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ROAD SAFETY AUDIT IN VIJAYAWADA CITY

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ABSTRACT

Growth in urbanization and number of vehicles lead to traffic countries of world for over fifty years. It is only in the past decade that developing countries like India have been to experience large increase in number of road accidents taking place and have found it necessary to institute road safety programs, because of rapid urbanization in the road traffic. It is strongly felt that most of accidents, being a multi factor event, are not merely due to drivers fault, on account of driver's negligence or ignorance of traffic rules and regulations, junctions, but also due to many other related factors such as the changes in road conditions, traffic flow characteristics, road users behaviour, climate conditions, speed and absence of traffic guidance, necessary awareness among the people accessing the facility. Systematic road safety program would require special attention, as up gradation of total network would be time consuming apart from requiring huge financial resources, which may be difficult to mobilize, the quick and cost effective step in improving road safety may be to identify accident-prone locations and improve them instead of improving the complete network. Most of the road environment factors can be modified by appropriate and timely remedial measures. Therefore attention has been focused to determine the effects of road geometry on accidents.

Models are built with the accident rate as a dependent variable and road geometrical parameters such as width of carriageway, unpaved shoulder width, horizontal curves, access points and junctions as independent variables. The model can be useful to determine expected accident reduction if improvement measures are carried out in future. In the present study, methodology is prepared for conducting the Road Safety of the existing roadways which are passing through urban areas. A checklist is devised to suit the local conditions. It gives the ranks to each stretch depending upon their risk values. Congestion in urban centers and CBD areas there by increasing the number of accidents on road networks. Accidents have been a major social problem in the developed as well developing.

INTRODUCTION

Urban population is growing at a very rapid rate. Added to this the liberalization of economy has contributed to accelerated growth of socio-economic standards of urban residents. The result is increased demand for travel. The growing travel demand and heavy concentration of population have resulted in high volumes of passenger and vehicular flows on urban roads. The supply of infrastructure has not been able to keep pace with the growing demand, since it requires huge investment to be made. The widening gap between these two has manifested itself in the form of increased congestion on the roads, increasing air and noise pollution, wasteful consumption of fuel, and raising accident rates. Accidents are of prime concern since they result in loss of life, injuries, damage to property and in turn loss to the community.

ACCIDENT SCENARIO IN INDIA

Road accident Studies have indicated that accident rate in developing countries are high compared with those in developed countries. In India according to official statistics 105,725 persons were killed in road traffic crashes in India in 2006. According to these statistics 324,377 persons were injured in 2006. The National Crime Records Bureau (NCRB) and WHO states that at least 13 people dying every hour on Indian roads, India has topped the global list of deaths in road accidents, leaving behind the world's most populated country – China. It is estimated that annual cost of road accidents at present is about 55,000 crores; Road accidents in India are Cause for growing concern and road accidents cost around two percent of Annual Gross domestic Product (GDP).

Table 1.1 Road Accidental Deaths vs. Total Accidental Deaths in India (2012-2015)

		Number of accidental deaths		% Share in
S.No	Year	Total road accidents	Total unnatural	unnatural total accidents
1	2013	84,430	2,44,671	34.5
2	2014	91,376	2,58,326	35.2
3	2015	98,254	2,71,760	36.2
4	2016	1,03,000	2,89,600	37.7

ACCIDENT CAUSAL FACTORS

Accidents and the fatalities on road are the result of inter-play of a number of factors such as fault of drivers, inadequate and improper traffic control devices, inadequate care in design, construction and maintenance of roads, inadequate knowledge about Road Safety; non observance of traffic rules; etc. Road users in India are heterogeneous in nature, ranging from pedestrians, animal-driven carts, bi-cycles, rickshaws, handcarts and tractor trolleys, to various categories of two / three wheelers, motor cars, buses, trucks, and multi-axle commercial vehicles etc. the elements responsible for accidents may be broadly classified into four categories:

(1) Road way Geometric factors

(2)Vehicle related factors

(3) Road User related factors

(4) Environmental factors

Road Way Geometric Factors

The Road Way geometric factors include such as

(a) Carriageway width
(b) Shoulders
(c) Curves and grades
(d) Sight distance
(e) Number of intersections
(f) Skid resistance

DATA COLLECTION AND PRELIMINARY ANALYSIS

In this chapter we present the various types of field and secondary data collected and its analysis. The data includes geometric information of existing road, traffic volume, speed data collection and accident data of the selected road stretch in Vijayawada city.

