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# Road Traffic Accident Analysis and Prediction Model: A Case Study Of Kashmir

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***Abatract:*** ***Road traffic injuries are recognized globally as a major public health problem.In case of india, Road injury is one of the top four leading causes of death and health loss among persons of age group 15-49 years. As per my research point of view , the total number of road accidents are declined from past few years but the number of persons killed in road crash has increased over the previous years. Accident severity has increased consistently from last few years and shows a sharp rise . Actually the number of accident due to pot holes,road surface conditions, undivided road,width of roadway etc has been ended so far. In 2016-2017 in Kashmir division more than 80% accidents are caused due to hit and run . During the calendar year 2017, the total number of road accidents is reported at 1,748 causing 274 lives in Kashmir division. This would translate on an average into 5 accidents and one fatal accident taking place on daily basis. The number of fatal accidents is rising up every year due to increasing vehicles and population. To develop road accident prediction model each and every parameter related with the accident is considered and a micro level analysis of road accident is performed. For micro level analysis road traffic accident data of last seven year (2011 to 2017) from JK Traffic Police stations and vehicles registered details from Regional Traffic Officer Srinagar are collected and a detailed analysis is performed on that basis. On basis of this analysis effect of accident is identified. After analysis road traffic accident prediction models is developed based on vehicular ownership to population (v/p) ratio.***

***Key words: Accident data, accident severity, fatality rate, accident prediction model,traffic accidents.***

## 1. Introduction:

Traffic accident is one of foremost issue in the world according to World Health Organization (WHO) data.Children, pedestrians, cyclists and older people are among the most vulnerable of road users.During the calendar year 2016, the total number of road accidents is reported at 4,80,652 causing injuries to 4,94,624 persons and claiming 1,50,785 lives in the country. This would translate on an average into 1317 accidents and 413 accident deaths taking place on Indian roads everyday or 55 accidents abd 17 deaths every hour.As compared to 2015, the number of road accidents and injured victims have declined in 2016 by 4.1% and 1.1% respectively.However number of persons killed in road crash has increased by 3.2% over the previous year.The number of fatal accidents i,e accidents in which at least one victim dies has increased consistently since 2005 and seen a sharp rise from 1,31,726 in 2015 to 1,36,071 in 2016.Road users in India are mixed in nature, reaching from pedestrians, rickshaws, bi-cycles, hand carts and tractor trolleys, to various categories of two/three wheelers, cars, trucks, buses, and multi-axle commercial vehicles etc.The vehicle population has been gradually increasing because of change in the grace of living of people and urbanization. Increase in vehicle population with limited road space used by a large diversity of vehicles has sensitive the need and urgency for a well thought-out policy on the issue of road safety. In India the rate of accident is increasing with increasing vehicle population.

## 2. Objective of the study:

- To Perform a micro level analysis of traffic accident
- To develop accident prediction model for road accidents based on vehicle ownership to population (v/p) ratio by using statistical analysis.
- To find out the accident and fatal severity.

## 3. Need of the study:

In india on an average 1,50,000 deaths occur over a year includes young peoples, childrens I,e our future on roads. We are losing our future personalities on roads everyday wheather they are using vehicles or as a pedestrian. Two wheels vehicular lies at the top among victims. Road accidents can not be eliminated totally but a well design roads and strict rules can reduce the road accidents upto some accidents.

## 4. Methodology:

### 4.1. Study area:

The study area of the research is Kashmir division which covers 168 km of NH01A from Qazigund to Baramula.Kashmir division is a part of state jammu and Kashmir which is very prone to road accidents.

### 4.2. Data Collection:

#### 4.2.1. Accident data;

Road accidents data has been collected from jammu and Kashmir traffic police,Srinagar from 2011-2017.Data includes time of accident, location of accident, number of vehicles involved, degree of fatality, road conditions, type of vehicle, cause of accident.

