequences (WHO, 2020a).

Of all the systems that people have to deal with daily, road transport is the most complex and the most dangerous one (Mittal, 2018). It is the eighth leading cause of death for all ages (WHO, 2018c). It is also the second leading cause of death in the economically active population group of 15-44 years of age. More than 75 percent of RTC causalities occur in the above-mentioned age group (Teferi & Samson, 2019).

The Rationale of the Study

According to the Traffic Police, in the first 51 days of the first lockdown during the COVID-19 pandemic, 255 vehicles crashed in the Kathmandu valley resulting in 10 human casualties. In the crashes, seven people were severely injured and 64 sustained normal injuries. Although the number of crashes was comparatively low, the fatality rate remained consistent (Nepal Traffic Police, 2020). The most vulnerable agent among these complexities was road users (WHO, 2018c).

Pedestrians and cyclists represent 26 percent of all deaths, while those using motorized two- and three-wheelers comprise another 28 percent. Car occupants make up 29 percent of all deaths and the remaining 17 percent are unidentified road users (WHO, 2018, 2018a). People with disabilities or reduced mobility and orientation are also included as vulnerable road users (IRF, 2019). In most crashes, the victims are pedestrians, cyclists, or motorcyclists, and road crash deaths and injuries disproportionately affect the poor and most vulnerable including children and youth (Schafer, 2020). In Nepal, it is often observed that there are better policies, plans, and strategies but the problem lies in their implementation. Furthermore, vulnerable road users are largely neglected while making plans and policies in Nepal (Shafiq, Dahal, Siddiquee, Dhimal, & Jha, 2019).

The course of road traffic deaths and injuries was observed since 2000. In the fiscal year 2017/18, a total of 2541 people died with a fatality rate of 8.59 per 100,000 population, whereas, there were 4144 people seriously injured and several minor injuries were reported. To the WHO report in 2016, the estimated fatality rate was 15.9 per 100,000 population, which is nearly double the official estimates (World Bank, 2016). The vulnerable road users accounted for around 72 percent of all road fatality victims, among the highest level in the region, with pedestrians accounting for half of these. Road deaths have a disproportionate impact on the young and working-age population (World Bank, 2016).

About 40 percent of people killed on Nepal's roads in 2017/18 were less than 26 years old. In 2016, transport injuries were the second leading cause of death among men aged 15-49 years (World Bank, 2016). So, more attention is required to understand the needs of pedestrians, cyclists, and motorcyclists, who have been largely neglected while planning policies (WHO, 2019). The policies that were approved decades ago haven't been revised in Nepal. The only action plan looking for road users is the Decade Action Plan (2011-2020).

The total population of Kathmandu is 1,424,000 with an annual increment of 3.49 percent. The population of Kathmandu comprises 4.88 percent of Nepal (Government of Nepal [GoN], 2019). The total number of registered vehicles in Kathmandu valley is 444,759 which is an increasing trend (Adhikari, 2014). If we calculate the population with several vehicles then everyone in three-person has a vehicle in Kathmandu. That is why it is very important to consider the safety of people residing in Kathmandu. This study tries to bring out the situation of road accidents and the road safety status of Kathmandu in light so that the national policies would address it in the future.

Research Objective

The research was conducted to describe the road safety status (the trend of road traffic injuries and deaths) in Kathmandu with an appraisal of the national policies on the safety of road users.

Methods and Materials

The descriptive retrospective method of analysis was used for trend analysis of road traffic injuries and deaths. Descriptive retrospective studies are case series and cross-sectional studies where the results of the interest have already occurred (Talari & Goyal, 2020). The quantitative method was used for data analysis. The study was conducted in two phases. In the first phase, different road safety policies were compiled and extracted from the policies targeted at road users, further critical analysis was also done. From the selected policies and strategies, activities, achievements, and challenges were critically analyzed.

In the second phase, the information for trend analysis obtained from the traffic police was presented. Police-registered road crashes information was used to quantify the trends of road traffic crashes, injuries, and deaths in Kathmandu valley. In all road traffic crashes; road users are vulnerable and likely to die or get injured. That is why it is important to focus on police data records on road traffic injuries and deaths. The information about the variables investigated was obtained from official records or depends on the memory of the participants, therefore, this study was based on the traffic accident information provided by the Metropolitan Traffic Police over the last five years (2016-2020).