Study Area Description about Vijayawada is the second largest city in Andhra Pradesh, India. It is on the banks of Krishna River. Vijayawada is a municipal corporation and headquarters of the Andhra Pradesh Capital Region Development Authority and Vijayawada mandal. It is also known as the business capital of Andhra Pradesh. This is because it is one of the major trading and business center of the state.

Vijayawada is the second largest city after the Visakhapatnam port city, in Andhra Pradesh. According to the 2011 census the total population of the city is 1,034,358. The urban area population is 1,476,931. The literacy rate of the city is 82.59%.

The city has a total road length of 1,264.24 km (785.56 mi), covering 1,230.00 km (764.29 mi) of municipal roads, 22.74 km (14.13 mi) of Roads & Buildings department roads, 11.50 km (7.15 mi) of national highways. M.G. Road and Eluru road are the main arterial roads of the city.

Benz Circle is one of the busiest road junctions in the city with an average of 57,000 vehicles crossing daily, The junction has the intersection of two national highways of NH 16 and NH 65 intersects.

Accident Data Collection From Secondary Sources

In India, police officers are responsible for recording road accidents. The accident data was collected from concern police stations. Data consisting details of accidents for all the two stretches for past 4 years from 2013 to 2016. Accident details includes date, day of occurrence, time of accident, type of area, nature of accident, vehicles involved, classification of accident, number of deaths, number of injured, type of maneuver, responsibility of driver, cause of accident etc. and are presented in Appendix A.

Figure 4.1: Study Area: Ramesh Hospital to Benz circle

Accident Data Analysis For Vijayawada City

Yearly Variation of Police Station wise Accidents During 2011 to 2014

Total numbers of accidents registered in the Patamata police are represented in Table 4.1. Total 2014 accidents were recorded during 2011 to 2014, out of these 457 was fatal accidents and 2620 were non-fatal accidents. More number of accidents occurred in police station region than remaining police station regions. The police station wise distributions of accidents are graphically presented in Figure 4.9. In the table 4.1, the total accidents are divided into fatal and non-fatal accidents. Then non-fatal accidents are further divided into grievous injury, minor injury and non-injury and they were shown in the tables 4.2 and 4.3. Table 4.2 shows the fatal, grievous injury, minor injury and non-injury for the years 2012 to 2015. Table 4.3 shows the fatal, grievous injury, minor injury and non-injury for the years 2012 to 2015. The classifications of accidents are graphically presented in Figure 4.10.

Table 4.1 Police station wise fatal and non-fatal accidents during 2012 to 2015

Name	2012		2013		2014		2015		Total
OF the Police Station	F	NF	F	NF	F	NF	N	NF	
Patamata	9	79	11	53	8	65	8	61	

Yearly variation of accidents during 2012 to 2015

The analysis of year wise distribution of accidents indicates that the number of the accidents was occurred in the each particular year. Table 4.1 shows the number of fatal and non-fatal accidents occurred during the years from 2012 to 2015. Table 4.1 shows the number of fat al and non-fatal accidents occurred during the years from 2012 to 2015. Table 4.2 shows the number of accidents occurred during the years from 2012 to 2015. The Yearly distributions of fatal and non fatal accidents are graphically presented in Figure 4.2.

