

Literature Review on Road Accident Analysis a Case Study on Dahod to Jhalod Section of N.H.113

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Abstract— The road transportation increases year by year, but the rate of road crashes also increases with it. India is one of the developing countries, where the rate of road crashes is more than the critical limit. This paper presents road accidents situation in India and literature review related to road accident and safety. In this paper also highlights of the objective of study, methodology and accidental data of a case study on Dahod to Jhalod section of N.H.113.

Key words: Accident; Safety; Black spot; National Highways

I. INTRODUCTION

Road Transport is the primary mode of transport which plays an important role in conveyance of goods and passengers and linking the centers of production, consumption and distribution. It is also a key factor for promoting socio-economic development in terms of social, regional and national integration. The road transportation increases year by year, but the rate of road crashes also increases with it. India is one of the developing countries, where the rate of road crashes is more than the critical limit. Road accidents are a human tragedy, which involve high human suffering. They impose a huge socio-economical cost in terms of untimely deaths, injuries and loss of potential income. The ramification 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.

The huge number of injury and death due to road traffic accident reveals the story of global crisis of road safety. Road collisions are the second leading cause of death for people between the ages of 5 and 29 and third leading cause for people between 30 and 44. With the number of vehicles rapidly rising in developing countries, this epidemic is quickly worsening in low and middle-income countries and is on its way to becoming the third leading cause of death and disabilities by the year 2020 (WHO 2000). The loss in road traffic accidents enormous in economy and health related issues. Families having accident victims shatters with death and the victims seriously injured often needs medical facilities for the rest of their life and eventually becomes burden to their family. Road traffic injuries are burdening health care systems in countries around the world. Low and middle income countries suffer from significant percentage of preventable deaths and injuries from road collisions in these countries.

A. Problem Statement:

Road accidents are one of the most relevant problems in today's humanity. Every year 1.24 million people die in road accidents around the world. Road traffic injuries are the leading cause of death among young people, aged 15–29 years. Half of those dying on the world's roads are

“vulnerable road users”: pedestrians, cyclists and motorcyclists. Road accidents not only impose huge economic losses representing between 1-3 % of annual Gross Domestic Product in most countries but also causes great emotional and financial stress to the millions of families affected. India is the developing country, and the Highways are the most vulnerable places for the occurrence of the accidents.

B. Scope of the Work:

The study area selected is Dahod to Jhalod section of N.H.113. To carry out Road Inventory Surveys and collect Road accidents data from zonal Police stations of the study area. To carry out Road accident analysis and traffic surveys of the study area.

C. Objectives of Study:

- To Analyze Road accidents and identify black spots based on accident occurrence rate on the study area.
- To Develop Road accidental model.
- To Propose Suggestions for reducing the occurrence rate and severity index of Road accidents on study area.

II. ROAD ACCIDENT SITUATION IN INDIA

During 2012, a total of 4, 90,383 road accidents were reported by all States/Union Territories. Of these, about 25.1 per cent (1, 23,093) were fatal accidents. The number of persons killed in road accidents were 1, 38,258, i.e. an average of one fatality per 3.5 accidents. The proportion of fatal accidents in total road accidents has consistently increased since 2003 from 18.1 per cent to 25.1 per cent in 2012. The severity of road accidents, measured in terms of persons killed per 100 accidents, declined for the first time to 28.2 during 2012 after it increased from 20.8 in 2002 to 28.6 in 2011.

A. Accidents in Terms of Classification of Roads:

National Highways accounted for 29.1 per cent in total road accidents and 35.3 per cent in total number of persons killed in road accidents during 2012, whereas the State Highways accounted for 24.2 per cent of total accidents and a share of 27.3 per cent in the total number of persons killed in road accidents during same period of time. Highways permit greater speed resulting in relatively greater number of road accidents and fatalities. National Highways accounted for 29.1 per cent in total road accidents and 35.3 per cent in total number of persons killed in road accidents during 2012, whereas the State Highways accounted for 24.2 per cent of total accidents and a share of 27.3 per cent in the total number of persons killed in road accidents during same

period of time. Highways permit greater speed resulting in relatively greater number of road accidents and fatalities.

B. Spatial Distribution of Road Accidents (Urban Vis-À-Vis Rural):

In 2012, the total number of road accidents that occurred in rural areas was more than that in the urban areas; the former accounting for 54.3 per cent (2, 66,450) and the latter accounting for 45.7 per cent (2, 23,933) of total accidents. Rural areas had more fatalities (61.6 per cent) than urban areas (38.4 per cent).