The target population in the study was the vulnerable road users including pedestrians, cyclists, and riders of motorized two-wheeler and their passengers, the passengers hanging off the sides of buses or overcrowded minibuses or buses. People with disabilities or reduced mobility and orientation are also included as vulnerable road users (IRF, 2019). The policies and regulations in favor of these road users were included in the study.

The techniques like desk review, retrospective method of analysis, and critical analysis were used. For the policy review, desk review and critical analysis were used as the technique.

For trend analysis of road traffic injuries and deaths; the retrospective method of analysis was used. The five successive years of road traffic injuries and deaths records were used for the quantitative analysis. On the other hand, the policies of road safety were extracted from the online websites of the Ministry of Physical Infrastructure, Transport and Department of Roads and other related Google search.

The secondary data were collected with the approval of the Traffic Police Officer. Inspector was asked to contact the data management section of the traffic police office. During the visit to the office; staff members were recording crashes at every moment. Depending upon the need for study, the data on road traffic crashes, injuries, and deaths in five successive years of Kathmandu were provided.

For policy review, all the existing national policies of road safety were used. But since the study focused on road users so, policies related to the safety of road users were extracted from each national policy on road safety. For the achievement of the implementation of road user policies, other publications, journal articles, and newspaper articles were also used. The quantitative data were analyzed on the frequency and percentage distribution and managed in graphical representation where bar diagram, pie chart, and tables.

Results

Road Safety Policy with a Special Focus on Road Users

There are certain risk factors to address the safety of road users. The policies, laws, and regulations of the country must be based on the management of risk factors to keep the safety of road users. These risk factors are the road safety measures which are shortly enlisted below (Government of Australia [GoA], 2004):

- Training centers for drivers to learn to drive
- Driving license procedure
- Route permit/Use of vehicle number plate
- Knowledge of traffic lights signal and traffic signs
- Use of seat belts and helmets
- Speed limitation system
- Use of mobile phones while walking/driving
- Alcohol consumption and driving/drink drive
- Insurance scheme for drivers, passengers, and pedestrians
- Lane separation system
- Use of zebra crossing, over-bridge system, and sidewalks

These indicators were utilized to find out about the existing policies of Nepal to address the safety of road users. The policy on road safety was introduced in 1970 through Nepal Road Standard, 1970. There are several national policies on road safety but only a few of them have directly focused on the safety of road users. Such policies include:

- Nepal Road Standard, 1970
- Public Roads Act, 1974
- Motor Vehicle and Transportation Management Act, 1993
- Traffic Sign Manual, 1997

- National Transport Policy, 2002
- Roads Board Regulation Act, 2004
- Nepal Road Safety Action Plan (2011-2020)

These policies were briefly reviewed and further activities and challenges were analyzed. Besides these policies, there is a newly revised action plan on road safety (2020-2030). The Nepal Road Safety Action Plan (2013-2020) was re-invigorated with a new council as a powerful, autonomous body to effectively coordinate safety efforts of stakeholders related to road safety management, safer roads, safer vehicles, safer road users, and post-crash response. The bill aims to review the existing policy and legal framework in which the new action plan will be incorporated to function (GoN, 2017).

The policies on the safety of road users in Nepal had brought out to be tremendously effective. But there are some challenges faced by the government of Nepal. Due to these challenges; the nation is unable to prevent and control the rates of road traffic injuries and deaths. Based on the literature reviewed, the following gaps/challenges were identified:

Table 1

Identified Gaps in Road Safety Policy for the Safety of Road Users

Safety measures	Gaps/Challenges identified
Anti-drink and drive	• Despite the suspension of driving licenses and fines for the offenders, most of the people in Nepal try to violate the rule. In the last fiscal year of 2019; about 40,000 cases were booked for drinking and driving (Nepal Police, 2019). • Traffic Police have allocated time for *MaPaSe* but it has been recorded that people drink and drive during the daytime to skip it (Nepal Police, 2019). • Many nightclubs in Kathmandu are open until dawn which has become a haven for drunkards to skip the *MaPaSe* and drive in the morning or daytime and have exist point for a drunkard (Nepal Police, 2019).
Seatbelt/ helmet use	• The low quality of helmets in the market has resulted in more death rates among motorcycle drivers in Nepal (Traffic Police, 2019). • Although the government had made helmets compulsory for pillion riders, the rule was not well received by the public, forcing traffic police to revoke it (Metropolitan Traffic Police, 2019). • There is no mechanism for checking the quality of helmets (Pradhan, 2019). • The four-wheeler vehicles lack child safety seats (Nepal Auto Trader, 2019).
Speed limit system	• No provision for reducing accidents by installing a modern device to control the speed of two drivers in the long route service (Department of Transport Management [DoTM], 2015a). • The speed breaker system is not functioning in the current situation. • In most parts of Nepal, the traffic rules are violated and people drive recklessly (Phuyal, 2016). • Schools and residential areas lack speed limit rules and their effective enforcement (Phuyal, 2016). • Nepal does not have any official motorway or any motorway speed limit (Phuyal, 2016). • People drive at high speed even in restricted areas where the speed limit is mentioned (Bhagat, 2017)
Traffic signs/signal	• Inadequate traffic lights on thoroughfares and main roads (Ojha, 2019b).

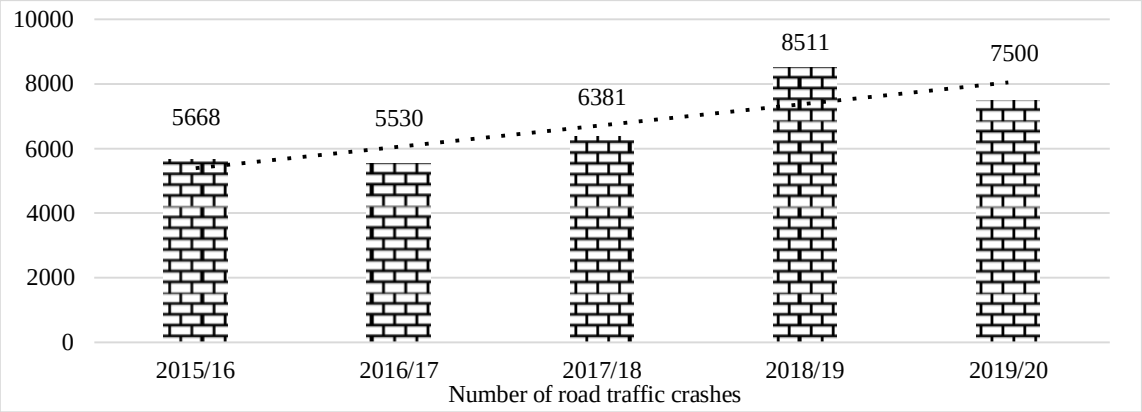
use	• Most road users are unfamiliar with the traffic signs and signals causing road traffic crashes (Pudasaini, 2019). • In most of the roads in Nepal; there are inadequate traffic lights and signals (Pudasaini, 2019). • Traffic signals placed on some roads aren't installed in visible places (Traffic Police, 2018). • Knowledge of traffic isn't incorporated into the education curriculum (Traffic Police, 2018).
Lane and sidewalk system	• Lack of enough sidewalks for pedestrians and insufficient separate lanes (Shrestha, 2019). • Limited road space: According to Metropolitan Traffic Police Division, in September 2019, the total length of the road is 4.5 million feet whereas, the single queue of all vehicles in the valley is across 7.2 million feet 2 (Ojha, 2019b). • Due to intensified road widening in the selected segments of roads in the capital; there is no separate cycle lane, and no sidewalk for pedestrians (KC & Bhandari, 2010). • Insufficient attention has been paid to the needs of pedestrians, cyclists, and motorcyclists (United Nations Economic Commission for Europe [UNECE], 2015).
Zebra crossing/ over bridge use	• Insufficient overhead bridges and unmanaged footpath vendors (Rashtriya Samachar Samiti [RSS], 2019). • About 60 percent of the zebra crossings in Kathmandu valley are faded and about 80 percent of the roads do not have zebra crossings. Due to this, people tend to cross the roads from undesignated areas (Ojha, 2019a). • The pedestrians are insecure in zebra crossings due to the negligence of drivers. The drivers do not stop their vehicles near the zebra crossings (Bhatta, 2017). • Most of the passengers carrying public vehicles drop and pick up from the zebra crossing and this obstructs the passers-by (RRS, 2018). • In the ring road of Kathmandu; there is no single zebra crossing along the 10.39 km road (Basnet, 2018).
Mobile phone use	• Four in one drivers are more likely to use mobile phones while driving a vehicle in Nepal (Banstola, 2019). • The number of drivers using mobile phones while driving is increasing in Nepal.
Insurance system	• Insurance for driving is less likely to be practiced in Nepal.
License system	• As the government has updated the digitalized system of licenses; there are more issues with the application being hacked (DoTM, 2020).
Training/ Workshop	• The training institutions are expensive for most of the people in Nepal so people try to learn on their own.

