

# ROAD ACCIDENT ANALYSIS ON STATE HIGHWAY-18

## “A CASE STUDY FROM DEWAS TO BHOPAL”

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### ABSTRACT

Accidents are the bane of any Industrial Society. The no. of motor vehicles on the road have doubled in the last 5 years duration and the existing road network is not capable of tackling this much traffic. In India, the magnitude of the road accidents in relation to the no. of motor vehicles on the road appears to be significantly higher than in developed countries. This leads us to the need for stepping up the researches and efforts to understand the causes and consequences of road accidents. There is a famous cliché in the field of traffic engineering that, “Road accidents do not just happen but they are caused”. So, if there exist some agents causing accidents, there will obviously be a way to diminish those factors or agents which causes accidents. The present growth of the no. of projects of industries and their industrial activities, no. of vehicles, population, spatial extension of city and so on, unmistakably strengthens the necessity of making a dispassionate enquiry into road accidents so as to eradicate them. Though it is not humanly possible to truly eradicate them, a careful study and analysis will surely help in minimizing them, also the cost calculation in extra laning of highway is performed so as to justify extra widening through cost-benefit ratio.

### 1. INTRODUCTION

The human doldrums as well as economic losses occurred in road accidents draws the attention of traffic researchers and engineers to resolve the problem of increasing accidents. In developing countries like India, road accident occupies a large fraction of various accidents. This is because of the heterogeneous traffic condition where, truck buses, cars, auto rickshaws, magic vans, hand carts, bicycles, motorcycles and animal drawn vehicle including pedestrian, all wield on the same road. Also, large portion of these roads are encroached by the hawkers, thele-walas, vegetables sellers and Gumties.

We are already aware with the fact that, almost all the towns and cities existed from ancient time had no town planning and the road network laid there too is not that much planned. So, it is obviously difficult to eliminate the accidents but they surely can be minimized to a great extent by improving the geometric parameters and so as to solve this, one have to conduct a detailed study of accidents.

## 2. LITERATURE REVIEW

Researchers who have worked in area of accident analysis defines accident as Any collision, overturning, slipping of road users maybe vehicle or pedestrians, which occurred on road open to public traffic results in the damage to property, loss of life or injury in which at least one moving vehicle is involved.

**Gaurav Goel, et al. (2016)**<sup>[1]</sup> NIT, Kurukshetra in his paper “analysis of road accidents on NH-1 between RD98 Km to 148Km” made an attempt to study the trends of road accidents data of 4 years from 2007-2010 on a 50 Km stretch from RD98 Km to RD148 Km which included the period when construction of 6 laning project started on the stretch.

They analysed the accident data on the basis of various road characteristics which included

1. Type of injury
2. Nature of accident
3. Causes of accident
4. Vehicle involved
5. Time of accident

**Ravi S. Rajaraman et al. (2009)**<sup>[6]</sup> in his paper, “analysis of road traffic accidents on NH-45, Kanchipuram district Tamil Nadu, India” carried out a 45 days real-time study on NH-45 for 60 Km stretch to collect and analyze Indian traffic accident data and standardize the methodology adopted for data collection and analysis of Indian traffic accidents.

Analysis of the data was done using the accident distribution by

1. Type of road user
2. Time
3. Severity of injury
4. Type of collision

The findings of the paper showed that front to rear end collision of heavy trucks and buses accounts 59% of the total accidents. The reason behind this can be slowing down, skidding or breaking down of the vehicle.

**H.S. Goliya et al. (2013)**<sup>[4]</sup> in their paper “Accident Analysis on National Highway-3 Between Indore to Dhamnod” suggested that, Road accident scenario in the country is a very grim, more so on National Highway. In fact, the study corridor, portion of NH-3 accounts, more rates of the accidents. They represented an analysis of accidents on small portion NH-3 Indore to Dhamnod. The data for analysis was collected for the period of 2009 to September 2011. More accidents occurred in Manpur region by faulty road geometry.

