Using Logistic Regression to Estimate the Influence of Environmental Factors on Motor Cycle Road Crash Severity

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The field of transportation has undergone a massive growth with the immense development that occurred with the industrialization. But as a side effect, a huge increase in road accidents can be depicted. It has become one of the leading causes of death and injury in Sri Lanka. Nowadays, the rate of incidence of traffic accidents is increasing severely. Much against the popular belief, it is the light vehicles that are most often causing traffic accidents. Each year over 35752 road accidents occur in Sri Lanka, causing on average eight fatalities every day. In every year the highest numbers of deaths occurred with motorcyclists. There are various factors which are related to motorcycle road accidents. So this study was carried out to find the factors influencing the severity of the motorcycle accidents in Sri Lanka. This study was based on the records of the Traffic Police Head Office, Colombo. 171493 motorcycle accident cases were considered during the period 2008-2017. Logistic Regression was used to estimate the severity of factors related to road. The logistic regression model is the most common model for data analysis when the dependent variable is in binary nature. It is normally used to study the association between a binary dependent variable and a group of the continuous or categorical independent variable. The response can take the values 1 or 0. The variable "Nature of the Accident" (Fatal/Non-fatal) is considered as a dichotomous variable, and the factors road surface, weather condition and the light condition are treated as influencing factors on the accident severity. After a series of statistical analyses were conducted, all of the independent variables were identified as influential variables to the accident severity. But as none of the four variables was included in the equation, there were no coefficients for them. Rather, dummy variables which code for each and every independent variable are in the equation, and those have coefficients. Of the road surface variable, two categories namely wet road surface and the slippery road surface were found to be significantly associated with the outcome of the dependent variable. Dry road surface and the road flooded with water were not statistically significant. Of the weather condition variable, two categories were found to be significantly associated with the outcome of the dependent variable namely rainy weather and the fog/mist weather. Clear and cloudy weather was not statistically significant. Of the light condition variable, three categories were found to be significantly associated with the outcome of the dependent variable namely daylight, no light at the night and the improper light at the night. Dusk/ Dawn and good street light at night were not statistically significant. Results from this study reveal that the fitted logistic regression model can be used for the safety improvements against the motorcycle road accidents in Sri Lanka.

Keywords: Accident severity; Environmental Factors; Logistic regression; Motor-cycle accidents

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