Table 4.2 Yearly wise total accidents during 2012 to 2015

Year	2012	2013	2014	2015
Accidents	585	475	471	484

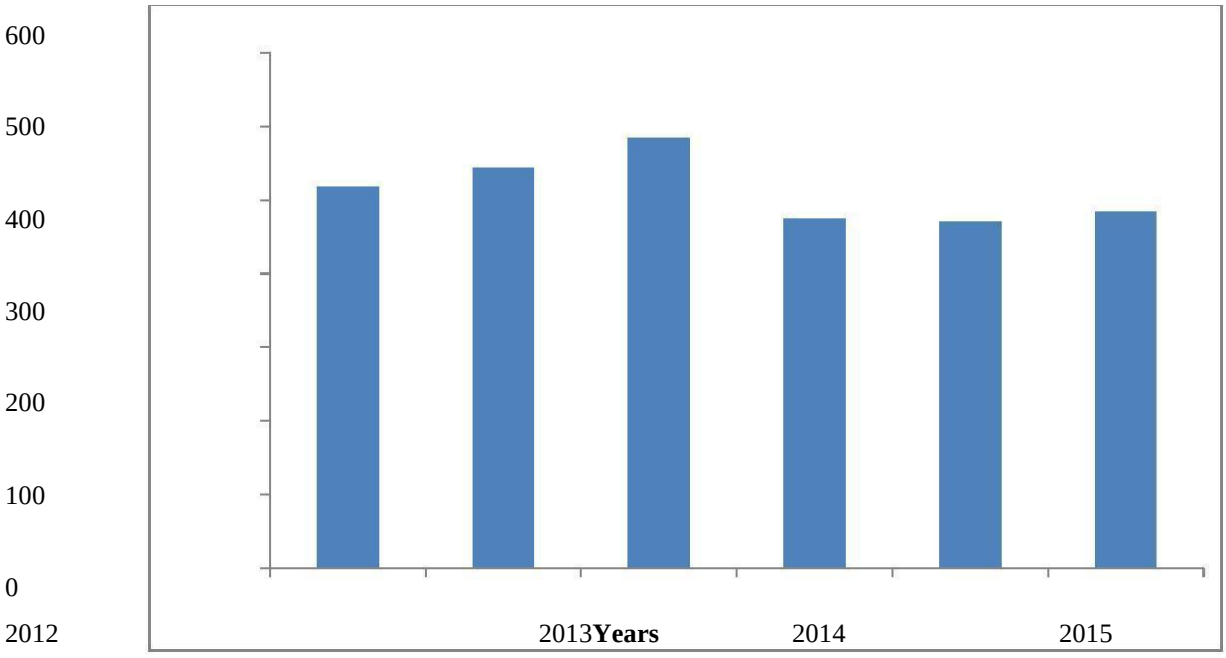

Figure 4.4: graphically representation of yearly accidents during 2012-2015

Monthly Variation of Accidents during 2012 to 2015

The analysis of month wise distribution of accidents indicates that most of the accidents were occurred in the months of January, February, and May. Table 4.3 shows the month wise distribution of accidents during the years from 2012 to 2015. Monthly distributions of accidents are graphically presented in Figure 4.3

Table 4.3 Month wise accidents during 2012 to 2015

Month	2012	2013	2014	2015	Total

January	41	42	44	57	184
February	56	42	31	41	170
March	49	38	37	38	162
April	46	39	43	44	172
May	55	43	43	41	182
June	57	42	46	34	179
July	58	39	36	30	163
August	48	34	45	31	158
September	45	32	39	35	151
October	41	36	41	44	162
November	38	42	41	41	162
December	46	42	30	51	169
Total	580	471	476	487	2014

MONTHS vs ACCIDENTS

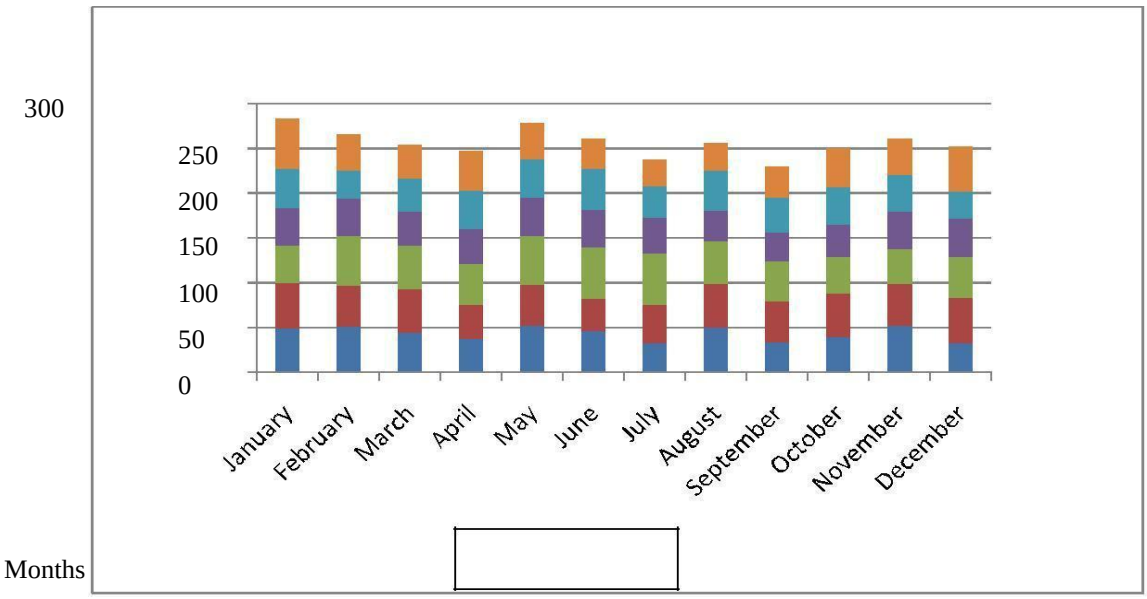

Figure 4.5 Month wise accidents during 2012 - 2015

ROAD SAFETY

This chapter presents the details about the characteristics of the study area, the Road Safety Audit (RSA) procedures adopted for the study area, findings of the audit and the recommendations given to improve the safety.