**R. V. Jadhav et al. (2017)**<sup>[7]</sup> et al studied related with identification of black spot and its objective was to gather accident data on Islampur and Ashta road for last five year, to identify the black spots on IslampurAshta road, to transfer out the surveys on black spots area and to give remedial measures for reduction in accidents on selected road.

Based on above referenced literature as well as other referred paper it is evident that no such work of accident analysis has been accomplished towards the safety audit of the selected stretch therefore contribution towards the accident minimization programme at the selected stretch is given.

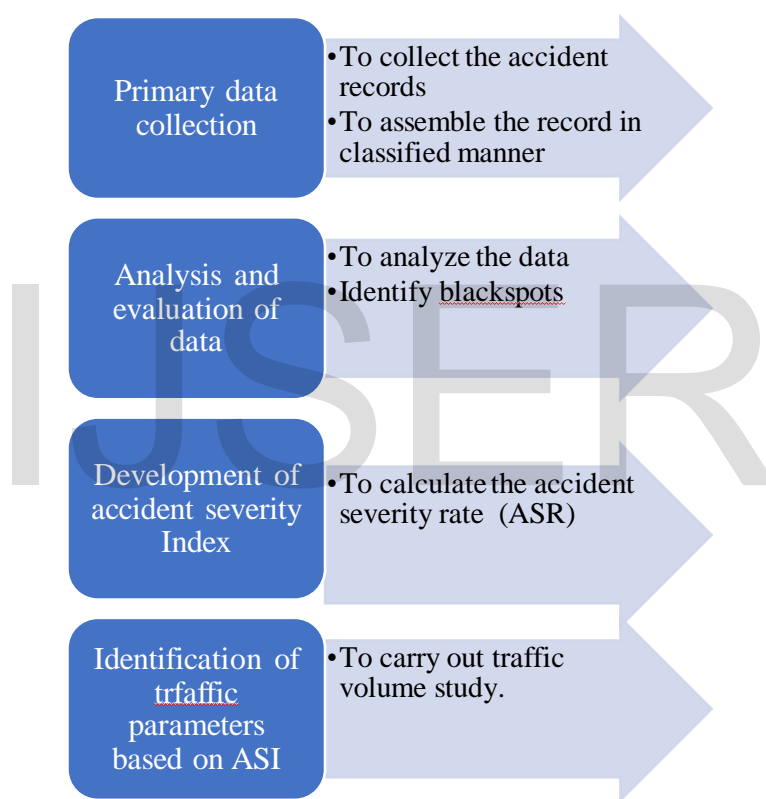
### 3. Study Area

The study area is stretch of 141 km State Highway - 18, from Dewas City starts from Dewas Bypass to Bairagarh in Bhopal City this highway passes through Sonkatch, Ashta and also Sehore town. This is an important highway which connects major cities of Madhya Pradesh. It connects Bhopal to both Indore and Ujjain.

### 3. DATA COLLECTION

Accident data describes a momentary state of affairs. The work is divided into three major steps viz. primary data collection which includes the collection of accidental records, analysis and evaluation of the collected data and identification of black spots and third is, secondary data collection which includes traffic volume counts at black spots, geometry of the section.

**Fig.1 Flow chart for Methodology**



#### 1. Primary Data Collection

The 3-year record of accident occurred on SH-18 between the stretch of Dewas to Bhopal was taken from January 2016 to December 2018. The data was collected from the SP office of Dewas district, Sehore district and Bhopal district.

The district SP office maintains the record of all accident in a separate file. Some manually and some on excel sheets. The information gathered from police office were, date, time, location, vehicles involved and accident severity as, no injury accident (IPC section 279), minor injury accidents (IPC section 377), major injury accident (IPC section 378), fatal accidents (IPC section 304A). The accident location recorded on police station data was not in numerical

values so, a micro level analysis was not possible and therefore the accident-prone areas recorded by police stations were considered for help.

The total stretch was divided in 4 parts according to the 3 tolls present on the highway. The details of stretch selected and length of station covering the stretch is given in the table.

