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A Review of Variation on Crashes and Fatalities on National Highway

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ABSTRACT: Accidents occur due to negligence of driver or faults in design of the road. Negligence cannot be overcome but design defects can be rectified. The rectification of the design is subjected to the environmental conditions therefore a safety audit should be done on priority to overcome these flaws. Regular safety audits should be conducted to avoid loss of vital assets. India suffers the highest number of road crash deaths in the world, to overcome these issues it is committed to reducing road crash fatalities and making the country's roads safe for all.

KEYWORDS: Transport, Highways, Road Safety, Management, highway maintenance.

I. INTRODUCTION

India suffers the highest number of road crash deaths in the world. The Ministry of Road Transport & Highways (MoRTH), Government of India, is committed to reducing road crash fatalities and making the country's roads safe for all. India is also a signatory to the global commitment to reduce road crash fatalities by 50% by 2030. National Highways constitute 2.03% of the total road network. These highways, however, contribute 35.7% of total fatalities in the country (MORTH, 2019).

II. OBJECTIVES OF PAPER

- To identify all safety-critical issues.
- To list out the locations where these safety-critical issues are present.
- To provide recommendations to address the safety concerns at these locations.
- To summarize the findings from the road crash vulnerability audit.

III. LITERATURE REVIEW

3.1 N. Naveen, M. Rajesh, M. Srinivas, Md. Fasiuddin, ROAD SAFETY AUDIT OF A RURAL ROAD, International Journal of Civil Engineering and Technology (IJCIET) Volume 8, Issue 4, April 2017, ISSN Online: 0976-6316, pp. 752-761

From the actual conditions of rural road accident in our country, it shows that the current rural road safety is facing the grim situation and emphasizes the need to conduct rural road safety audit. This article analyzes the factors effecting safety in rural road accidents from human, vehicle, road, external environment and the other factors, summarizes the connotation and the steps of rural road traffic safety audit. It divides the contents of rural road traffic safety audit into two parts: newly built and rebuilt rural roads & the existing rural road traffic safety audit. Finally, this project aims at these problems existing in implementation process of rural road & proposes the corresponding solutions to support the work of rural road traffic safety audit. Road safety audit has the greatest potential for improving safety when it is applied to a road or traffic design before the project is built. Purpose of the audit is to look at the accident potential and safety performance of the proposal.



Accident causation is very complex and must be understood adequately to improve accident Prevention. This paper had given suggestions for a safe road. It showed the road hazards like Sharp curves, less widths, inefficient road markings and sign boards. This document hashigh lighted the problem of road traffic injuries among the general population, apply equal to

the policy maker working to cut the volume of road traffic injuries. We would like to say that road safety is not a topic to be taken lightly. The important thing is to stay alert at all the times while using the roads we must know that what is happening around us in what way we can take necessary action to avoid danger. High priority must be given in identification and rectification of black spots.

3.2 Shradha S Parsekar, Mannat M Singh, Bhumika T Venkatesh, Sreekumaran N Nair. Road safety in India: a public health concern. Indian Journal of Community Health. 2015, pp.191-196.

Road traffic accident (RTA(s)) is one of the major preventable public health problems and is on the rise which can be attributed to increase in the number of vehicles, lifestyle changes and risky attitudes. Injuries due to RTA as one of the prime causes to the 'global burden of diseases' was on the 10th position in the year 2002 (3), but according to 'Global status report on road safety 2013' it is on the eighth place and expected to be at the fifth place by 2030 if trends continue at the same pace. In low and middle income countries (LMIC's) mortality due to RTA is projected to rise by 83% provided stringent measures are not taken. This paper was intended to get an overview of road safety in India. It provides evidence on factors responsible for injuries, trends of fatalities, various adverse effects as well as about control and prevention of road traffic accidents (RTAs) in a condensed form. This might help the policy makers as well as practitioners to make use of this evidence in forming policies for tackling the issue of RTA which is on the rise. The burden of RTA was found to be considerably high globally including India. RTA is one of the major preventable public health problems and is on the rise which can be attributed to increase in the number of vehicles, lifestyle changes and risky attitudes. Though the burden of RTAs in India is high, there is dearth of evidence on it at the national level, which is a serious issue. RTAs cause a number of adverse effects which can be: economical, physical, psychological and social. The burden of RTA is increasing, making it necessary to take a multi-sectoral approach for its prevention and control.

3.3 Dinesh Mohan, Omer Tsimhoni, Michael Sivak's, Michael J. Flannagan's Road Safety in India: Challenges and Opportunities The University of Michigan Transportation Research Institute Ann Arbor, Michigan 48109-2150 U.S.A.

