Road Accident Analysis for Evaluation of Safety at Different Location in Vidisha City.

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Abstract: Road Traffic Accidents (RTAs) are an important cause of morbidity and mortality worldwide, especially in low and middle-income countries. Traffic police reports indicate that RTAs are amongst the commonest health challenges India faces. Assessing the magnitude of the challenge, understanding the impact on public health and gaining more insight into the actual risk factors involved in RTAs, and especially RTAs that result in serious injuries and fatalities, is important for the road transport authority, the traffic police and for public health planners, in order to improve road safety, to develop effective countermeasures and to improve preparedness for effective health care, respectively. India is densely populated country and Madhya Pradesh is its one of the biggest state which is densely populated too. Vidisha near Bhopal the capital of Madhya Pradesh is noisy, congested, polluted, and typically disordered. The roads in the city are crowded and interrupted by several movements and actions.

Index Terms - Road Accidents, Road Safety Motor Vehicle Statistics, Motorization, Visions, Goals, action plans, Set of measures, Implementations, Evaluation.

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I. INTRODUCTION

A road safety audit is a formal examination of proposed or existing roads and road related areas from the perspective of all road users with the intention of identifying road safety deficiencies and areas of risk that could lead to road crashes. It does not consider crash history. It is conducted by an independent, qualified team of professionals. Road accidents may be defined as a human tragedy, associated with major health problems, negative socio-economic growth, and poverty. Road accidents involve high human suffering and monetary costs. In India, the number of reported road accidents is 3.03 lakhs (approximately 300,000) while fatalities are well over 60,000 per year [9]. Road traffic injuries are a major but neglected public health challenge that requires concerted efforts for effective and sustainable prevention. Of all the systems with which people have to deal every day, road traffic systems are the most complex and the most dangerous. Traffic accidents give rise to multi faceted problems such as health, social and economic problems, in all countries. Road accidents constitute a large problem throughout the world. Road accidents cause –beside grief and physical suffering substantial economic losses to individuals and societies. The traffic accident in many developing countries have become one of the leading causes of death, and the people injured put a heavy burden on already overloaded medical resources. In the present traffic conditions, it is necessary to complement safety built into vehicles and roads with educational activities aimed at changing attitudes to safety and driving. Road safety is collective responsibility on which the Government, Industry and the people must work together.

Road accidents are a severe problem in most of the developing countries including India. Road accidental deaths per 10,000 vehicles i.e. defined as fatality rate are also quite high in comparison to developed countries. While in Europe and North America the condition is generally improving, many developing countries face a threatening situation. The problem is really very different in developing countries in many ways as in developed countries. The fraction of commercial and public vehicles in road accidents is very high. Pedestrians and cyclists are often more unsafe on roads. As the people not following the traffic rules sincerely. Problem of providing medical aids instantly or inadequacy of medical facilities increases the number of death rates in the country.

The road safety is important because of the following Main reasons:
• Road accidents will be with us for a long time.
• Accident trends are on the rise and issues need to be addressed.
• Comprehensive road safety programs can reverse accident trends
• Road accidents block economic and social development.

Road accidents are a human tragedy, which involve high human suffering. They impose a huge socio-economic cost in terms of untimely deaths, injuries and loss of potential income. The ramifications of road accidents can be colossal and its negative impact is felt not only on individuals, their health and welfare, but also on the economy. Consequently, road safety has become an issue of national concern. Road Safety is a multi-sectoral and multi-dimensional issue. It incorporates the development and management of road infrastructure, provision of safer vehicles, legislation and law enforcement, mobility planning, provision of health and hospital services, child safety, urban land use planning etc. In other words, its ambit spans engineering aspects of both, roads and vehicles on one hand and the provision of health and hospital services for trauma cases in post-crash scenario. Road accident in India is shown in Table 1. Road safety is an issue of immense human proportions. Over 75 percent of these casualties occur in developing and transition countries, though they account for only 32 percent of motor vehicles [10]. These accidents will continue, and very likely increase as motorization increases, unless all stakeholders act together. 65% of deaths involve pedestrians and 35% of these deaths are children [7]. Over 10 million are permanently disabled or seriously injured each year [11]. It has been estimated that at least 6 million more will die and 60 million will suffer injuries during the next 10 years in developing countries unless immediate action is taken [5]. The actual situation gives a daily fatality rate of over 3,200 victims [13].