**Table 1 Length of various sections**

S.No.	Stretch selected	Length	District
1.	Dewas – Bhourasa Toll	21Km	Dewas
2.	Bhourasa Toll – Amlaha Toll	77Km	Sehore
3.	Amlaha Toll – Fanda Toll	42Km	Sehore
4.	Fanda Toll - Bhopal	22Km	Bhopal

## *2. Identification of Black Spot*

For the calculation, each and every accident is taken in account so as to find out the black-spot. The definition of black spot too varies with the country but in general, for a metropolitan city, MORTH suggests a black spot to be called a site which have 5 accidents (fatal or grievous) in 3 years or 10 fatalities in last 3 years. For less urbanized area, 4 accidents in 3 years are regarded as exceptional. first screening of the black spots is done according to the number of accidents and fatalities included in accident keeping in mind the above discussed criteria of selection of black spots suggested by MORTH.

## *3. Secondary Data Collection*

A traffic volume survey at different intervals of time was conducted on the different locations of the study area viz. at Bhourasa toll in which traffic from single directions were taken in account in which the count of vehicle in

Survey was done on the Amlaha toll booth which is currently in working condition but this place gives information of the straight going vehicles to Bhopal.

At last, the survey was conducted on the Fanda toll booth which is after the sehore town towards Bhopal. The number of vehicles for heavy vehicles doesn't change much from the previous survey location at this location. The difference was only in two wheelers count which turns to various villages in the path. The Table 2 below shows the number of vehicles with a classified vehicle count and respective PCU values at these three locations at different time interval.

**Table 2 Traffic Volume Count for locations 1, 2, 3**

S.No.	Vehicles	8:00 AM- 8:00 PM		
		1*	2*	3*
1.	Car/jeep/taxi	2080	1924	2124
2.	Scooter/motor cycle	791	734	942
3.	Buses	365	339	412
4.	Truck/tankers	312	303	345
5.	Multi axle Bus Trailers/ Trucks	324	298	328
6.	Others	140	132	151
	Total	4012	3730	4733

1\* - Location 1 (Bhourasa toll booth, Ashta)

2\* - Location 2 (Amlaha Toll Booth, Sonkatch)

3\* - Location 3 (FandaToll Booth, Sehore)

## 4. ANALYSIS OF DATA

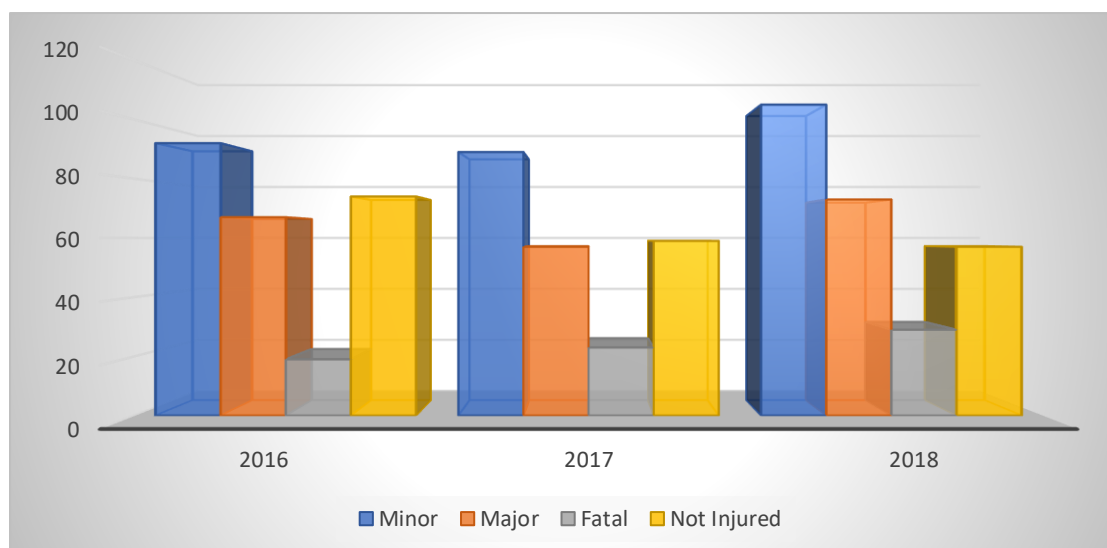
### 1. Trends of Accidents

Below will be shown trends of accidents analysed Year wise, Month wise, and on Hourly basis through different table, charts method shown in tables below.

