Identifying and Quantifying Factors Affecting Traffic Crash Severity under Heterogeneous Traffic Flow

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Abstract : Studies on safety on highways are becoming the need of the hour as over 400 lives are lost every day in India due to road crashes. In order to evaluate the factors that lead to different levels of crash severity, it is necessary to investigate the level of safety of highways and their relation to crashes. In the present study, an attempt is made to identify the factors that contribute to road crashes and to quantify their effect on the severity of road crashes. The study was carried out on a four-lane divided rural highway in India. The variables considered in the analysis includes components of horizontal alignment of highway, viz., straight or curve section; time of day, driveway density, presence of median; median opening; gradient; operating speed; and annual average daily traffic. These variables were considered after a preliminary analysis. The major complexities in the study are the heterogeneous traffic and the speed variation between different classes of vehicles along the highway. To quantify the impact of each of these factors, statistical analyses were carried out using Logit model and also negative binomial regression. The output from the statistical models proved that the variables viz., horizontal components of the highway alignment; driveway density; time of day; operating speed as well as annual average daily traffic show significant relation with the severity of crashes viz., fatal as well as injury crashes. Further, the annual average daily traffic has significant effect on the severity compared to other variables. The contribution of highway horizontal components on crash severity is also significant. Logit models can predict crashes better than the negative binomial regression models. The results of the study will help the transport planners to look into these aspects at the planning stage itself in the case of highways operated under heterogeneous traffic flow condition.

Keywords : geometric design, heterogeneous traffic, road crash, statistical analysis, level of safety
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