Accident Analysis: A case study of J&K

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Abstract:

In today's technological age, it appears surprising and eldritch owing to road accidentscaused by road user negligence on twisting hilly routes, which recur to bring and cause more lives and injuries. To reduce the number of lives and fatalities caused by road accidents in the research region, it is critical to offer corrective actions based on accident data analysis, such as improving the pavement condition and progressively increasing the factor of safety. However, according to a collective analysis conducted by MoRTH, more accidents happened in the research region of Jammu and Kashmir alone as a result of vehicle over-speeding and rain- induced lighting. The use of accident analysis limits the number of accidents to a minimum, as well as the amount of money lost in the economy. Total accidents that happened across the research region were 5836 in 2015 and keep on increasing every year. Last but not least, 2683 accidents happened in the month of July from 2015 to 2019 owing to tourist cars and melting snow, resulting in rapid deterioration of earthen shoulders. When the average fatality rate in Jammu and Kashmir due to traffic accidents is compared to the rest of India, it has been shown to be two times higher in recent years. Accident analysis and road maintenance in the study region of Jammu and Kashmir, on the other hand, might help to design strategies for avoiding accidents.

Keywords: Accident Analysis, J&K, Remedial Measures, Statistical Data Analysis.

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1. Introduction

The precise meaning of present-day study is to minimize the rate of road accidents and, subsequently, the rate of human "deaths and grievous" can be reduced effectively after that. Accidents due to roads are more prone and common compared to other ways of transportation depicted by analysis. Accidentsby road cause large quantities of accidents and vulnerability so far. Technology-based roads empowered the sign of reduction of road accidents, and advancement of transportation, modernization, development,and transformation of the nation can be enhanced as yet into consideration which ultimately played a vital role in the development of road and reduction of crashes too. Advancement and improvement of roads based on existing data can effectively reduce the overall and average no. of accidents.

1.1. Accident Scenario of India

The population growth during the stipulated time rapidly increases; subsequently, the rapid growth of vehicles and users expanded over to excess traffic flow will fall underdeveloped areas. Table 1 presents the accident scenario of India. Furthermore, after analyzing the data, it is concluded that accidents declined by +2.5% to -3.86% in the calendar year 2019, while killed accidents decreased from +4.6% to –0.20%, and in percentage number of injured persons falls from +1.4 to -3.86%.

Table 1. Total number of accidents and number of persons affected during years 2015-2019

Year	No of Accidents		No of Persons		Severity#
	Total	Fatal	Killed	Injured	
2015	5,01,423	1,31,726(26.3)	1,46,133	5,00,279	29.1
2016	4,80,652	1,36,071 (28.3)	1,50,785	4,94,624	31.4
2017	4,64,910	1,34,796(29.0)	1,47,913	4,70,975	31.8
2018	4,67,044	1,37,726(29.5)	1,51,417	4,69,418	32.4
2019	4,49,002	1,37,689(30.7)	1,51,113	4,51,361	33.7

figures in the parentheses indicate % share of Fatal accidents in Total Accidents. # Number of personskilled per 100 accidents.

1.2. Objective of the Study

To gather achievement of traffic accidents using annual data to get optimization of accidents in prone zones of the study area of Jammu and Kashmir.

Use of statistical data to bring up to more prior to developing prediction tools of road accidents in orderto get declination in the rate of accidents.

To suggest developing traffic signs, divided medians, pavement design, soil erosion meshes keep unmaintained roads, and underdeveloped areas desirable moreover to provide awareness campaign to road users tackle to drivers most being responsible.

1.3. Need of the Study

Crashes by road accidents formulated enormous situation to the country's GDP and health-based institutions; however, it becomes more alarming whenever young men are indulged and constitute a higher percentage of the population. Let it be more frequent that India contributes to the top of road accidents. To be more meticulous, it has been identified by the World Bank (WB) report and IBRD Indiacontributes to 11% of Global deaths leading to the weird situation in the nation. Furthermore, accidents in India due to roads possibly happened three times higher than in higher-income countries.