### Year wise Distribution of Accidents (2016-18)

**Table 3 Year wise accidents distribution**

Year	No. of Accidents	Casualties			Total Casualties
		Minor	Major	Fatal	
2016	252	92	67	19	178
2017	228	89	57	23	169
2018	266	105	73	29	207
Total	746	286	197	71	554

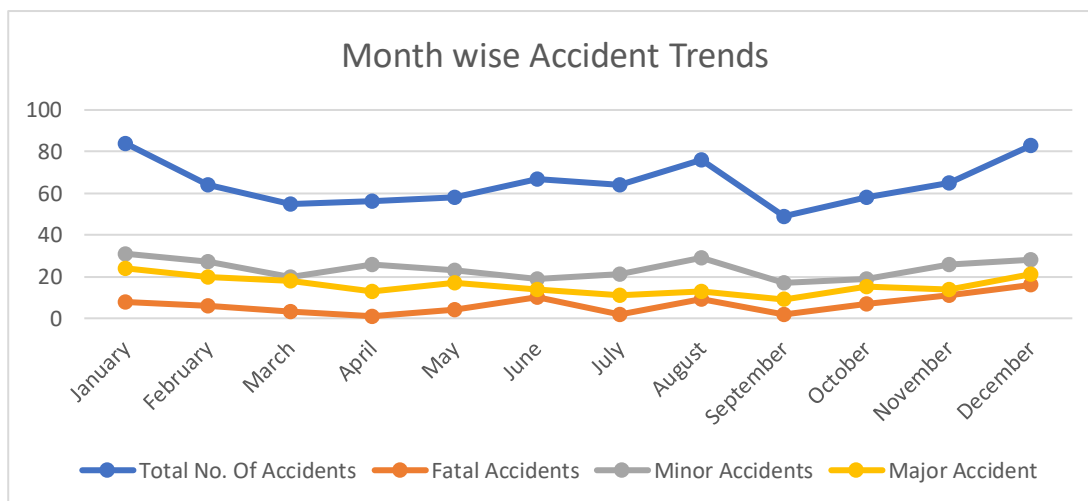


**Fig. 2 Graphical illustration of Yearly accidents trends**

- Month wise distribution of accident shows that the total number of accidents are more in the month of October, November and December, This maybe because of low visibility and increased night hours at the time of winter.

**Table 4 Month Wise Distribution of Accidents (2016 - 18)**

S.No.	Month	Non injury	Minor injury	Major injury	Fatal	Total
1	January	21	31	24	08	84
2	February	10	23	16	04	51
3	March	13	20	11	03	47
4	April	16	26	13	01	56
5	May	14	21	14	04	53
6	June	21	16	13	10	60
7	July	30	21	11	02	64
8	August	25	29	13	09	76
9	September	21	17	09	02	49
10	October	17	19	15	07	58
11	November	13	26	14	11	65
12	December	19	28	21	16	83

