

Abstract

Bicyclists are one of the most vulnerable road users. Due to lack of dedicated infrastructure facilities, such as bicycle lanes, to accommodate them, the safety of bicyclists is a serious concern on Indian roads. This study presents an effort to understand vehicle-bicycle interactions. In this study, the lateral passing gap between motorized vehicle and cyclists during overtaking incidents on urban arterial roadways is considered. An instrumented vehicle was used to collect vehicle-bicycle interactions while passing. Point data collected at high frequency using a LiDAR is used to capture the required data. A total of 280 passing incidents were recorded. The observations included are the lateral gap of bicyclist from the left edge of the road, the speed of a passing vehicle, and the width of the road and the overtaking vehicle type. The results show that the lateral passing gap has a significant dependence on the lateral gap of a bicycle from the left edge of the road, width of the road, and overtaking vehicle type. However, surprisingly, no significant relation was found between the lateral passing gap and the speed of the passing vehicle. Safety analysis performed considering the 1-m passing distance rule showed that in most cases, the bicyclists are at high risks while other motorized vehicles pass them.

A multi-linear regression model is developed to establish a relationship between passing distance, and set of predictor variable considered in the study and a Bayesian quantile regression model is developed to provide a comprehensive understanding of the effect of the predictor variables considered have on passing distance. The independent variables considered include, the lateral gap of a bicycle from the left edge of the road, width of the road, speed of the passing vehicle, and the type of the passing vehicle. The model showed that all the predictor variables, except for the speed of vehicle, have

significant influence on predicting the response variable in every quantile of response variable.

Keywords: Lateral passing distance, Quantile regression, LiDAR, bicycling, bicycle safety