Table 1.1: Number of Road Accidents and Number of Persons affected: 2011-2017

| Year | Number of Accidents | | Number of Persons | | Accident Severity |
|---|---|---|---|---|---|
| | Total | Fatal | Killed | Injured | |
| 2011 | 2325 | 309 | 365 | 3345 | 15.70 |
| 2012 | 2346 | 294 | 368 | 3555 | 15.68 |
| 2013 | 2256 | 290 | 353 | 3033 | 15.65 |
| 2014 | 1962 | 296 | 306 | 2743 | 15.59 |
| 2015 | 2050 | 258 | 301 | 2976 | 14.68 |
| 2016 | 1700 | 223 | 288 | 2298 | 16.94 |
| 2017 | 1748 | 232 | 275 | 2248 | 15.73 |

Source: information supplied by JK Traffic Police .
*Accident severity: number of peoples killed per 100 accidents

#### 4.2.2. Vehicular Data:

Number of vehicles registered year wise and vehicle type wise from year 2011 to 2017 from Regional transport officer, Srinagar.

| Year | Commercial vehicles | Non-comercial vehicles |
|---|---|---|
| 2011 | 59,210 | 2,24,605 |
| 2012 | 71,025 | 2,58,299 |
| 2013 | 82,271 | 2,90,879 |
| 2014 | 92,691 | 3,28,152 |
| 2015 | 1,01,200 | 3,63,028 |
| 2016 | 1,09,598 | 4,05,962 |
| 2017 | 1,15,119 | 4,51,150 |
| Total | 6,31,114 | 23,22,075 |

**4.2.3. Population data:**

Thedata regarding population of Kashmir division has been gathered from census india and jammu & Kashmir statistical annual report.

| Year | Population in Millions |
|---|---|
| 2011 | 6.89 |
| 2012 | 7.05 |
| 2013 | 7.22 |
| 2014 | 7.33 |
| 2015 | 7.50 |
| 2016 | 7.66 |
| 2017 | 7.78 |

## 5. RESULT AND DISCUSSION

### 5.1.Preliminary analysis

Table no.2.1 Accident severity of Kashmir division from 2011-17.

| Year | Total accident | Persons killed | Accident severity |
|---|---|---|---|
| 2011 | 2325 | 365 | 15.699 |
| 2012 | 2346 | 368 | 15.686 |
| 2013 | 2256 | 353 | 15.647 |
| 2014 | 1962 | 306 | 15.596 |
| 2015 | 2050 | 301 | 14.683 |
| 2016 | 1700 | 288 | 16.941 |
| 2017 | 1748 | 275 | 15.732 |

### 5.2. Accident rate and fatality rate based on population

$$AR = TA * 100000 / P$$

Where AR – Accident Rate per 100000 population TA – Total Accident

P – Population

$$FR = FA * 100000 / P$$

Where FR –Fatality Rate per 100000 population FA – Fatal Accident

P – Population

Table 5.2. Accident rate and fatality rate based on population

| Year | Population | Total accident | Fatal accident | Accident rate | Fatal rate |
|---|---|---|---|---|---|
| 2011 | 1,25,00000 | 2325 | 309 | 18.60 | 2.472 |
| 2012 | 1,28,00000 | 2346 | 294 | 18.33 | 2.297 |
| 2013 | 1,31,00000 | 2256 | 290 | 17.22 | 2.214 |
| 2014 | 1,33,00000 | 1962 | 296 | 14.75 | 2.225 |
| 2015 | 1,36,00000 | 2050 | 258 | 15.07 | 1.897 |
| 2016 | 1,39,00000 | 1700 | 223 | 12.23 | 1.604 |
| 2017 | 1,41,20000 | 1748 | 232 | 12.38 | 1.643 |

**5.3. Accident rate and fatality rate based on vehicle ownership**

AR = TA * 100000 / V

Where AR – Accident Rate per 10000 Vehicles Registered TA – Total Accident

V – Vehicle Registered

FR = FA * 100000 / V

Where AR – Accident Rate per 100000 Vehicles Registered FA – Fatal Accident

V – Vehicle Registered

**Table 5.3. Accident rate and fatality rate based on vehicle ownership**

| Year | Vehicle registered | Total accident | Fatal accident | Accident rate | Fatal rate |
|---|---|---|---|---|---|
| 2011 | 2,83,815 | 2325 | 309 | 819.19 | 108.87 |
| 2012 | 3,29,324 | 2346 | 294 | 712.37 | 89.27 |
| 2013 | 3,73,150 | 2256 | 290 | 604.58 | 77.72 |
| 2014 | 4,20,843 | 1962 | 296 | 466.21 | 70.33 |
| 2015 | 4,64,228 | 2050 | 258 | 441.59 | 55.58 |
| 2016 | 5,15,560 | 1700 | 223 | 329.74 | 43.25 |
| 2017 | 5,66,269 | 1748 | 232 | 308.69 | 40.97 |