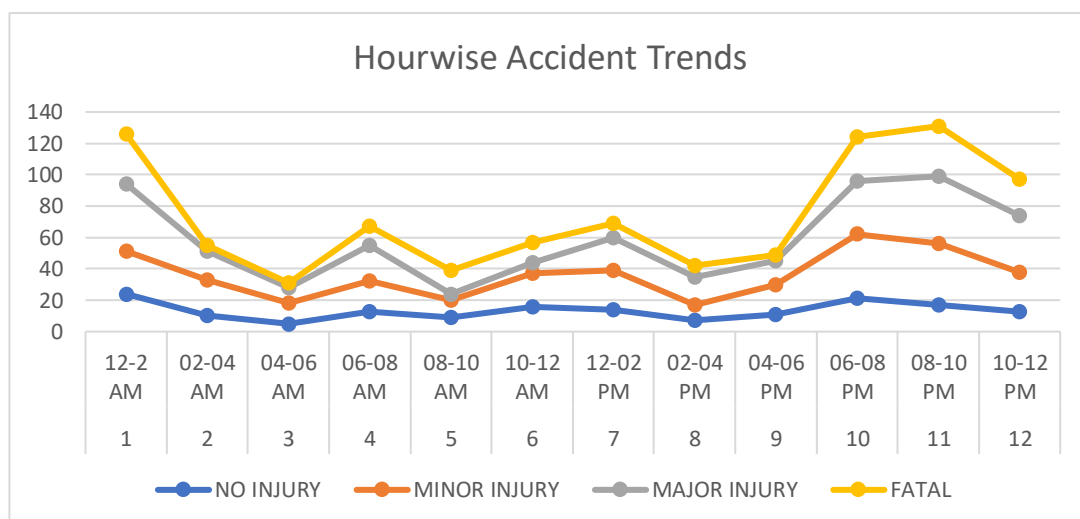


**Fig. 3 Month wise accidents trends**

- Hour wise distribution of the accidents shows that more no. of accidents occurs in between the time slot of 6:00 pm to 02:00 am but more no. of fatal injuries occurred in mid night that is, at the slot of 12:00-02:00. The reason is that, most of the vehicles involving in accidents and wielding this stretch are of loading vehicles or goods carrying vehicles which generally prefer to travel at night.

**Table 5 Hour Wise Distribution of Accidents (2016-18)**

S.No.	TIME	NO INJURY	MINOR INJURY	MAJOR INJURY	FATAL	TOTAL
1	00-02	24	27	43	32	126
2	02-04	10	23	18	4	64
3	04-06	5	13	10	3	31
4	06-08	13	19	23	12	67
5	08-10	9	11	4	15	39
6	10-12	16	21	7	13	57
7	12-14	14	25	21	9	69
8	14-16	7	10	18	7	43
9	16-18	11	19	15	4	49
10	18-20	21	41	34	28	124
11	20-22	17	39	43	32	131
12	22-24	13	25	36	23	97

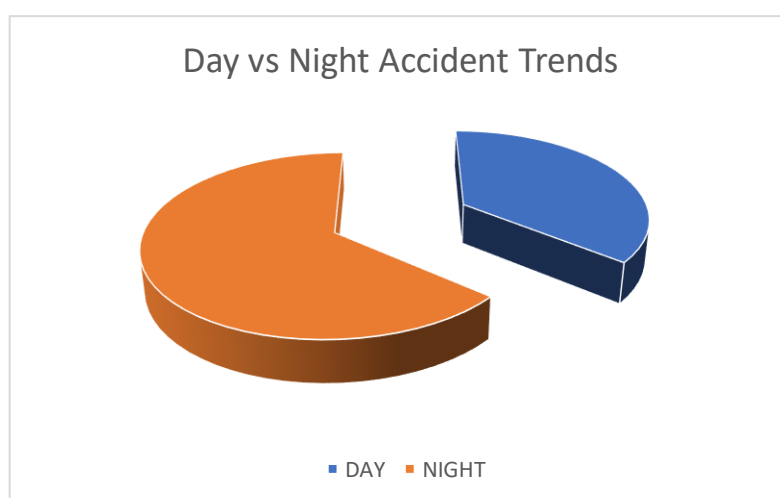


**Fig. 4 Hour wise Accident distribution**

- Day and Night Wise Distribution of Accident The shows that the percentage of night time fatal injury is higher than that of daytime injury. This may be because of the reasons of low visibility and preference of the goods carrying vehicles at this time.