Table 1Road accidents in India (2002-2011)

Number of Road Accidents and Number of Persons Involved: 2002 to 2011					
Year	No of Accidents		Number of Persons		Accident Severity
	Total	Fatal	Killed	Injured	
2002	4,07,497	73,650	84,674	408,711	20.8
2003	4,06,726	73,589	85,998	435,122	21.1
2004	4,29,910	79,357	92,618	464,521	21.5
2005	4,39,255	83,491	94,968	465,282	21.6
2006	4,60,920	93,917	105,749	496,481	22.9
2007	4,79,216	1,01,161	114,444	513,340	23.9
2008	4,84,704	1,06,591	119,860	523,193	24.7
2009	4,86,384	1,10,993	125,660	515,458	25.8
2010	4,99,628	1,19,558	134,513	527,512	26.9
2011	4,97,686	1,21,618	1,42,485	5,11,394	28.6

Source: Road statistics of India (2011)

Causes of accidents and their contribution are as follows by statistics of Road accidents in India (2011)

Drivers fault- 77.5%

Defects in road condition- 1.5%

Defects in motor vehicle- 1.6%

Fault of bicyclist- 1.3%

Fault of pedestrian- 2.4%

Weather condition- 1%

All other causes- 14.8%

Road safety in India is the poorest in the world. According to MORTH 2013 India has the highest no of accidents in the world. Awareness among road users and safe design of road components is necessary to reduce accident involving both human and vehicles.

II. SAFETY ISSUES ON INDIAN HIGH SPEED CORRIDORS

The Asia-Pacific Region accounts for almost half (around 0.5 million) of all estimated worldwide road accident deaths. The estimated economic loss in ADB's developing member countries (DMCs) is more than $35 billion annually. This is more than double the amount of annual foreign development aid they receive. Road accidents cost DMCs 1-3% of GDP annually. The trends of road traffic fatalities in the People's Republic of China (PRC) were 183% during the 1990s compared with 113% in Asia. Because of the rapid economic growth in the PRC and the region, both public and private vehicle fleets are expected to continue to grow rapidly in the coming years, creating tremendous pressure on insufficient road infrastructure. Without effective action, traffic deaths in the PRC and other countries in Asia are expected to increase sharply within this 2decade. Road accidents significantly inhibit economic and social development. They are associated with

• Millions of premature deaths and injuries.

• Billions of dollars in medical costs.

• Strain in welfare service.

• Loss of productivity.

• Low economic growth.

• Poverty.

Road safety has not been given high priority during the development of current infrastructure due to the need for basic services and lack of funds. There is a lack of integration of urban and rural roads with highway development programs. Road deaths and injuries are increasing at faster pace in Asia than other regions of the world. Current World Bank studies indicate that around 50% of hospitalized road victims in Bangladesh are road accident victims. In 2001, there were about 755,000 road accidents, killing 106,000 and injuring 546,000 persons in the People's Republic of China (PRC) this translates to one death every five minutes. In Malaysia, about 60% of traffic fatalities involve motorized 2-wheeler. In India, fatalities among pedestrians are around 45%. .

III. ACCIDENTS STATICS OF VIDISHA DISTRICT OF MADHYA PRADESH

There is a tremendous increase in the number of accidents during last three years. The number of accidents in year 2015 was 991 in which number of fatal accident were 214 and non fatal were 1099. The number of accidents in the year 2016 quite same up to 991 in which the fatal accidents were 190 and nonfatal was 1073. In 2017 Accident rate is getting low 881 total accident happens in which the fatal accidents were 170 and nonfatal were 870. Table 2 below represents the accident scenario in vidisha.

Table 2 Accident scenarios in vidisha.

Year	Fatal	Non Fatal	total accidents
2015	214	1099	991
2016	190	1073	991
2017	170	870	811

IV. THE GENERAL TRAFFIC SITUATION OF INDIA

Before India is a one of the largest country in Asia and it is located in Southern Asia, bordering the Arabian Sea and the Bay of Bengal, between Bangladesh and Pakistan with total area of 3,287,590 sq. km slightly more than one-third the size of the US. An estimated population

is over one billion inhabitants is heterogeneously distributed over its 28 states and Federal District. Nearly 65-70% of the inhabitants live in rural areas. Possessing large agricultural, inning, manufacturing and service sector [23].

4.1 Road System in India

     Before 1927, there was no policy in India for the development of roads in a planned and systematic manner. In the year 1927, Govt. of India, accepted the recommendations of Jayakar Committee to the effect that planned development of roads should be an essential objective. Later, in the year 1943 a Road Development Plan, named as Nagpur Plan, was drawn up and it was to be implemented during the next 20 years. It was for the first time that roads were categorized as National Highways, State Highways, Major District Roads, Other District Roads, and Village Roads. National Highways, State Highways and MDRs were considered a part of main arterial road network and ODRs and Village roads were considered as feeder roads of the main road network. In the year 1961, Bombay Plan was introduced for 20 years (1961-81) on the similar lines as Nagpur Plan. The Indian Road Congress in its Lucknow Session held in 1985, drew up the Lucknow Plan for the next 20 years (1981-2001). The Lucknow plan 5,880 kms of National Highways, 35,300 kms. Of State Highways, 59310 kms. of MDRs and 2, 54, 662 kms. Of ODRs and Village Roads was developed in the year 2001. Against these targets only 2,733 kms. of NHs, of ODRs & Village Roads could be constructed up to 1995. Thus, the length of total road network in the year 1995 was only 1, 84,052 kms as against the target of 3, 55,166 kms. Set for the year 2001 as per Lucknow Plan [24].