## 6. ACCIDENT PREDECTION MODEL

In this study the parameter for the prediction of model are vehicle –population ratio

### 6.1.Development of prediction model based on vehicle ownership to population (v/p) ratio

The linear regression models are developed for prediction of total accidents, considering number of total accidents as

dependent variable (Y) and vehicle ownership to population (V/P) ratio as independent variable(X). The models developed will take the following form:

y=a +bx Where y = number of total accidents

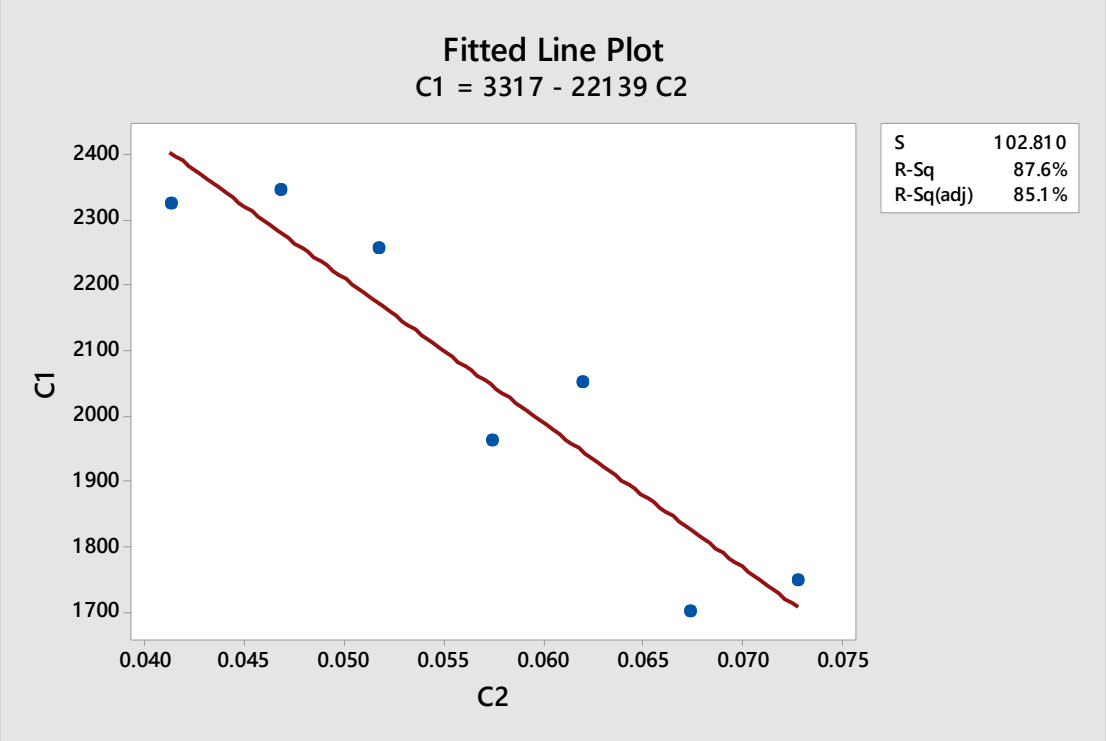
x = vehicle ownership to population ratio (for year 2011 to 2017)

b=Coefficient for Independent variable, a=Constant (Estimated parameter)

Model for total accident:

**y= 3317-22139x**

**S= 102.810 R-sq= 87.6% R-sq(adj)= 85.1%**




Scatter Plot between no. of accidents(y) vs V/P ratio(x)

## 7. CONCLUSION

In this project we analysis road traffic accident (preliminary and micro level) and we predict model based on the parameters of vehicle ownership –population ratio. We concluded.

1. During the last seven years the number of killed peoples (accident severity) of the study area is increasing year to year with increasing population.
2. The highest cause of the accident is fault of driver and 2W type of vehicle in the study area.
3. Accident is increasing with increasing of type of vehicle and number of vehicles.
4. About 80% accidents are caused due to hit and run.
5. There is no relationship between weather conditions and no. of accidents as from last seven years no accident is caused due to bad weather.

Accident prediction model was validated by Chi squared test and found to have a good linear relationship between vehicle ownership –population ratio and number of accidents.

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