**Table 6 Day and Night wise distribution of the accidents (2016 - 18)**

S.No.	Type of Injury	Day(06:00- 18:00)	Night(18:00-06:00)	Total
1	No Injury	69	90	159
2	Minor Injury	105	168	273
3	Major Injury	88	183	271
4	Fatal	60	132	192



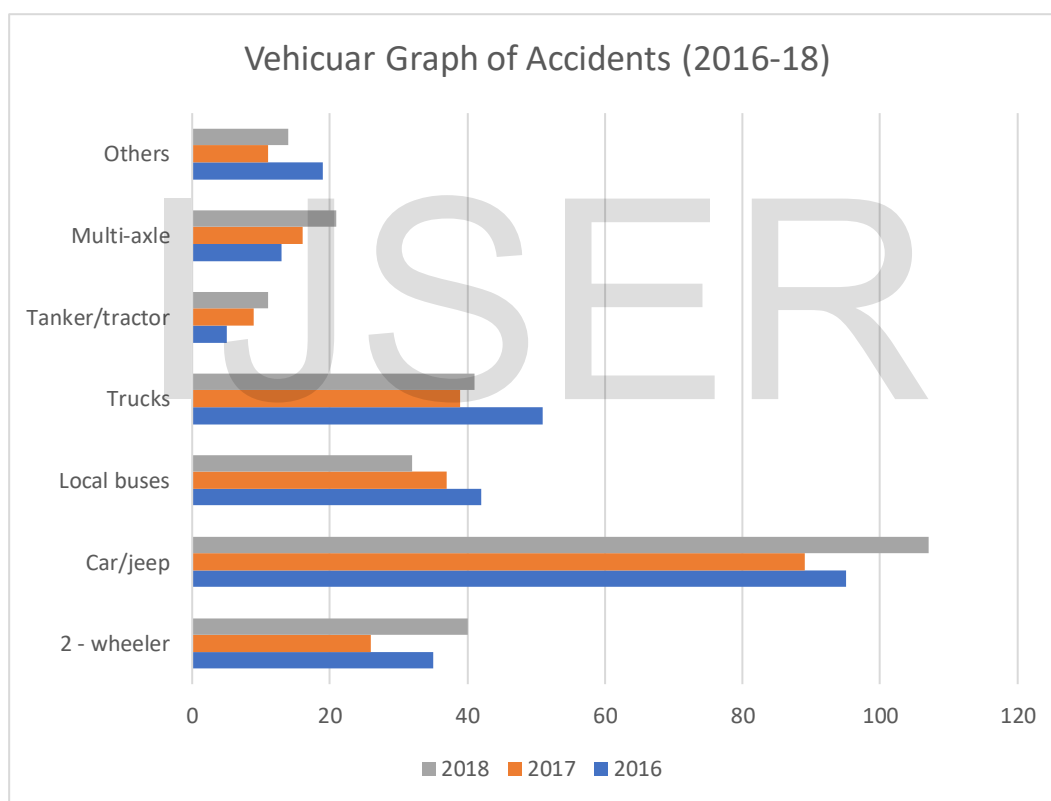
**Fig. 5 Day vs Night Accident Distribution (2016-18)**



- Vehicular wise road traffic accidents distribution it is also an important classification which gives us the exact study that which class of vehicle is most affected on this highway like cars, buses, trucks, 2wheelers etc. So, in this study we found out that Car/Jeep is most affected which may be due to high speed of them.

**Table 7 Vehicular Classification of Accidents**

Year	2-Wheeler	Car/Jeep	Local Buses	Tankers/ Tractors	Multi-axle	Others
2016	35	95	42	51	13	19
2017	26	89	37	39	16	11
2018	40	107	32	41	21	14