As per the latest data the Indian road network comprised a total of 3319644km (paved 1,517,077-km) being ehavior by a vehicle fleet of 59.16 million vehicles (numbers for 2004). As shown in figure 6, the fleet consisted of 7.69 million cars/jeeps, 42 million two wheelers, 0.59 million buses, 2.96 million goods vehicles, and 6.1 million others with growing tendency. The Indian Road Network consists of three following patterns of road networks [24].

• Primary Network – Only 2 to 3 % 4 – Lane, and 15% single lane.

• Primary/Secondary Network – Severe capacity constraint and lack of mobility.

• Tertiary Network.

♦ Connectivity and issue.

♦ 40 % habitations not connected by all weather roads..

V. DATA COLLECTION

The only information available for accident studies is the FIR (First Information Report) lodged in the police stations. The data from these records of last ten years (2015-2018) were extracted from the FIR record filed under IPCno.279/337/338/304 (A).Vehicles those involved in accidents and reported in the F.I.R. The categories of vehicles include tempo, auto, mini-truck, minibus, Tata indica, Tata-407, trecker, motor cycle, tanker, tailor (articulated vehicle), truck and bus, Handcart, Bicycle.;

5.1 Road selected for study

     The existing transportation system of Vidisha is mixed type system. But basically, there is no such system followed by the roads. The study area is

1. Petal mill intersection

2.4-legged junction at SATI gate

3.4- Legged junction at durga nagar square

4. Railway over bridge

5. Gandhi chowk intersection

6. Staggered intersection near sabzi mandi and bus stand

7. Eedgaah intersection

8. Culvert near rangai

9. Curve near rangai temple and location near Rangai Bridge.

5.2 Data collected from Police Records

     With the prior permission of the concerned S.P, the accident data were collected on Vidisha highways and road intersections from different police stations. The police stations have their own FIR records of several years. The data from these records of last ten years were extracted from the FIRs filled under IPC NO.279/337/338/304 (A). Accident details during 2015-2018 on this road section are shown in Table 3. Accident data were collected year wise from each police station records then sorted out month wise. Average yearly variation of accidents stretch wise during 2015-2018 are shown in Table 4.

Table 3 Details of accidents

Year	Total no. of accidents	Person Killed	Person Injured
2015	991	214	1099
2016	991	190	1073
2017	811	170	870
2018	503	131	482

5.3 Data collected from P.W.D Records

P.W.D (Public Works Department) records are the main source of details of road. The Performa used to record these details is shown in Table 4.

Table 4 Performa for details of road section

Width of Carriage way in Mt	7	7
Width of Formation in Mt	12	12
Width of Land in Mt	45	45

In addition to the above, traffic volume data were also obtained from PWD records.

VI. RESULTS AND DISCUSSION

6.1 Annual Variation in Accidents

Fig. 1 shows the annual variation in accidents of total stretches during year 2015-2018.It is observed that percentage accidents are increasing relatively in most of the year. In the year 2015 &2016 accident rate was high and low in the year 2017.It may be due to increase in no of vehicles, bad traffic environment, and increase in population.