After learning various literature reviews and then gathering somehow information by manually and theexisting data of traffic accidents, it depicted to have more research in the study area of Jammu and Kashmir; by doing that, it seems to be predictively improvised on roads, the wellbeing of people, innovated designing, renovation of ditches, well panning through appropriation but other factors remain same to get diminishing recurrence and vulnerability of traffic accidents.

2. Literature Review

Nida et al. (2019). The primary goal of current research on India's traffic systems is to lower traffic accidents and traffic jams. Numerous accomplishments have been made, but more research and technological breakthroughs are required. Various ITS devices, in partnership with advanced engineering techniques, were used in the present research to decrease accidental injury and death, as well as damage to property, on a road stretch with a high accident rate [1]. **Singh and Suman (2001**) presented an accident prediction model. The goal was to determine the monthly and yearly fluctuation in accident rate, the influence of traffic volume on road crashes, and to create a model based on AADTand highway conditions [2]. **Valli (2005)** created traffic accident models for major metro areas. The primary goal of this research was to create models by analyzing traffic accident data using the concept of Smeed's and Andreasen's mathematical models. The study's key finding was that in attempt to lessen accidents, key policies could be changed to way of mitigating of personalised vehicles and inspire others to use public transportation [3]. **Singh and Misra (2004)** investigated a case study on traffic accident assessment and concluded that heavy traffic and encroachment are the primary causes of traffic incidents [4]. **Khan et al. (2022)** analyzed the accidental FIR data of Sonipat city in terms of month, year, cause, nature, type of accidents, etc. [5]. **Patel et al. (2017)** created a traffic accident model whose goal was toanalyze traffic fatalities that occurred in a specific stretch of road using a statistical approach given a large number of road users, particularly cars [6]. **Kharola et al. (2010)** studied the safety of the traffic and transport system by using a microanalysis system to find out the accident crashes and the flow of patterns involved in the public buses. However, they give a very strong suggestion that change of design of the bus by improving some various important things like automatic closing of the doors and windows,safer bus fronting, separated infrastructures for the bicycle and pedestrian crossing provided with propermarkings on the roads, in turn, it will be very helpful for safety point of view and less

destructive will occur on the roads so that lesser accidents on the roads [7]. **Elvik (2013).** A comprehensive review of research on the danger of crashes related to drug use while driving is provided. The use of drugs whiledriving increases the risk of serious and fatal incidents [8]. **Khan and Singh (2021)** carried out a studyto evaluate passenger car unit of e-rickshaw in order to help urban planners. E-rickshaws, nowadays, cause many accidents, especially on urban roads [9]. **Badgujar et al. (2017).** According to the Global Safety Report, more than 1.5 million people die in road traffic accidents globally annually. The likelihood of an accident occurring is determined by a variety of factors such as road surface condition,geometric patterns of the road, vehicle, pavement status, and weather condition, among others. For the past three years, data on traffic accidents along a 101-kilometer span of an Indian national highway weregathered to determine the influence of different parameters on road crashes. The use of regression models in data processing allows for the prediction of the accidents occurring in a given situation, and similar applications could be conducted out on another passageway to obtain a regression model of a similar nature [10].

3. Study Area and Data Collection

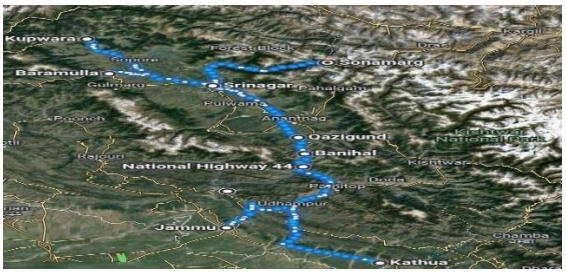

Figure 1. The map depicted the entire route of Jammu and Kashmir

Jammu and Kashmir, arranged between 320 17′ N and 360 58′ N latitudes and 730 26′E and 800 30′ E longitudes, is the extreme northern province of India. By that elevation encrypted by hilly areas, winter climatic features impact the pavement of roads drastically prompt landslides, snow accumulation causes skidding to vehicles, and roads cannot work as usual. Besides that, this study comprised the entire road of Jammu & Kashmir, having a total road length of 108,677.000 km (approx.1 lakh) and a highway length of 2423km. The map depicting the entire route of J&K is shown in figure 1.