According to official statistics, 105,725 people were killed in road traffic crashes in India in 2006 (NCRB, 2007). The situation in India has worsened in recent years. Traffic fatalities increased by about 5% per year from 1980 to 2000, and since then have increased by about 8% per year for the four years for which statistics are available (Figure 1). This is attributable partly to an increase in the number of vehicles on the road, and partly to the absence of a coordinated official policy to control the problem. The fatality rate has increased from 36 fatalities per million persons in 1980 to 95 fatalities per million persons in 2006.

The total motor vehicle population has increased from about 300,000 in 1951 to about 73,000,000 in 2004 (see Figure 2). (The actual number of motor vehicles in the country may be 20-30% lower, as registration procedures do not remove many of the out-of-service vehicles from the records. This issue is dealt with in more detail in a later section.) The numbers and 2 percents of various types of vehicles registered (in 2004) and sold (in 2007) in India are given in Table 1. Most notably, motorcycles are more than five times as numerous as cars. It is also interesting that the total of buses, trucks, and other vehicles is similar in magnitude to the number of cars. These proportions of vehicle types are different from those in the high-income countries and can influence fatality rate patterns. In the U.S. in 2005, for example, passenger cars constituted 66% of vehicles on the road; trucks, and vans constituted 30%; motorcycles were only 3%; and buses 1%.

3.4 Sanjay Kumar Singh, Road Traffic Accidents in India: Issues and Challenges, Transportation Research Procedia, Volume 25, 2017, Pages 4708-4719

The main aim of this paper is to analyze the road accidents in India at national, state, and metropolitan city level. Analysis shows that the distribution of road accidental deaths and injuries in India varies according to age, gender, month and time. Age group 30-59 years is the most vulnerable population group, though males face higher level of fatalities and injuries than their female counterparts. Moreover, road accidents are relatively higher in extreme weather and during working hours. Analysis of road accident scenario at state and city level shows that there is a huge variation in fatality risk across states and cities. Fatality risk in 16 out of 35 states and union territories is higher than the all India average. Although, burden of road accidents in India is marginally lower in its metropolitan cities, almost 50% of the cities face higher fatality risk than their metropolitan counterparts. In general, while in many developed and developing



countries including China, road safety situation is generally improving, India faces a worsening situation. Without increased efforts and new initiatives, the total number of road traffic deaths in India is likely to cross the mark of 250,000 by the year 2025. There is thus an urgent need to recognize the worsening situation in road deaths and injuries and to take appropriate action.

3.5 A. Anusha, P. Ayyappa, V. HemanthNaik, Ch. Hanumantharao, Field Study on Safety of National Highways, TEST Engineering & Management, May – June 2020, ISSN: 0193-4120 Page No. 2404 - 2413

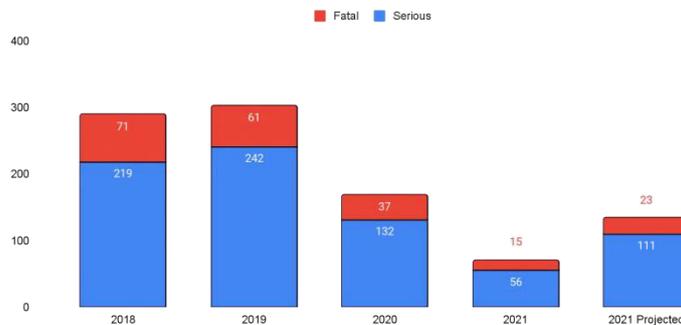
Road safety is the main aspect that should be considered in the developing country like India. The present study objective is to evaluate the road safety deficiencies and improvements on existing road network i.e., NH-65 from Pune to Machilipatnam the total length of the selected stretch is 51.20 Km that is from Jaggaiahpet to Vijayawada. In this stretch the accident data is collected, black spots are identified, and maintenance measures are identified. Perakalapadu junction i.e.,(230km+600m) is one of the major black spots in this stretch. Road safety deficiencies such as unauthorized median openings, confused behavior of pedestrians, unavailability of bus stops, neglecting the traffic rules etc., were identified in the location. In addition to these it was found. Keeping all these deficiencies in the view certain security, safety, quality and mitigation measures are taken by National Highway Authority of India[NHAI] in order to control the percentage of accident.

IV. DATA ANALYSIS

This chapter explores the Spatio-temporal analysis of the FIR data and concessionaire reported incident data. The chapter further analyses information obtained from the local trauma care centre/hospital, as well as vehicle volume and speed data. The chapter also presents a detailed investigation of the pre-crash, crash, and post-crash contributing factors. Additionally, this chapter derives and exhibits several valuable insights related to the black spots and high fatality zones.