Five Years Trend of Road Traffic Deaths and Injuries in Kathmandu

This section provides brief information on the trend of road traffic deaths and injuries in Kathmandu. The information is based on Metropolitan Traffic Police Office, Kathmandu. The deaths and injuries are tabulated and shown in the following section.

Figure 1

Frequency Distribution of the Number of Road Traffic Crashes in Kathmandu from Fiscal Year (FY) 2015/16-2019/20



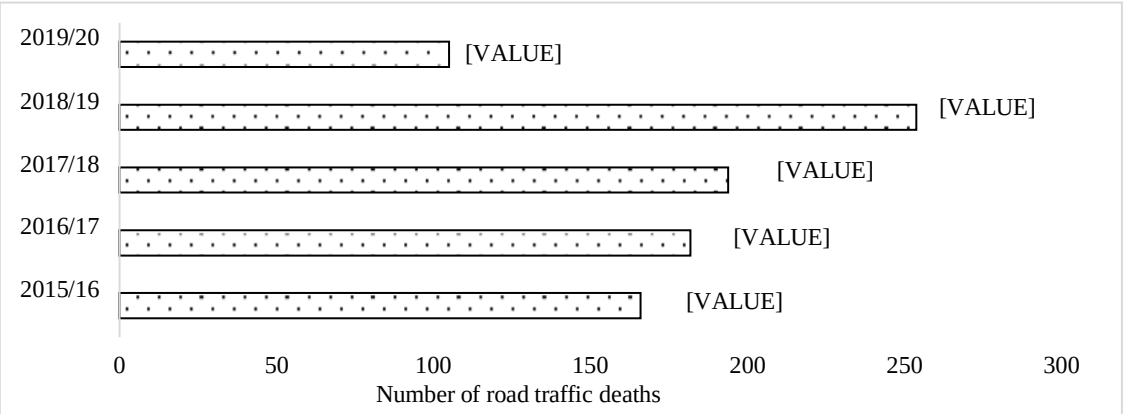
Source. Metropolitan Traffic Police, Kathmandu, 2020

The number of road traffic crashes was high in FY 2018/19. There were 8511 road traffic crashes in Kathmandu in FY 2018/19. It shows that the number of crashes in FY 2018/19 was 1.5 times more than the number of crashes in FY 2019/20.

Figure 2 below shows the number of road traffic deaths in Kathmandu within the five years of the trend.

Figure 2

Frequency Distribution of the Number of Road Traffic Deaths in Kathmandu from FY 2015/16-2019-20



Source. Metropolitan Traffic Police Office, Kathmandu, 2020

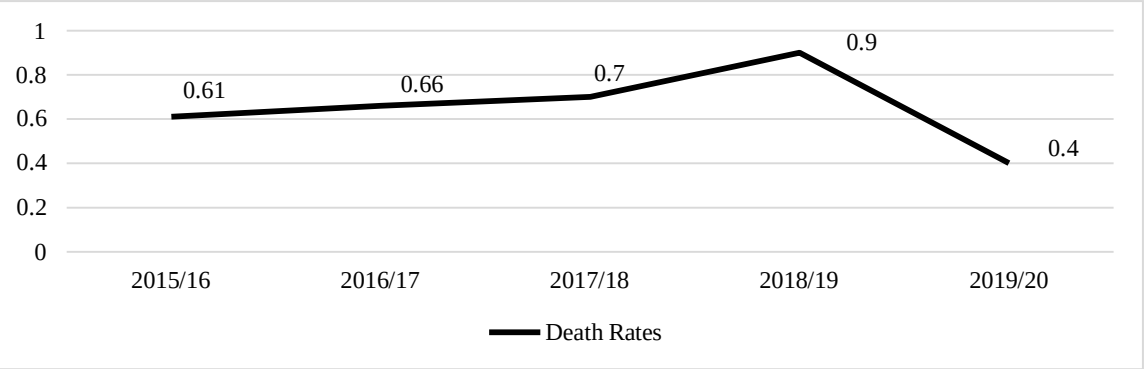
It shows that the frequency of deaths is increasing trends. In FY 2015/16, the number of deaths was 166 which increased in FY 2016/17 to 182 similarly, it increased to 254 in FY 2018/19. The cause-specific death rates were calculated by using the formula:

Cause-specific death rate= Number of deaths due to certain cause/Total Population* 100,000

Figure 3 below shows the mortality rates of road traffic crashes from the fiscal year 2015/16-2019/20.

Figure 3

Proportion Distribution of Road Traffic Death Rates in Kathmandu from FY 2015/16-2019/20



Source. Metropolitan Traffic Police Office, Kathmandu, 2020

As shown in figure 3, the death rate in 2015/16 was 0.6 per 100,000 population. It increased to 0.7 per 100,000 population in FY 2017/18. Similarly, it increased to 0.9 per 100,000 population in FY 2018/19 and dramatically decreased to 0.4 per 100,000 population in FY 2019/20.

Table 2 shows the frequency distribution of road traffic deaths sex-wise.

Table 2

Distribution of Road Traffic Deaths by Sex in Kathmandu

Fiscal year	Road traffic deaths				Total	Sex ratio
	Male		Female			
	n	%	n	%		
2015/16	130	78.3	36	21.7	166	361
2016/17	121	66.5	61	33.5	182	198
2017/18	147	75.8	47	24.2	194	312
2018/19	196	77.2	58	22.8	254	337
2019/20	83	79.0	22	21.0	105	377

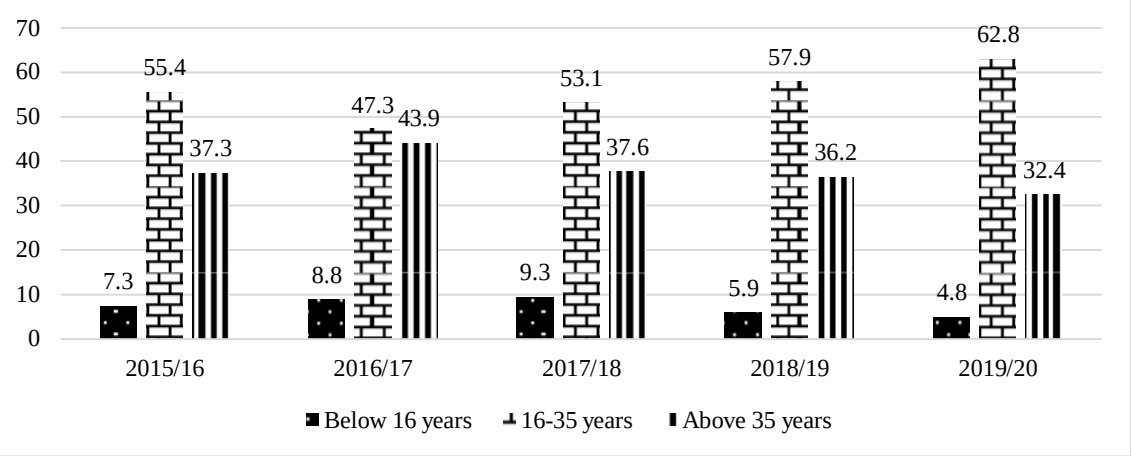
Source. Metropolitan Traffic Police Office, Kathmandu, 2020

The overall trend shows that males had more fatalities in road traffic crashes than females. When a female died in road traffic crashes, 4 males died in road traffic crashes in the fiscal year 2015/16. The sex ratio was 361 males to 100 females in FY 2015/16. Similarly, in FY 2019/20, the ratio was similar showing 377 males to 100 females were reported to die in road traffic crashes in Kathmandu. But in FY 2016/17; the sex ratio was different; it was 198 males to 100 females. In this fiscal year, the number of male death was twice more than the death of females. Figure 4 below illustrates the road traffic deaths based on the age of the population.

