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PUNE MUMBAI EXPRESSWAY TO AVOID ACCIDENT NEAR URSA-TOLL PLAZA

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ABSTRACT

The costs of fatalities and injuries due to road traffic accidents (RTAs) have a tremendous impact on societal well-being and socioeconomic development. RTAs are among the leading causes of death and injury worldwide, causing an estimated 1.2 million deaths and 50 million injuries each year (World Health Organization, 2004).The basic hypothesis of this project is that accidents are not randomly scattered along the road network, and that drivers are not involved in accidents at random. There are complex circumstantial relationships between several characteristics (driver, road, car, etc.) and the accident occurrence. As such, one cannot improve safety without successfully relating accident frequency and severity to the causative variable. We will attempt to extend the authors' previous work in this area by generating additional attributes and focusing on the contribution of road-related factors to accident severity. This will help to identify the parts of a road that are risky, thus supporting traffic accident data analysis in decision-making processes.

Keywords: *Road traffic, accidents*

I. INTRODUCTION

The Mumbai – Pune Expressway is a controlled-access highway that connects Mumbai, the commercial capital of India, to the neighboring city of Pune, an educational and information technology hub. This divided 6-lane roadway is an alternative to the old Mumbai – Pune highway and helps in reducing travel time between the two cities. It has a speed limit of 80 km/h along most parts of the stretch. Two-wheelers and three-wheelers are not permitted to use most parts of the expressway. Common vehicle types plying the expressway are cars, trucks and buses. The expressway is 94 km long and is witnessing a large number of traffic crashes, fatalities and serious injuries. This report presents results for accidents occurring near at URSA toll plaza.India is currently ranked highest in the world for traffic fatalities; thus, there is a critical need to reduce the number of road traffic-related fatalities across the country. While the economic and social benefits of implementing standardized accident reporting and crash data collection systems to improve road and automotive safety and reduce fatalities have been demonstrated in Europe and the USA for some time, there has been no comparable system in India.

II. OBJECTIVES

In continuation of the same study, a cumulative total of 74 accidents have now been examined and analyzed in detail, covering the period from January 2010 to December 2014. This report provides an in-depth analysis of these accidents, as well as an analysis of the various factors influencing accidents and injuries on the Mumbai – Pune Expressway. The report not only identifies these "contributing factors" but also ranks them based on the number of accidents these factors have influenced. This ranking is to help policy makers, decision makers and road safety stakeholders in planning cost-effective road safety investments using data-driven road safety strategies.

Some objectives of accident studies are listed below:

- To study the causes of accidents and suggest corrective measures at potential location
- To evaluate existing design
- To compute the financial losses incurred
- To support the proposed design and provide economic justification to the improvement Suggested by the traffic engineer
- To carry out before and after studies and to demonstrate the improvement in the problem.

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III. TO TACKLE THE PROBLEMS OF SPEEDING OR SLOW MOVING VEHICLES

Even though the expressway has posted speed limits, drivers often ignore these or consider them inappropriate for the vehicle they are driving (e.g., 50km/h a good speed for a heavy truck, but not for their responsive lighter car). Hence, there is an urgent need for scientific research to understand what drivers feel is a safe-speed based on the road features and the vehicle being driven. Many countries have improved on speed limits using speed management techniques such as one described below.

Step 1: Speed Data Collection
The first step is to identify whether the posted speed limits are acceptable to the traffic. This can be established by conducting traffic speed studies to identify speeds by vehicle type (cars, trucks, buses, mini trucks, etc.) for a sample of vehicles. Then determine the 85th percentile speed (the speed below which 85% of the sample population is travelling on a stretch of road).

Step 2: Plan the speed limits
With the speed data obtained, road engineers can plan for reliable and safe speed limits on various sections of the expressway. The speeds can differ by vehicle type or by the lane of travel.