4.1 Spatiotemporal Analysis of crash data

This section constitutes several insights obtained from the crash data. The timeline used for the analysis is from 2018 onwards. The following Figure 3.1 illustrates the year-wise distribution of severe injuries and fatalities. It indicates that the year 2020 has witnessed a 45% decline in fatal crashes from 2019. The figure also explains that the number of fatalities may reach 23.



4.1: Yearly fatalities and serious injuries.

4.2 Seasonal Variation in crashes and fatalities.

Figure 4.2 illustrates the trimester distribution of crashes and fatalities from 2018 onwards. It is clear that apart from the lock-down period seen in 2020, the fatalities tend to increase from January to June and show a downward trend at the end of the year.

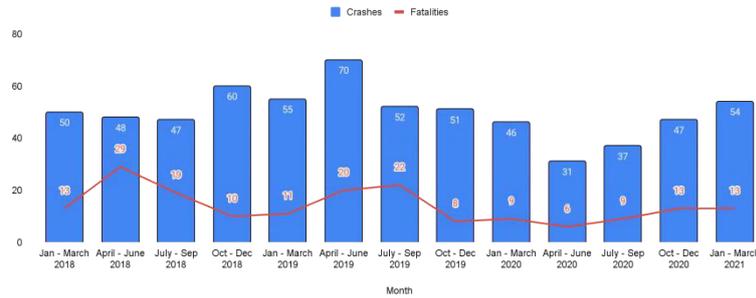


Figure 4.2: Time variation on crashes and fatalities.

4.3 Monthly variation on crashes and fatalities

Figure 4.3 presents a month-wise distribution of crashes and fatalities. Here, it becomes clear that most of the crashes occur in January, followed by February and March. The foggy conditions in winters could be a significant reason for the high number of crashes in December and January. Further, the monsoon may be the reason for low crashes in July. On the other hand, most of the fatalities have been captured in February and March (Figure 4.3).

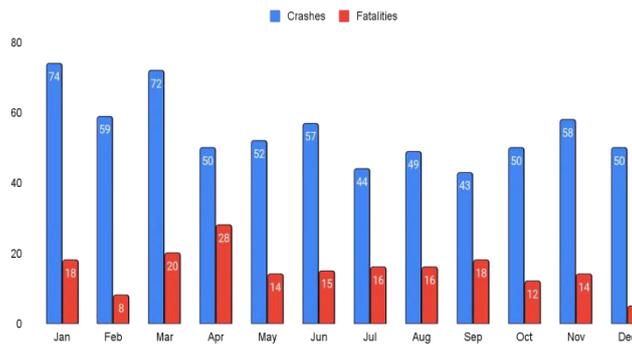


Figure 4.3: Monthly variation on crashes and fatalities.

4.3 Collision Partners

In this section, the aim is to analyze high-risk collision partners. Table 4.1 shows the distribution of crashes according to the vehicle type. As can be seen from the table, in the known categories, motorised two wheelers are over represented in the crashes. The major collision partners are motorised two wheelers and trucks followed by motorised two wheelers and cars. Figure shows that collisions between vehicle and vehicle, and collisions between vehicle and pedestrian lead to fatality. These two types of collisions are the major concern on the present study stretch

Vehicle Type/Vehicle Type	3-Wheeler	Bicycle	Bus	Car/Jeep	M2W	Tractor	Truck	Others	Total
3-Wheeler	--	--	--	--	--	--	--	2	2
Bus	--	1	2	--	2	--	4	21	30
Car/Jeep	1	2	9	--	27	1	15	69	124
M2W	--	1	12	--	14	1	4	50	82
Tractor	--	--	--	--	4	--	--	2	6
Truck	--	5	14	1	34	1	15	36	106
Others	--	1	1	1	15	--	1	36	55
Total	1	10	38	2	96	3	39	216	405

Table 4.1: Collision partner.



V. CRITICAL ROAD SAFETY ISSUES

5.1 Absent Crash Barrier

Recommendations

- Installation of thrie beam or W-beam crash barriers along the entire highway
- Provision of the bull-nosed tapered crash barrier at median gaps to ensure safety at such locations.
- Provision of proper transition between the crash barrier and concrete

5.2 Damaged Crash Barrier

Recommendations

- The road-owning agency needs to reinstate damaged crash barriers within 24 hours of notification or crash.
- Independent Engineers to conduct monthly asset checks to ensure that crash barriers are in perfect condition.

5.3 Gap in Crash Barrier

Recommendations

- The unnecessary gaps in the crash barrier must be repaired. The median crash barriers should be continuous.
- Regular asset management checks shall be conducted to ensure that there is no broken crash barrier

5.4 Inappropriate Termination of crash Barrier:

Recommendations

- The termination to a bridge/culvert parapet wall should overlap the concrete structure. It shall be attached to the concrete structure.
- The crash barrier beginnings should have deflected bull-nosed ends to ensure safety to commuters. Such deflected bullnose ends will ensure that impalement through the vehicle does not occur.