Figure 4

Figure 4

Percentage Distribution of Road Traffic Deaths by Age in Kathmandu from FY 2015/16-2019/20

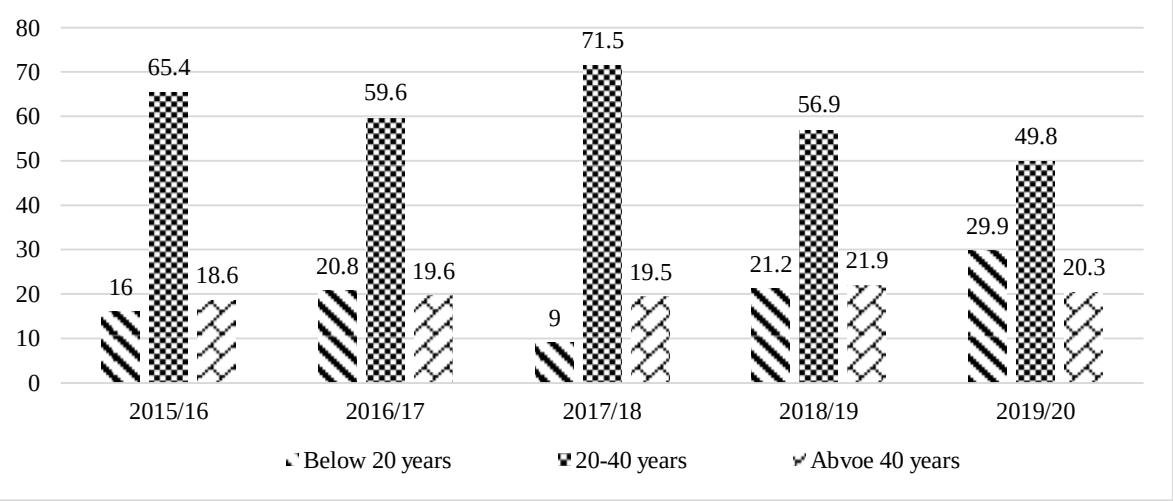


Source. Metropolitan Traffic Police Office, Kathmandu, 2020

The age group is categorized into three age range groups; below 16 years, 16-35 years, and 35 above. Majority of the population of the age group 16-35 years died from road traffic crashes followed by the age group above 35 years. In figure 5 below, the percentage distribution of the age group of drivers who were involved in road traffic crashes is explained.

Figure 5

Percentage Distribution of Drivers Involved in Road Traffic Crashes in Kathmandu



Source. Metropolitan Traffic Police Office, Kathmandu, 2020

The number of drivers involved in road traffic crashes under the age of 20 years was 1,619, 2046, 993, 3214, and 4060 in the five consecutive years. Similarly, in the age group of 21-40 years, there were 6607, 5860, 8224, 8350, and 6776 respectively in the last five years. The drivers in the age group above 40 years caused 1877, 1924, 2190, 3325, and 2757 accidents

in the FY 2015/16, 2016/17, 2017/18, 2018/19, and 2019/20 respectively. The total number of drivers involved in road traffic crashes in FY 2015/16 was 10103, in FY 2016/17 was 9830, in FY 2017/18 was 11507, in FY 2018/19 was 15190, and in FY 2019/20 was 13593.

The data relating to injuries were confined which is why depending upon the available resources on injuries; the following results were analyzed.

Table 3

Frequency Distribution of Injuries due to Road Traffic Crashes in Kathmandu

Fiscal year	Number of injuries		Number of deaths	Death-injury ratio
	Minor injuries	Severe injuries		
2015/16	3901	275	166	1:25
2016/17	3914	201	182	1:22
2017/18	4333	219	194	1:23
2018/19	5890	317	254	1:24
2019/20	4959	171	105	1:48