Study Location

The study location taken for conducting the RSA is Ramesh hospital to Government Hospital. The Road Safety Audit is conducted on this particular road because more number of accidents is reported on this road. The road is further divided into three stretches. It is shown in the table 8.1. The study location stretch taken for the conducting the RSA is shown in the figure 8.1.

Table 8.1 Stretches selected for auditing

S.No	Name of the stretch	Length of the Stretch (Km)
1	Ramesh Hospital	1.8
2	Benz circle	3.2
3	Government Hospital	1.4

SUMMARY AND CONCLUSIONS

In this chapter the summary of the work carried out, conclusions drawn from the preliminary analysis, model analysis, safety index and safety audit are presented.

Summary

The phenomenal growth of road transport has brought along with it the serious problem of traffic accidents. There has been an increasing trend in the number of road accidents as well as casualties from year to year. The present study is mainly intended to determine the effective independent variables for the cause of accident. Field visits have been made to select the variables and detailed analysis was carried out. To find the influence of the causative factors on accident severity Accident data analysis was carried out for the period of 2012-2015 for Vijayawada city, from the secondary data obtained from concerned police stations.

Yearly variation of accidents Monthly variation of accidents Type of vehicles involved in the accidents. Nature of accident occurred.

Time wise distribution of accidents occurred at different places. Responsibility of the driver Classification of accused driver's age on accidents

Models correlating road accidents with factors affecting are the basis for any scientific way of accident reduction. Since the road geometrical parameters are more or less correctible in nature, quantifying their influence is a must for any accident reduction program. The present study is mainly intended to determine how the road geometrical parameters effecting the accidents.

In the present study, methodology is prepared for conducting the Road Safety Audit of the existing roadways which are passing through urban areas. A checklist is devised to suit the Local conditions. Checklist is used as an aid for conducting the Road Safety Audit. It mainly describes about Road signs, Road markings, Pavement condition, Alignment and Pedestrian facilities. It addresses the most common problems considered by road designers. Each

section of the road was audited closely by observing the deficiencies regarding safety and suitable remedial measures were suggested to improve the safety.

In the present study, the traffic volume and speed data are taken for developing the Road Safety Risk Index of selected stretches of the city. It gives the ranks to each stretch depending upon their risk values. For every stretch risk value is obtained by adding all the risk values of the particular locations by taking the factors of Consequence, Exposure and Probability of occurring accident at that location. So totally every stretch has given a risk value and depending on that ranks are given representing the rank 1 given to the highest risk value. It compares the risk of the stretches in the city. It can also compare the countries roads with the ranks and index scores.

CONCLUSIONS

The following conclusions are drawn from the preliminary analysis:

- Maximum numbers of accidents are reported in the months of January, February and May on the roads of the city.
- Most accused type of vehicles causing accidents are the 2-wheelers and 3-wheelers and the victims are two wheeler riders and pedestrians.
- Head on and Rear end collisions and others (hitting the pedestrians) are observed in more number of accidents.

The more number of accidents were occurring during day time.

- Highest numbers of accidents have occurred near the residential areas and recreational areas of the city.
- Almost 96% of the causes of accidents are recorded as the fault of the driver. Most of accused vehicles drivers' age is between 31-40 years
- Almost 82% of the accidents are due to exceeding lawful speed of the accused drivers.

The following findings are drawn from the study.

- Free movement of pedestrians anywhere on the road forces drivers to take wrong decision. Inadequate sings and markings on the roads make the situation as accident.
- Number of horizontal curves, Number of access points, Number of junctions, Peak hour traffic volume and Speed of the vehicles are the positive relation to the accidents on the roads of the Hyderabad city.
- Paved shoulder width and unpaved shoulder width are the negative relation to the accidents on the roads of the city.

Limitations of the Study

In the present study road safety audit was conducted both in day and night time. In addition to that it should also be conducted in adverse weather Conditions such as rain and snow conditions But due to lack of time the audit Could not be conducted in rainy conditions. Road user behavior is not incorporated in the present study.

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