ABSTRACT

With the phenomenal increase in population and the number of registered vehicles over the past decade, there is a corresponding growth in accidents. The road accident problem in India is acute and is compounded by inadequate road, increasing population and growing number of vehicles plying on the roads. A number of factors like population, number of vehicles, surfaced road length etc, can be correlated with the growth of accidents. The main objectives of this study are,

- To develop a probabilistic model for estimating accident reduction factor due to pavement marking.
- A Bayesian approach is adopted to eliminate the expected accident rates.
- To calculate the accident ranking among the districts of the Tamilnadu state in India using accident rate to take remedial measures for reducing accidents.
- To identify the black spots on selected roads of Tiruchirappalli, a district within Tamilnadu state, India.
- To calculate the accident rates using regression equations correlating the registered vehicles and population.
- To develop Accident Risk Index (ARI) for various districts of Tamilnadu in order to calculate the prevailing probability for an accident taking place in the district.
To develop Accident Severity Index (ASI) and compare it across the districts of Tamilnadu in India to enhance highway safety.

To compare the ARI, ASI and accident rate.

The available data of Tamilnadu state in India, collected from different government organizations from 1997 to 2008 are analyzed with statistical analysis.

For evaluating the safety effectiveness of pavement marking of rural and urban roads, a probabilistic procedure is applied. Eighty seven sites (stations) are selected from the population of improved roads in Tiruchirappalli, Pudukottai and Thanjavur districts of Tamilnadu state in India from 2003 to 2006. To eliminate the effect of regression to the mean, a Bayesian approach is adopted for the expecting accident rates in two periods (before and after). Results of the analysis indicate that the beta distribution is adequately fitted with accident reduction factor frequencies at all sites (three districts). Hence the pavement marking does improve the safety of hazardous sites on urban and rural roads.

For calculating the accident ranking among the three districts (Tiruchirappalli, Pudukottai and Thanjavur) and all the districts of Tamilnadu in India, accident rate is used. The purpose of this system is to take remedial measures to reduce accidents and compare the local rates with district rates, state rates and national rates. Ranking is done on the basis of number of accidents and accident rates. To identify the black spots on selected roads of Tiruchirappalli in Tamilnadu state, India using the severity factors and accident point weight age, very effective methods are brought to quantify and
categorise road locations with respect to accidents. It is also used to calculate the accident rates using regression equations correlating the registered vehicles and population.

Accident risk index is one such indicator which reflects the impact of vehicle, road length, area and population on the number of accidents and identifies the prevailing probability for an accident to take place in the district or state. An attempt has been made to develop ARI for various districts of Tamilnadu and rank the districts for their accident proneness based on computed ARI values. Effort is taken to form Accident Severity Index (ASI) by combining a set of accident indicators. Values of ASI have been computed and compared across the districts of Tamilnadu in India. ARI and ASI are reliable and dependable tools to identify the accident risk zone.

A lot of accidents can be avoided by using the below mentioned procedures. The data for the 12 year period were analyzed to build models to understand the nature and extent of the causes of accidents using the concept of regression, multiple regression, trend analysis by least square method and trend chart. On the basis of population and motor vehicle growth rates, which were derived from the empirical formulae the above models were used for estimating road accidents in the districts of Tamilnadu for the years 2012 to 2015. As the variation between model and observed values is negligible, models seem to perform well for Smeed’s equation. These models can be used as tools to measure the effectiveness of future safety improvements implemented in the district.