Step 3: Driver communication and then, speed enforcement
Any new speed limits need to be effectively communicated. In addition to speed limit posts, communication of changes in speed limits can be enhanced through road markings and traffic calming measures. For example, in sections where trucks slow down to climb a grade, signage could warn approaching drivers of the slow traffic lane ahead. In the ideal scenario, the road environment itself would psychologically influence the driver to follow a safe speed limit. Good speed enforcement is the final alternative to control driver speeds.

Improper lane change — 5.41%
This problem is due to a driver either weaving diagonally across lanes (rather than moving through one after another in an orderly progression) or failing to check mirrors or indicate intention to other drivers before changing lanes, catching other drivers by surprise. Many motorists have been observed changing lanes without giving proper indication.

To keep drivers in their proper lanes or convince them to use indicators
Use of indicators to communicate to other drivers about the intention to turn or change lanes is important and must be encouraged for safe driving. Proper lane use can be enforced through visual evidence from CCTV cameras and fining motorists at toll plazas.
Co-passengers could help, too, by requesting that the driver use indicators and observe lane discipline. This is essential for the safety of all vehicle occupants and other road users.

Vehicle Engineering: Forward Collision Warning
In addition to the lane departure warning systems previously mentioned, engineered warning systems designed to monitor the road ahead for collision possibilities are available on some vehicles. These provide object recognition and detect relative speeds between a vehicle and objects on the road. If the closing speed represents a risk of an impending collision, drivers are alerted. In some models, the vehicle will even assist with sudden braking or steering, depending on the information given by the vehicle sensors and the electronic control module's comparison algorithms. Such warning systems serve not only to detect improper lane changes by others but also to alert the driver in case of improper lane usage or the presence of any fixed/moving objects on the carriageway.

Human Factors Influencing Injury Occurrence

1. Seat belt not used
2. Overloading of occupants (No. Of occupants > seating capacity)

Seat belt not used
Seat belts are designed to secure occupants in a safe position within the vehicle in the case of an accident or sudden stop. Seat belts have been proven to reduce injury severity by preventing occupants being ejected from the vehicle

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entirely or from the seat and into hard objects such as the windshield. Seat belts should be worn by all occupants, including rear seat occupants. The photos shown at right were taken a few milliseconds after an impact with a barrier to show how belted and unbelted rear occupants move in an accident. Rear occupants can impact the driver and other front seat occupants even if these have airbags, causing serious (and avoidable) injury to all impacted persons. In fact, even those protected by driver and passenger airbags need to wear seat belts, as shown in Figure 9. It is possible for an unrestrained occupant to move out of the effective protection zone of the airbag and sustain serious (preventable) injury. Hence, it is very important that all occupants in a vehicle wear seat belts.

The illustration to the left showcases how seat belts are important for effective usage of airbags in mitigating injuries in vehicular frontal collisions.
As shown, seat belts restrict the movement of an occupant during the collision, which facilitates the proper inflation and deflation of airbags. Unrestrained occupants can hinder the proper functioning of the airbag, resulting in serious injuries.

Overloading of occupants
A few accidents involved higher injury severity because of the number of occupants in the vehicle being greater than the actual seating capacity of the vehicle. As is recognized the world over, such overloading can have serious consequences, particularly in an accident situation.A clear and detailed listing of the dangers, as posted online by the National Road Safety Council of Jamaica, is provided below (next page).

IV. CONCLUSION

Everything a traffic engineer does, from field studies, planning and design; to control operation is related to the provision of the safety system for vehicular travel. This chapter gives an insight of how the analysis of traffic accident can be done from the view point to reduce it by designing proper safety measure.

Traffic accident leads toloss of life and property. Thus the traffic engineers have to undertake a big responsibility ofproviding safe traffic movements to the road users and ensure their safety. Road accidentscannot be totally prevented but by suitable traffic engineering and management the accidentrate can be reduced to a certain extent. For this reason systematic study of traffic accidents arerequired to be carried out. Proper investigation of the cause of accident will help to proposepreventive measures in terms of design and control.
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