Figure shows annual variation in accidents of the four stretches. It is observed that no of accidents are more for Durga Square and Gandhi chowk intersection are higher than other 7 squares of study. This is because of high traffic volume on Durga square. Traffic volume decreases on different locations is connected to NH-46 which goes towards sagar district. Accident rate is more due to more no of commercial and noncommercial vehicles on the road, bad traffic environment.
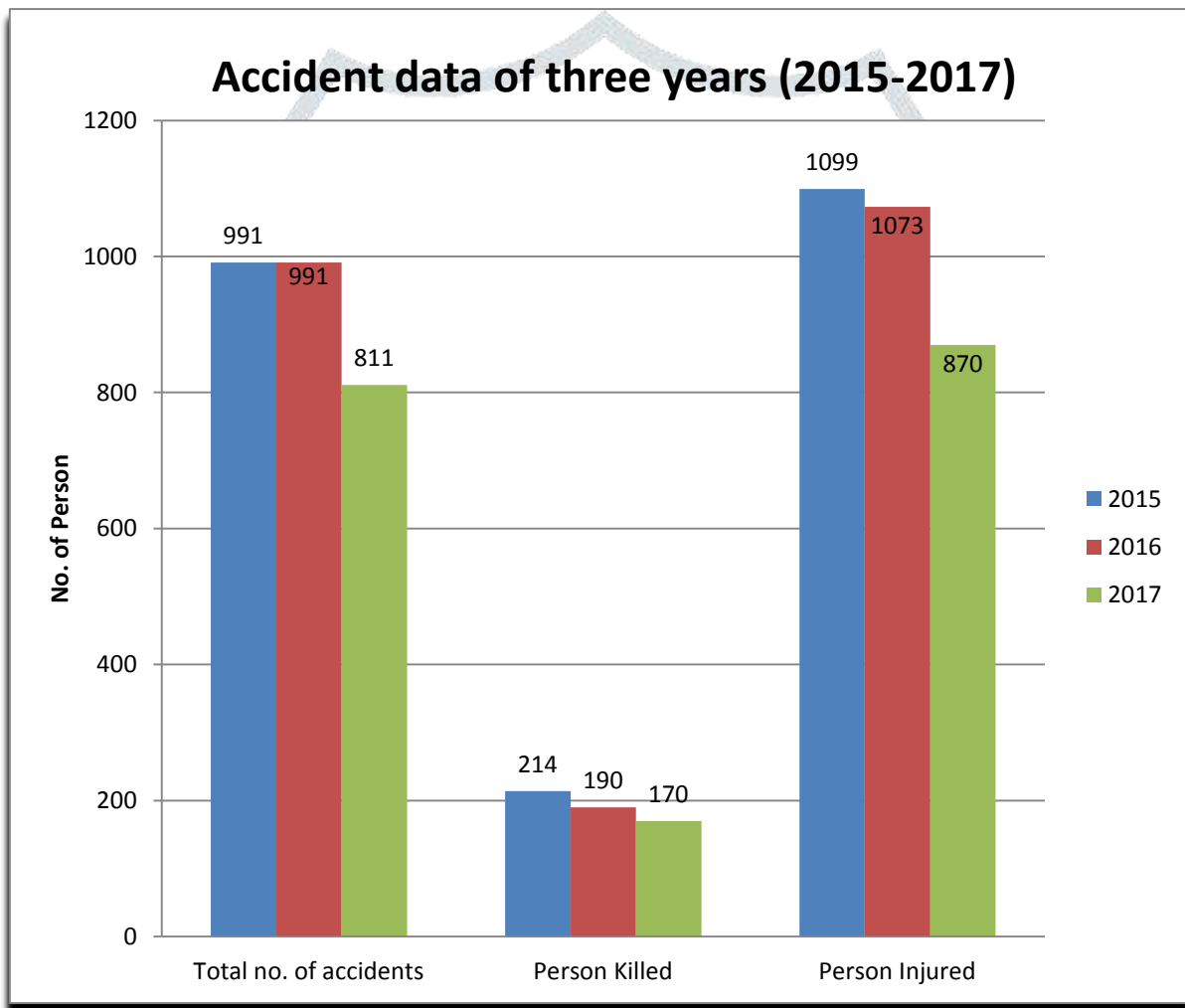