Precise, thorough data collection is more important for road safety management. It additionally helps in better comprehension or understanding of accidents in depth. The fundamental issue behind inappropriate information or non-accessibility of information is the negligence or carelessness of concerned engineers or authorities. Total accidents recorded during the data collection period are shownin table 2.

Table 2. Total accidents recorded in Jammu & Kashmir

Sr.no.	Year	Total Accident	Fatality	Grievous Injury	Minor Injury
1	2015	5836	917	2342	5800
2	2016	5501	958	2095	7843
3	2017	5624	926	3805	3614
4	2018	5978	984	4169	3676
5	2019	5796	996	4224	3308
Total		28735	4781 (16%)	16635 (58%)	24241 (84%)

4. Data Analysis

Numerous accidents are occurring in the stretch of state of Jammu and Kashmir.

4.1. Nature of Accident wise distribution of Accidents

FIR studies show that other accidents contributed 71% of accidents while Hit & Run accidents are more than others, as shown in figure 2. Over-turning accidents are 8%, and Head on Collision accidents are also considerable as 4%. It is all because due to large no of traffic flow and over-speeding of vehicles followed by rain accumulation on roads caused slippery to vehicles and unprovided lanes marking caused undistributed traffic flow.

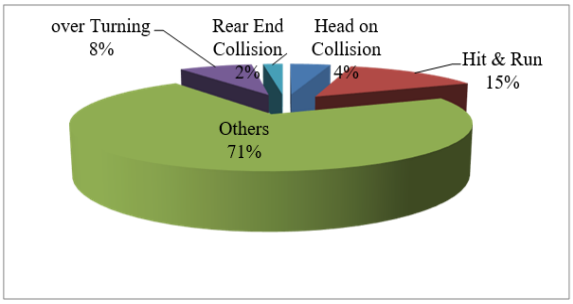

Figure 2. Nature wise distribution of Accidents

4.2. Classification of Accidents according to Type of Junction

More accidents occurred at Round About Junction, up to 42% of total accidents. Then, T-Junction does22% occupied as per the last five years has been considered while at Y-junction and at Four Arm Junction fewer accidents occurred as shown in figure 3.

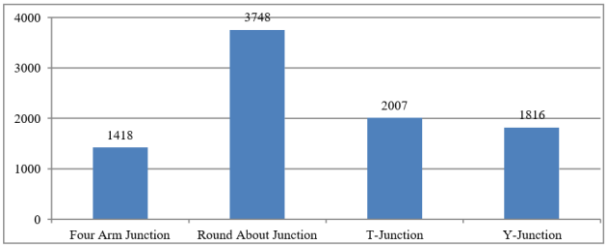

Figure 3. Distribution of accidents according to type of Junctions

4.3. Cause-wise distribution of Accidents

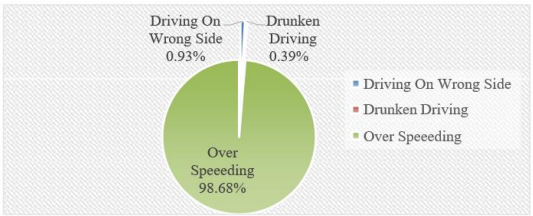

Figure 4. Cause-wise distribution of Accidents

Figure 4 depicts that accidents due to over speeding are far more than accidents due to any other cause. Negligence of driver while driving is the second most important cause of accidents while as least accidents occurred due wrong side driving & Visibility as per the FIR data of the last five years.

4.4. Distribution of Accidents according to Hitting vehicle

Heavy Commercial Vehicles (HCVs) are hitting vehicles involved in the most accidents as per the study from 2015-2019, as shown in figure 5. These vehicles are responsible for more accidents out of total accidents on selected roads, while buses, light commercial vehicles (LCVs) & 3-wheeler are involved in lesser accidents prevailing than others.