III. LITERATURE REVIEW

Review of literature is important in any research work. Many researchers have carried out research work in the area of road accidents. Some of them have analyzed accident data in different ways. Some of them Identification of Black spot zone. Some of them have developed accident models for forecasting future accident trends. They have also proposed strategies for road safety. In the present chapter literature review is carried out covering the different issues related to road accident and road safety.

Yannis T.H. (2014) was presented A Review of The Effect of Traffic and Weather Characteristics on Road Safety. Despite the existence of generally mixed evidence on the effect of traffic parameters, a few patterns can be observed. For instance, traffic flow seems to have a non-linear relationship with accident rates, even though some studies suggest linear relationship with accidents. Regarding weather effects, the effect of precipitation is quite consistent and leads generally to increased accident frequency but does not seem to have a consistent effect on severity. The impact of other weather parameters on safety, such as visibility, wind speed and temperature is not found straightforward so far. The increasing use of real-time data not only makes easier to identify the safety impact of traffic and weather characteristics, but most importantly makes possible the identification of their combined effect. The more systematic use of these real-time data may address several of the research gaps identified in this research.

K. Meshram and H.S. Goliya (2013) were presented an analysis of accidents on small portion NH-3 Indore to Dhamnod. The data for analysis is collected for the period of 2009 to September 2011. More accidents occurred in Manpur region by faulty road geometry. The trend of accidents occurring in urban portion (Indore) is more than 35 % to rate of total accidents in each year. This may due to high speeds and more vehicular traffic. In the present study area the frequency of fatal accidents are 2 in a week and 6 for minor accidents in a week. More number of accident observed in 6 p.m. to 8 p.m. duration because in that time more buses are travels between villages and city. One fatal and five casualties are occurring per km per year in the study area. The volume of the trucks passing through study corridor is increasing by year. At Rajendra Nagar from 2000 onwards the traffic is reduced due to the construction of by passes in that area.

Rakesh Mehar and Pradeep Kumar Agarwal (2013) were highlighted the deficiencies in the present state of the art and also presents some basic concepts so that systematic approach for formulation of a road safety improvement program in India can be developed. The study

presents basic concepts to develop an accident record system, for ranking of Safety hazardous locations, for identification of safety improvement measures and to determine priorities of safety measures. It is expected that this study will provide a systematic approach for development of road safety improvement program in India and thus pave the way for improving safety on Indian roads

E.S.Park et al (2012) studies the safety effect of wider edge lines was examined by analyzing crash frequency data for road segments with and without wider edge lines. The data from three states, Kansas, Michigan, and Illinois, have been analyzed. Because of different nature of data from each state, a different statistical analysis approach was employed for each state: an empirical Bays, before-after analysis of Kansas data, an interrupted time series design and generalized linear segmented regression analysis of Michigan data, and a cross sectional analysis of Illinois data. Although it is well-known that causation is hard to establish based on observational studies, the results from three extensive statistical analyses all point to the same findings. The consistent findings lend support to the positive safety effects of wider edge lines installed on rural, two-lane highways. In conclusion, this study lends scientific support to the positive safety effects of wider edge lines installed on rural two-lane highways. Although the magnitudes of crash reductions were somewhat different from state to state, the results point in the same direction.

Amir H. Ghods et al. (2012) Differential speed strategies increased the number and rate of car-truck overtakes over the range of volumes considered in this analysis. This suggests a negative effect on safety resulting from differential speed strategy applied to two-lane rural highways. On a positive side DSL and MSL strategies have reduced the number of car-car overtakes at different volumes, hence increasing safety. This latter relationship suggests a calming effect of slower trucks on the speed of the traffic stream, which results in fewer interactions between cars. No significant effect was observed concerning differential speed control strategies and both average TTC and PTDO. The effect on TTC was due to volume; highest TTC for car-car and car-truck interactions at very low volumes, decreasing to a minimum in the range between 500 vph to 800 vph and increasing slightly thereafter. This indicator suggests the highest head-on risk is experienced in the mid volume region. The average speed of traffic decreases in a nonlinear fashion with volume with differential speed strategies indicating a downward shift in this relationship.

Michael Williamson and Huaguo Zhou (2012) were the development of calibration factors for crash prediction models in the new Highway Safety Manual (HSM) for rural two-lane roadways in Illinois. The crash prediction modes (so called Safety Performance Functions (SPF)) in the HSM were developed using data from multiple states, therefore the models must be calibrated to account for local factors, such as weather, roadway conditions, and drivers' characteristics. In this study, two calibration factors were developed for two different SPFs to give a better prediction of crash frequencies on rural two lane roadways in Illinois. This study determined the SPF that best predicts the crashes was developed specifically for rural two-lane Two-way roadways in Illinois. It is recommended that local

SPFs be developed and compared to the HSM SPF when evaluating the safety of a roadway.