5.5 Inappropriate Height of Crash Barrier

Recommendations

- Crash barriers must have a minimum ht of 73 cm on the NH.
- The height may increase depending on site conditions as per IRC 119:2015 guidelines.

5.6 Inappropriate Placement of crash Barrier

Recommendations

- Crash barriers must be installed such that a crashed vehicle's first impact with a structure is the crash barrier itself.
- The installation shall be as per IRC 119:2015 guidelines.

5.7 Hard Structures

Recommendations

- Road owning agency shall remove concrete and other hard objects which can be removed from the highway.
- If the agency cannot remove the objects, they must be protected using MBCB.
- Objects that cannot be removed or protected must be made highly visible per IRC 35: 2015.

5.8 Exposed Trees

- Recommendation
- The presence of exposed trees on the shoulder or median poses a hazard to traffic and road users and should be effectively protected if can't be removed or relocated altogether.
- Exposed trees should be painted white from the base to a height of 1.2m and retro-reflective tape should be given around the bark of the tree.

5.9 Absence of Sign Board

Recommendation

- Road owning agency shall install chevron signs along all curves. They shall install signs related to sudden lane

end and construction zone ahead as per IRC: 67-2012 (Code of Practice for Road Signs).

- The signs should be large and visible for a sufficient distance to provide the
- Road user with adequate time to rectify the change in alignment.
- Spacing between two signs is such that the road user always has an adequate time to perceive and react to the sign.

5.10 Signage Covered by Vegetation

Recommendation

- Pruning of excess or overgrown vegetation along the entire highway especially at locations where signboard is covered due to excess vegetation.
- Pruning of vegetation obscuring/ hiding road information such as signages.
- Pruning and Maintenance of Median & Roadside Plantation/ Vegetation are briefly described in Section 10 of IRC: SP: 21-2009 – Guidelines on Landscaping and Tree Plantation.

5.11 Absence or Discontinuous Pavement Marking

Recommendation

- Visible centre lines and edge lines shall be present throughout the project highway.
- Road owning agency to provide edge lines without centre lines in the case of intermediate lanes. The pavement marking must be provided as per the IRC 35: 2015 guidelines.
- RRPMs should be provided along the edge line on the carriageway, especially where vulnerable road users are present. Amber RRPM should be used across the carriageway as a pre-warning to intersection/pedestrian crossing. Red road studs indicate a line that is not crossable such as the left edge of the carriageway. Road owning agency to install Red road studs along the edge lines.
- Pedestrian crosswalks should be clearly marked near the median openings and at the intersection crossings.
- The paint on traffic calming measures should always remain painted. Independent Engineer to carry out regular checks to ensure that the paint does not fade over time.

5.12 Improper Construction Zone

Recommendation

- Each construction site must have a proper transition at the start, guidance through the construction site, and proper end transition.
- Safety specifications for the construction zone must follow IRC SP 55: 2014 guidelines.
- The chapter on 'Recommendations and Conclusions' presents a detailed recommendation for the construction zone.

5.13 Potholes

Recommendation

- Potholes should be repaired. Patching is one good repair option. Patching is the process of filling potholes or excavated areas in the asphalt pavement.
- Quick repair of potholes helps control further deterioration and expensive repair of the pavement.
- Pavement maintenance and rehabilitation should follow IRC: 82-2015 specifications.

5.14 Pooling of Water due to poor drainage

Recommendation

- Adequate camber and good drainage system shall be provided.
- The highway drainage criteria must follow IRC SP 42: 2014 design guidelines.

5.15 Untreated Gap in Median

Recommendation

- NHAI to provide 'median gap' sign at median openings
- The curb shall be painted yellow and black for better visibility at night.
- Road owning agency to install road studs along the edge line of the median to improve night visibility
- NHAI provides retro reflective pavement marking for pedestrian crosswalks at median openings, especially at the built-up areas. This retro-reflectivity improves visibility during the night.



VI. CONCLUSION

This paper emphasizes various safety elements of infrastructure, enforcement, emergency care, and engagement on the highway. The observations of the study point to the need for several engineering and non-engineering safety mitigation measures to achieve the goal of a Zero Fatality Corridor.

The paper begins by presenting an in-depth crash analysis followed by an in-depth survey observation. The in-depth study of Crash, fatalities at various location on the corridor has been studied

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Links:-

1. <https://www.youtube.com/watch?v=bdSTdxwAVA4>
2. <https://www.youtube.com/watch?v=k0m6Iz8L4M4>
3. <https://www.youtube.com/watch?v=zm1fgFDyYBE>
4. <https://www.youtube.com/watch?v=8JHrZ-aNxyQ>



		
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