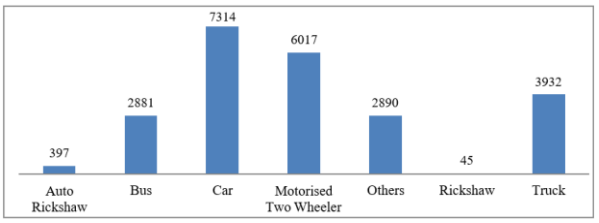

Figure 5. Classification of accidents according to hitting of vehicle

4.5. Distribution of Accidents according to Area Wise

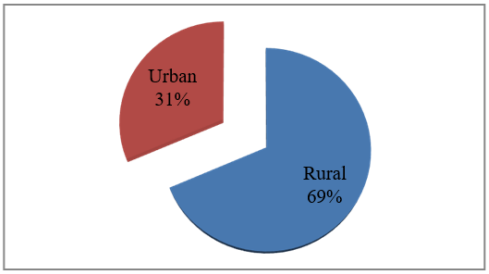

Figure 6. Distribution of accidents according to area wise

From the data, it has been identified that accidents that occur in the rural area are more than in urban areas; indeed, rural area accidents are 69%, while 31% of accidents have been identified in urban areas,as shown in figure 6.

4.6. Distribution of Accidents according to Age of Victim Vehicle

From the data, it has been identified that more accidents occurred in the age of 5-10, as shown in figure7.

4.7. Distribution of Accidents occurred on National Highway (NH)

As per the report, most national highway accidents occurred in the year 2017, followed by 2016 and then 2018. It has been identified vulnerable year was 2017 as far as accidents are

concerned. Also, it isshown that the least no of accidents happened in the concerned year 2015, as shown in figure 8.

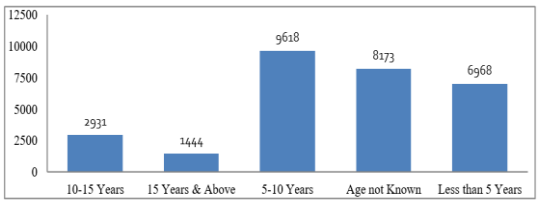

Figure 7. Distribution of accidents according to age of Victim Vehicle

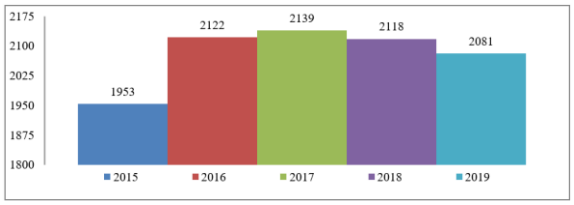

Figure 8. Distribution of accidents occurred on National Highway

4.8. Distribution of Accidents occurred on State Highway (SH)

As per this study, most accidents on state highways occurred in the year 2015, followed by 2017 and then 2018. it has been identified that vulnerable accidents happened in the year 2015, and also, it is shown that least no of accidents happened in the concerned year 2016, followed by 2019, as shown in figure 9.

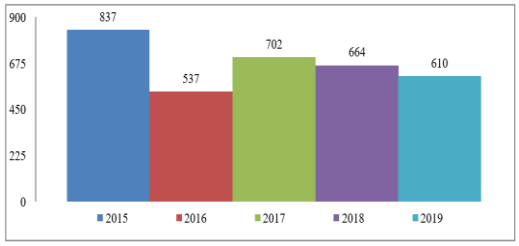

Figure 9. Distribution of accidents occurred on State Highway

4.9. Distribution of Accidents Per Lakh Population

Most accidents per lakh population occurred in the year 2015, followed by 2018 and then 2019. While least no accidents happened in 2016, followed by 2017, as shown in figure 10.

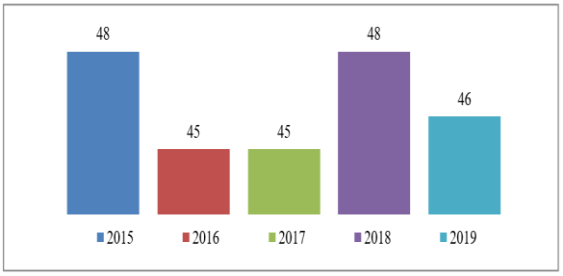

Figure 10. Distribution of accidents per Lakh Population

4.10. Distribution of Accidents per 10000 Vehicles

As per this distribution, most accidents per 1000 vehicles occurred in the year 2015, followed by 2016,as shown in figure 11.