Source. Metropolitan Traffic Police Office, Kathmandu, 2020

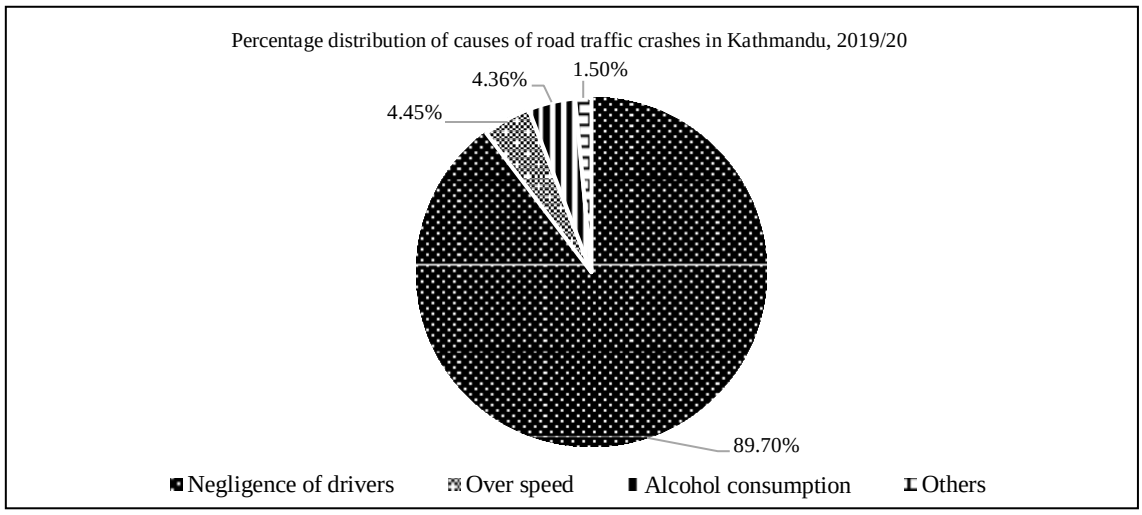
Table 3 shows the frequency distribution of the population who were injured in road traffic accidents. The total number of people who got injured in FY 2019/20 was 4959 among which those severely injured were 171 people. The number was higher in the FY 2018/19 with 317 severely injured people while 5890 suffered from mild injury.

In FY 2015/16, in one death to road traffic accident, 25 were injured, among which, 2 of them were severely injured. Similarly, in FY 2018/19, when the death occurred due to road traffic crashes there were 24 people injured. Among them, 1 was seriously injured. The ratio seems higher in the FY 2019/20, as 2 of them were severely injured out of 48 injuries. In figure 6 below; the causes of road traffic crashes reported by the Traffic Police in FY 2019/20 are shown.

Figure 6 shows that the main cause of road traffic crashes was the negligence of drivers followed by excess speed and alcohol consumption. Very few of road traffic accidents were caused due to the negligence of pedestrians and other causes like weather and junction.

Figure 6

Percentage Distribution of Causes of Road Traffic Crashes in Kathmandu in FY 2019/20



Source. Metropolitan Traffic Police Office, Kathmandu, 2020

Discussion

The five years trend of road traffic deaths and injuries showed that mortality and morbidity in increasing ratio every year in the Kathmandu valley. This is not only happening in Nepal but also in some other countries in South Asia. A study conducted in India from 1990 to 2017 showed that the trend of deaths in road traffic crashes is also in increasing trend (Kumaresh et al., 2019). The study conducted in Pakistan also revealed that road traffic deaths and injuries were in increasing trend (Hyder, Ghaffar, & Masood, 2018).

The findings showed that the most vulnerable age group to road traffic injuries and deaths was the young aged population; 16-35 years. The Global Status Report on Road Safety, 2018 showed that road traffic crashes were common among young adults of age 18-40 years (WHO, 2018b). Thus, the above age is considered the most vulnerable because most of them this age are bike riders, they have little knowledge about the road and traffic rules, and they are the most energetic but aggressive so, they are more likely to get involved in road traffic crashes, injuries, and deaths. So, the government should take action accordingly.

The data from the Nepal Police used in this study showed that the major cause of road traffic crashes was the negligence of drivers. Similar to the study; a study conducted in India showed that the major causes of deaths and injuries on roads were due to the negligence of drivers (Kumaresh et al., 2019). Although the study showed similarities but in a country like Nepal; most of the time, the drivers are blamed to cause crashes. It is often evident that the other factors are also equally contributory to the crashes but in the documentation; negligence of drivers is given the higher rank. That is why, a strict and direct investigation is required for identifying the real cause so that, the government and concerned authorities can work effectively.

A universal objective is to reduce the number and severity of crashes within the limits of available resources, science, technology, and legislatively mandated priorities (Nepal & Parajuli, 2014). That is why, the right interventions through strong and effective road safety policies are key elements and can make a significant positive impact to reduce road traffic crashes and injuries ("Road Safety in Australia," 2019). Many countries of the world comprising developed and developing have reduced or controlled road traffic crashes and injuries by the means of scientific and pragmatic policies, strategies, guidance, intervention, and evaluation (Mahmus, Talukder, Ahmed, & Raihan, 2013).