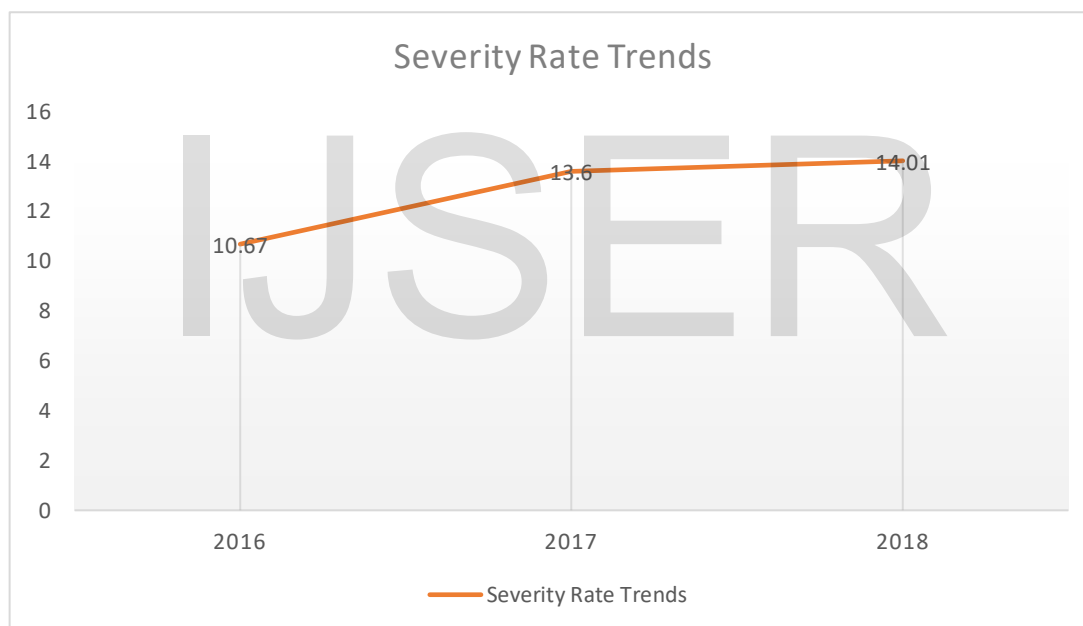
**Fig. 6 Vehicular accidental graph**

## 5. Accident Severity Rate (2016-2018)

Accident Severity Rate (ASR) shows the severity of the accidents that are being unfortunately happening on that particular locations.

**Table 8 ASR for 3 Years**

YEAR	SEVERITY RATE
2016	10.67
2017	13.60
2018	14.01



**Fig. 7 Severity Rate Trends**

## 6. RESULTS

The black spots are identified according to the norms decided by MORTH as discussed earlier. These black spots are then considered so as to calculate ASR values. The calculated ASR values are given in the following table also; ranking on the basis of hazardous black spot is given in. Below in the table shown different classification according to different black spots.

**Table 9 Black Spot Rankings**

Black Spots	No Injury	Minor Injury	Major Injury	Fatal Injuries	Total	ASR	Ranking
Khatamba	21	31	24	16	92	17.3	5
Jamgod	28	34	27	21	110	19.1	3
Sumrakhedi	24	29	20	14	87	16.1	6
Sonkatch	18	32	28	11	89	12.3	7
Ashta	20	37	32	26	115	22.6	1
Amlaha	11	15	12	8	46	17.4	4
Fanda	25	27	33	24	109	22.1	2

## 7. CONCLUSIONS

- Percentage of number of accidents is higher for night time in comparison with day time which is **1.5** times higher than day.
- It is seen that during July, August there is **24.5%** increase in the accidents,0 this may be due to the slippery roads during rainy season in which braking is usually difficult and skidding may occur.
- Car/Jeep alone are having **39%** of accidents this may be due to there is lot personal vehicles which travel between these two important cities.
- Studies have been done on 7 different black spots Khatamba, Jamgod, Sumrakhedi, Sonkatch, Ashta, Amlaha and Fanda.
- It is seen that major reason for accidents are over speeding which is at 4 out of 7 black spots so it is a major issue on this highway.
- Accident severity is seen to be maximum at Fanda area which is around **21.1%** for over speeding, this is cause a lot of traffic between Bhopal – Sehore.
- The maximum number of accidents are occurring at Black spot Ashta which ranks 1, and more accidents are happening due to overturning on it which is **16.8%**.
- When accidental cost analysis is done, estimated cost calculated was **19 Crore** Rupees for 3 years.
- It is also seen that number of Fatal accidents have been increased year by year from **10.67** in 2016 to **14.01** in 2018.

## 8. REFERENCES

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