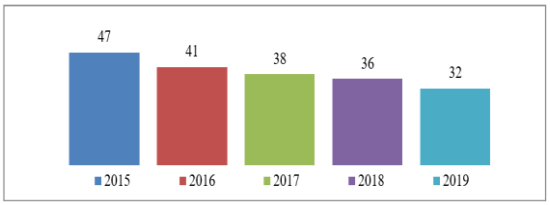

Figure 11. Distribution of accidents Per 10000 Vehicles

4.11. Distribution of Accidents per 1000 KM (Kilo Meter) of Road

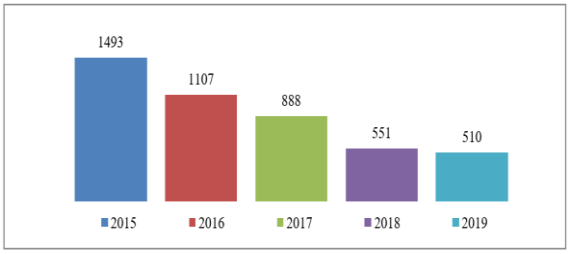

Figure 12. Distribution of accidents Per 1000 Kilometer of Road

Figure 12 shows the distribution of accidents per 1000 kilometers (km) of road. It has been identified that most accidents occurred in the year 2015, which was 1493, followed by in the year 2016 and then 2017.

4.12. List of Top Ten Blackspots

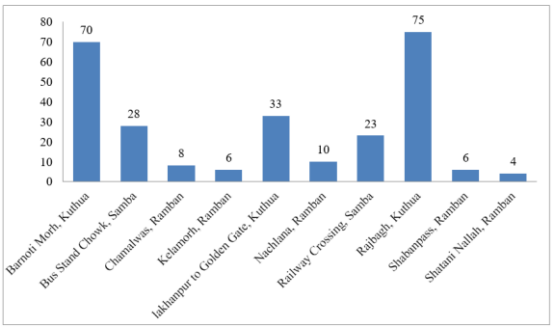

Figure 13. List of top ten black spots

Figure 13 shows the list of black spots. Out of 10 blackspots, 75 accidents occurred on Rajbagh blackspot alone.

5. Some Photos of the Study Area

6. Conclusion

The conclusion of the present study is as follows –

1. Road accidents took place in the study area from the years 2015-2019. However, we see in July a larger scale of accidents moveto happen (2683) than respected months it may due to fast deterioration of earthen shoulder byrain and melting of snow bring then to cause landslides in the hilly areas of Jammu and Kashmirat the end roads becomes slippery.
2. Hit & Run are involved in almost 15% of accidents, while 8% by overturning have been found from 2015-2019. The main reasons behind these accidents are the non-availability of pedestrian facilities, improper marking (marking not being brought on highways), and over speeding of vehicles involved.
3. As per the analysis of hitting-wise accidents, most of the accidents out of total accidents causeddue to hitting of vehicles are 7314, and it happened due cars and then most reasonable is Motorized Vehicles (MV), we see the reason being highly momentum of cars without being properly trained so far. Furthermore, if the use of personal vehicles could remain minimum in frequencies over to public vehicles may lower the rate of road accidents.
4. According to road conditions, data depicted most severe accidents occurred are 36% due to straight roads. In comparison, as 10% of accidents occurred due to curved roads, there was a lack of facilities for pedestrians, undivided roads, and minimum super-elevation.
5. In July, most accidents took place because of high traffic flow on very poor and few roads, so to get optimization and keep the frequency of road accidents minimum in scale.
6. Last but not least, mishaps invaded by the infrastructure deficit could further be minimized and procurement via definite

proportion on pavements let to controlled and maintained by the concerned department of safety in order to get necessary safety on the given study area. Hence, in this way, in the study area, the GDP of the nation and precious life may remain unaffected for a better future.

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