R.R. Dinu, A. Veeraragavan (2011) was presented Random Parameter Models for Accident Prediction on Two-Lane Undivided Highways in India. Based on three years of accident history, from nearly 200 km of highway segments, is used to calibrate and validate the models. The results of the analysis suggest that the model coefficients for traffic volume, proportion of cars, motorized two-wheelers and trucks in traffic, and driveway density and horizontal and vertical curvatures are randomly distributed across locations. They have concluded with a discussion on modeling results and the limitations of the present study.

IV. STUDY AREA

National Highway 113 (NH 113) is a National Highway in western India. NH-113 is connected Dahod (Gujarat) to Nimbahera (Rajasthan). It runs for a distance of 240 km of which 200 km is in Rajasthan and 40 km is in Gujarat.

Study area is selected from Dahod to Jhalod section of N.H.113. It is located in Gujarat state. It is a two lane undivided rural highway. Length of this highway section is 32 km. The study area is surrounded by villages, industries, market, colleges etc. It is unsafe from safety point of view. The main reason is local traffic has direct access to the National Highway, which results in congestion and accidents.

V. METHODOLOGY

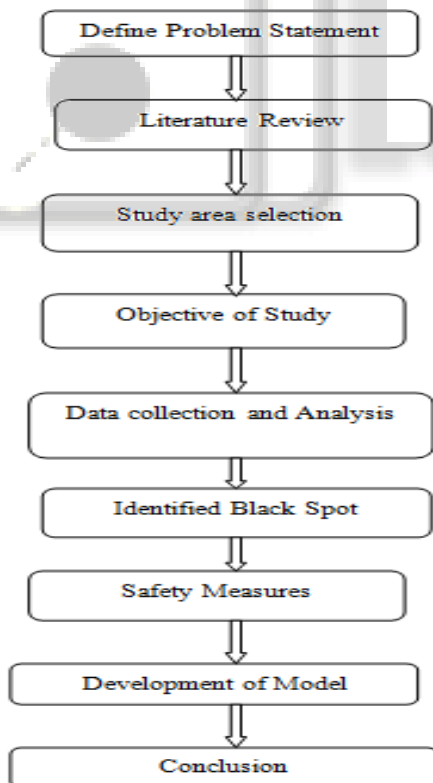


Fig. 2: Flow Chart of Methodology

The first step in methodology is to define problem statement; it covers the subject of work. The next is literature review, in this step the previous years' works on that subject are collected and has been studied carefully. The third step is to select study area for implementing thought of work and it should be suitable for

the objective. After the selection of study area the objectives of work should be decided. For achieving that goal the data collection and data analysis is going to be carried out. Once the data analyzed, on the bases of analysis results some remedial measure for road safety is going to be suggested. Last step is to give conclusion of this complete work done.

VI. DATA COLLECTION

A. Road Accident Details of Study Area:

Road Accident data was collected from various zonal police station of study area. Road accident occurred in last five years is summarized as shown in table 5.1. The total fatal accidents occurred are 150, major accidents are 213 and minor accidents occurred are 146 in years of 2010 to 2014.

Year	Type of Accident			Total	Severity Index
	Fatal	Major Injury	Minor Injury		
2010	25	36	22	83	30.120
2011	29	41	28	98	29.59
2012	37	47	33	117	31.62
2013	27	45	30	102	26.47
2014	32	44	33	109	29.35
Total	150	213	146	509	29.46

(Source: Zonal police stations of Study area)

Table 1: Accidents Classified According to Year Wise

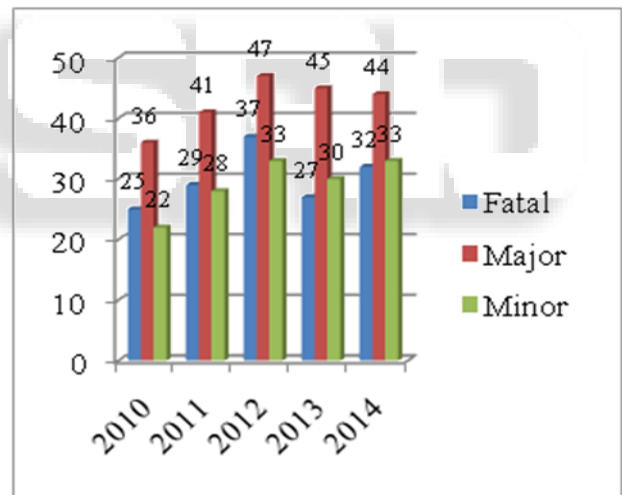


Fig. 1: Graphical representation of accident statistics from the year 2010 to 2014

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