

Prediction of motorcyclist traffic crashes in Cartagena (Colombia): development of a safety performance function

H. Ospina Mateus; L. Quintana Jiménez; F.J. López Valdés; S. Sankar Sana

Abstract-

Motorcyclists account for more than 380,000 deaths annually worldwide from road traffic accidents. Motorcyclists are the most vulnerable road users worldwide to road safety (28% of global fatalities), together with cyclists and pedestrians. Approximately 80% of deaths are from low- or middle-income countries. Colombia has a rate of 9.7 deaths per 100,000 inhabitants, which places it 10th in the world. Motorcycles in Colombia correspond to 57% of the fleet and generate an average of 51% of fatalities per year. This study aims to identify significant factors of the environment, traffic volume, and infrastructure to predict the number of accidents per year focused only on motorcyclists. The prediction model used a negative binomial regression for the definition of a Safety Performance Function (SPF) for motorcyclists. In the second stage, Bayes' empirical approach is implemented to identify motorcycle crash-prone road sections. The study is applied in Cartagena, one of the capital cities with more traffic crashes and motorcyclists dedicated to informal transportation (motorcycle taxi riders) in Colombia. The data of 2,884 motorcycle crashes between 2016 and 2017 are analyzed. The proposed model identifies that crashes of motorcyclists per kilometer have significant factors such as the average volume of daily motorcyclist traffic, the number of accesses (intersections) per kilometer, commercial areas, and the type of road and it identifies 55 critical accident-prone sections. The research evidences coherent and consistent results with previous studies and requires effective countermeasures for the benefit of road safety for motorcyclists.

Index Terms- Motorcycle, Crashes, Prone-section, Safety performance function, Negativebinomial regression, empirical Bayesian approach.

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