Fig. 1 Annual variation in accidents in 2015-2017

6.2 Monthly Variation in Accidents

Fig shows the monthly variation in accidents. Peak accident occurs in summer season i.e. in the month of March, April and may. This is due to distraction related to environment. Problem in these months are glare, fatigue, inconvenient heat.
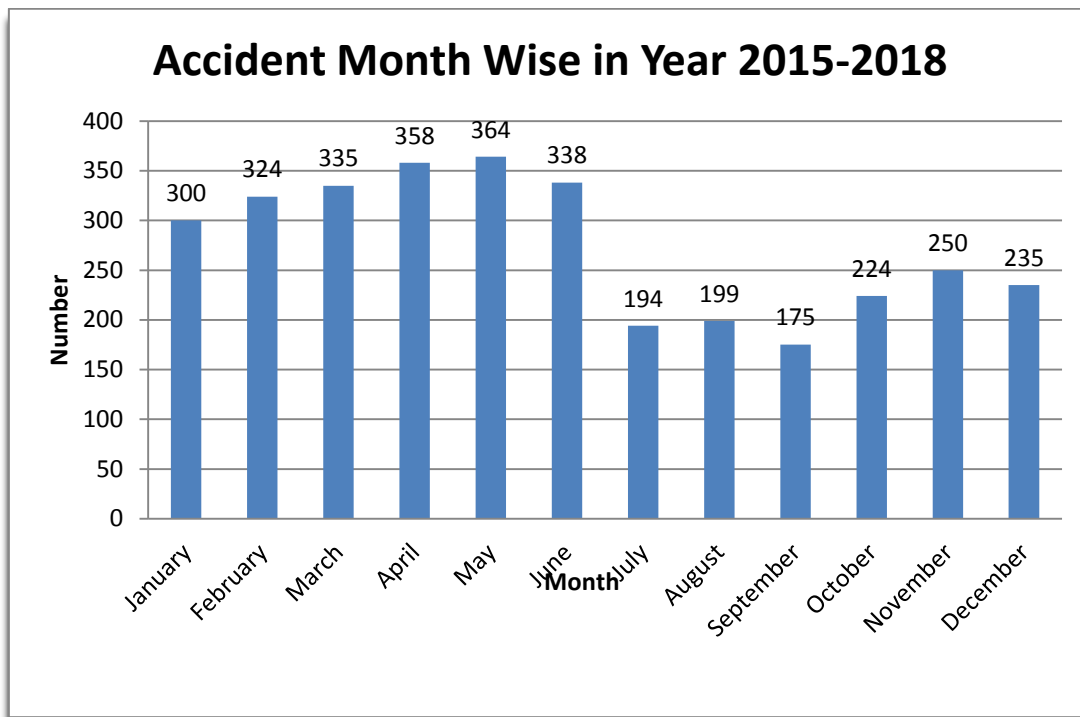
Figure 2 Accident month wise (2015-2018)

4.4 Hourly Variation in Accidents

Fig 3 shows hourly variation in accidents. One can observe more accidents occurs in between 8PM to 9PM.In this hour line truck (Truck Series) start their long journey. Most of the driver do not use speedometer as they drive by approximation. Speed crosses limiting speed as a result accident occur. Also they drink and drive in the evening hour. In the late night they use marijjuana as a result reaction time increases and loss of control occurs. Some drivers make the vehicle over load. In India load capacity is 10 ton or 16.2 ton for goods carriage but they carry more than that results uncontrolled and leads to accidents.
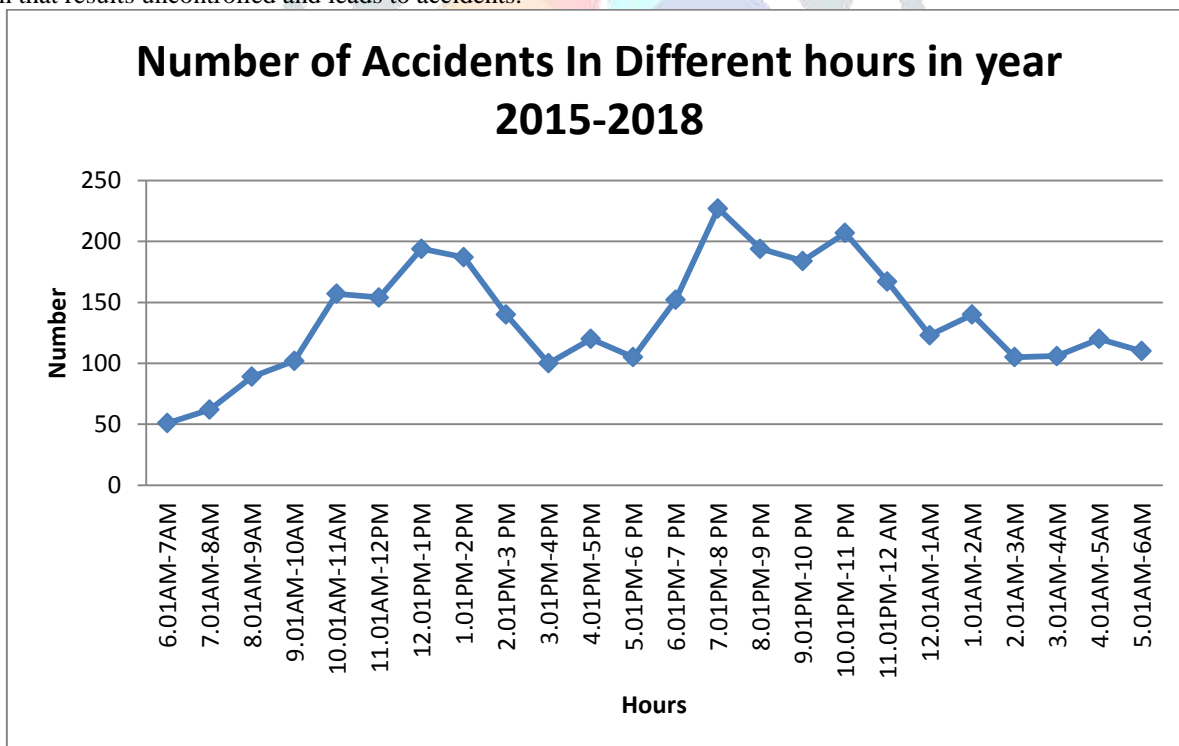