Education, engineering, and enforcement are prescribed as the major sectors to decrease the rate of road accidents (Ojha, 2021). A study conducted in Bangladesh showed that educating children on traffic rules is a major and effective preventive measure. It has justified that education measures need to be modified for children at a young age. The school should start with practical training of pedestrians as pedestrians, then bicyclist skills, and increasingly involve higher-level skills to match children's increasing independence as pedestrians, passengers, and bicyclists (Afifah & Hossain, 2017). Thus, Nepal should also prioritize the need for school education for the improvement of road safety for all road users.

Conclusion

The major findings of the policy review revealed that there are several policies for the safety of road users. The policies that were formulated decades ago are still in practice. In the recent road safety action plan; one of the pillars has focused merely on the safety of road users. The provision of insurance to the grief of vehicle owners, drivers/conductors, passengers, and third parties have been provided since 1997. Based on the type of road and geography, the speed limit has been allocated. The practice of separate lanes, use of zebra crossing, traffic lights and signals, and zero tolerance to drink and driving is highly focused on the policy.

The findings have shown that several activities were conducted to avoid road traffic accidents. They include license punching, suspension of driving licenses, penalty to the violators, random and periodic checking, separate lanes on some main roads, zebra-crossing and overhead bridge construction, sidewalks, and use of traffic lights on main roads have been implemented. Despite all these efforts, there are some challenges to ensuring the safety of road users. One of the main challenges is the negligence of road users, the encouragement of nightclubs to drunkard drivers, no provision of insurance schemes, and high premiums. From the findings, it is proven that most drivers drive at excessive speeds. There are inadequate sidewalks, traffic lights, signals, zebra-crossing, and sidewalks. Very few of the roads have separate lanes and the haphazard parking on the side of roads making the roads congested is the most common. Similarly, less attention is paid to pedestrians and cyclists. The trend of using mobile phones while driving is high in practice.

From the five successive years' trend on road traffic deaths and injuries in Kathmandu, it was analyzed that the number of road traffic crashes in the fiscal year 2018/19 was 1.5 times higher than in 2019/20. The frequency of deaths was in increasing trend but the death rate in 2019/20 was lower i.e. 0.4 per 100,000 population in comparison to the death rate in 2018/19 which was 0.9 per 100,000 population. The fatality of the male population was higher than that of the female and the majority of them were of the age group 16-35 years. It shows that the young aged population was at higher risk of road traffic crashes, injuries, and deaths. The data

have illustrated the age of the drivers as well which shows that the most common age group was below 20 years who were involved in road traffic crashes. The data relating to injuries showed that the injuries were higher. The death and injury ratio was calculated which showed that the ratio was higher in the fiscal year 2019/20 indicating 46 mild injuries and 2 severe injuries when a single death was recorded. The main causes of road traffic crashes were further analyzed which showed that the common cause was the negligence of road users followed by excessive speed and overtaking.

Thus, it is concluded that road traffic deaths and injuries are serious public health problems in Kathmandu. The national policies are formulated for the safety of road users. But there is inadequacy in implementing the policies. While reviewing it was found that very limited studies were conducted on this issue so, the national-level research is recommended on the safety of road users. The major causes of road traffic crashes were negligence of road users and over-speeding. The rate of injuries should be minimized by the proper use of protective equipment like helmets, seatbelt use, leg pads, gloves, mask, and goggles while driving on the roads. Self-awareness and internalization by the public are also expected. Public awareness should be encouraged and implemented effectively for this.

It is recommended that there must be multi-sectoral coordination among education and transportation ministries and departments for ensuring the awareness and safety of road users. Information and awareness through the education sector will develop positive attitudes among pedestrians and vehicle riders. There should also be coordination and collaboration of horizontal authorities with traffic police for the safety of road users. All the authorities of health, education, road and transportation, and vehicle manufacturing companies should work together for improvements in road safety. The preventive measures, including traffic knowledge on school curriculum and children's education, are highly prioritized. The traffic police are also recommended to work more effectively and efficiently to support the implementation of national policies regarding the safety of road users.

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