Fig. 3 Accident time wise (2015-2018)

4.5 Vehicles Involved in Fatalities

Vehicle users related to fatalities during 2015-2018 are shown in pie chart in percent. The results indicate that 59 percent of fatalities are due to truck drivers followed by 26 percent by unknown driver, 7 percent by motor cycles, 5 percent by car and jeep, 3percent by bus respectively as shown in fig.4.They consume alcohol and drugs in long driving. As a result reaction time increases and loss of control occurs during speed driving leads to fatalities.
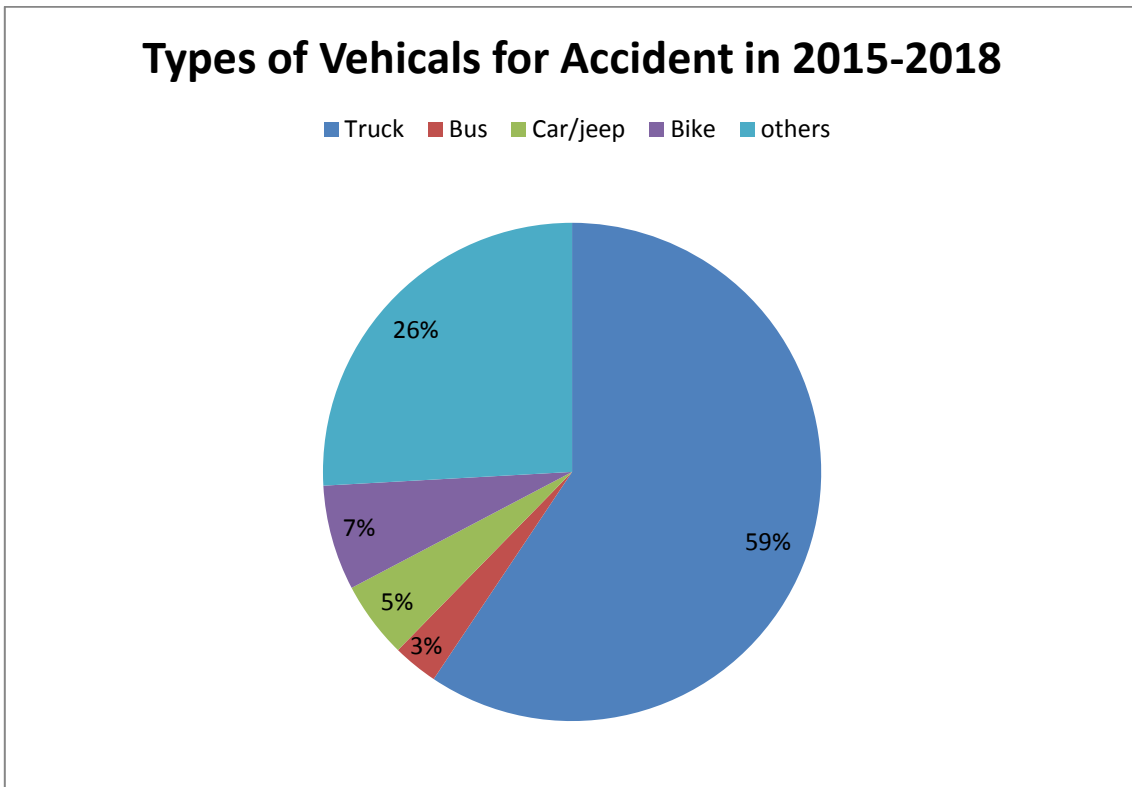
Fig. 4 Vehicle involved in fatalities during (2015-2018)

4.6 Age Group involved in Accidents

Age group Categorized for fatalities during 2015-2018 are shown in pie chart in percent. The results indicate that mostly percent of fatalities are age group 18-30 year which have 61 percent followed by 30-60 year person involved in 28 percent after that 6 percent lead by age of greater than 60 year & least percent of person of age group less than 18 year has 5 percent.
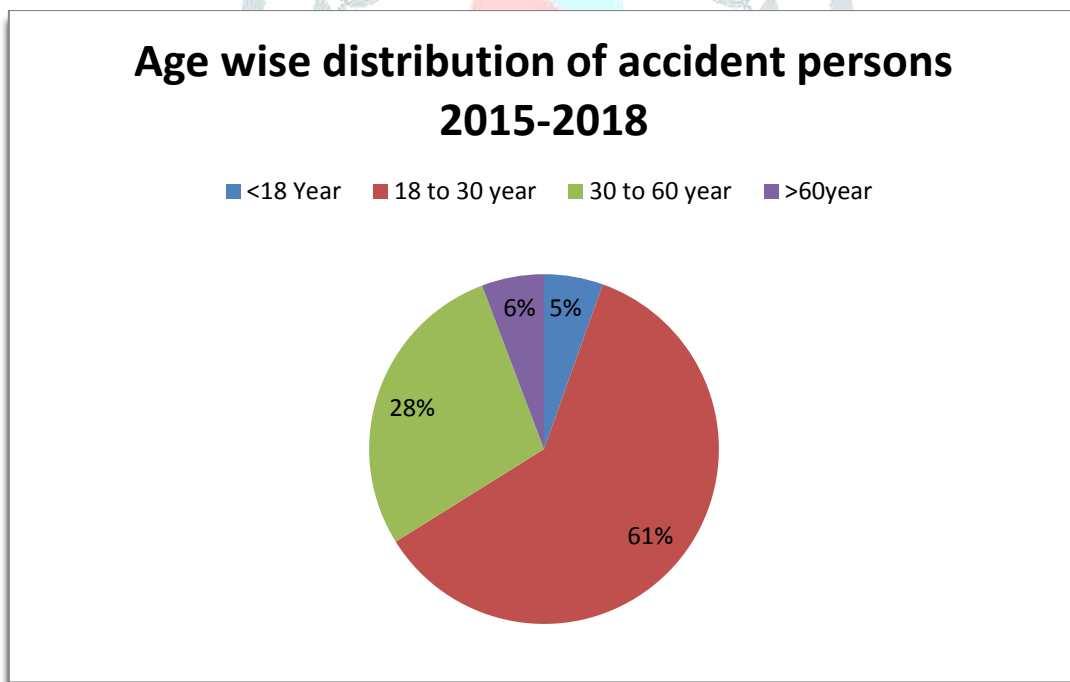

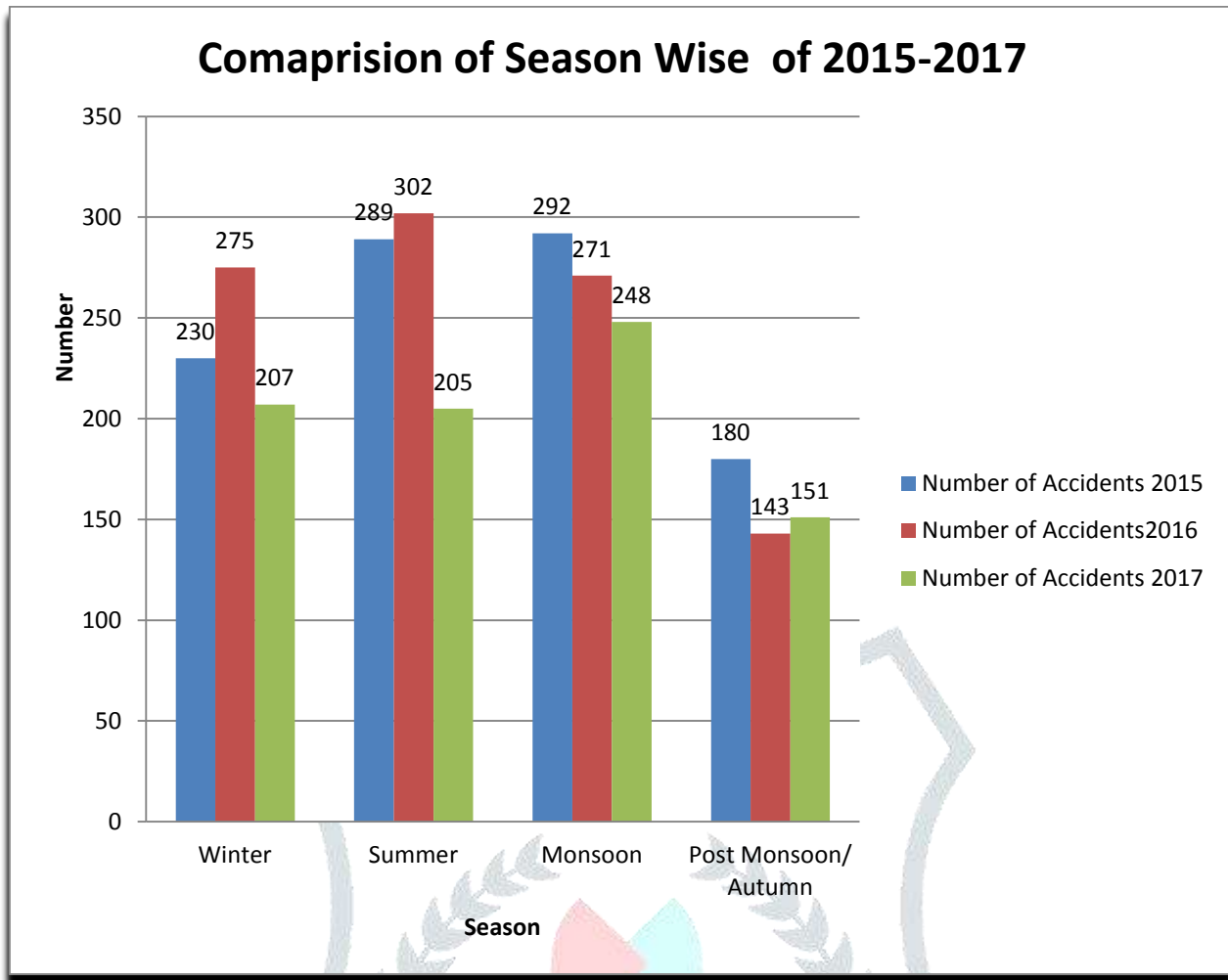**Fig. 5 Age group Percentage in fatalities during (2015-2018)**

Fig.6 Season wise accident comparison of data collected in year 2015-2017.

Thus it can be concluded that:

−Accident Rate has highly in 2015-16

−Fatality Rate is rapidly increasing.

−People aged 15-20 and 21-30 are major victims of accidents

−Major causes of the accidents are the bad roads and improper traffic control devices.

−Most of the accidents have occurred in March & December.

Table 5 Accident spot analysis in year 2015, 2016, 2017

S.No.		No. of Accidents	Problems	Safety Enhancement
1	Petal mill intersection	343	Absence of parking, lack of proper traffic control devices, illegal maneuvers	Construction of parking facility at that location, also provide proper traffic sign, proper lane division
2	4-legged junction at sati gate	358	Lack of proper traffic control, high speed of vehicles	Providing traffic sign and signal as well as speed breakers, road marking
3	4-legged junction at durga nagar square	485	Absence of improper traffic control, traffic light, footpath , zebra crossing,	Providing traffic control device, zebra crossing, footpath and also provide traffic sign

4	Railway over bridge	248	High speed of vehicle, absence of lighting	Providing traffic signs and signals as well as speed breakers
5	Gandhi chowk	299	Illegal parking, absence of traffic sign, zebra crossing, improper design of rotary cause confusion in the road users, absence of proper turning space	Providing traffic signs, parking, zebra crossing and redesign the rotary according to IRC method and also provide proper turning space for vehicles
6	Staggered intersection near sabzi mandi & bus stand	299	Parking problem, excess speed of vehicles, absence of traffic sign	Providing parking facility, traffic sign, speed breakers
7	Eedgaah intersection	277	Absence of traffic signs, footpath, rotary, road side heavy vehicles parking cause parking	Provide rotary, road marking, sign, also provide proper solution of heavy vehicles parking
8	Culvert near rangai	268	Absence of proper lane division, width of culvert, informatory sign	Provide Proper lane division ,traffic sign
9	Curve near rangai temple and location near rangai bridge	256	Width of bridge, Absence of traffic light, speed breaker, blindfold turn	Increase width of bridge, provide speed breakers for reduction of vehicle speed, provide lights

VII. CONCLUSION & RECOMMENDATION

In this paper study is oriented in Vidisha city different location in which data is collected from police station and sp office vidisha. There are so many modes of transport, but roads are narrow and overcrowded. Today people follow fast life in our society due to the changes in income, standard of living, changes in technology etc. Accident is a usual process in our society. Majority of the lives lost by accidents. We can see that so many reasons behind the road accidents i.e. bad condition of roads, ignorance of traffic rules, careless driving, driving without helmet etc. This study evaluates the root causes of road accidents and its financial repercussions on the personal life of the victims and the family. There are so many causes of road accidents. From them, fault of motor vehicle driver is the main cause of road accident and followed by 'other reasons', fault of other motor vehicle drivers, drunken driving, fault of cyclist, pedestrian and passenger, technical defect of vehicles etc. Some recommendation for country needs a lead agency on road safety, with the authority and responsibility to make decisions, control resources and coordinate efforts by all sectors of government – including those of health, transport, education and the police. This agency should have adequate finances to use for road safety, and should be publicly accountable for its actions. An important element in dealing with

road safety is ascertaining the magnitude and characteristics of the problem, as well as the policies, institutional arrangements and capacity within the country to deal with road traffic injuries. This includes an understanding not only of the volume of traffic deaths, injuries and crashes, but also of which road users are most affected;

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