

Exploration and Evaluation of the Effect of Multiple Countermeasures on Road Safety

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Abstract : Every day many people die or get disabled or injured on roads around the world, which necessitates more specific treatments for transportation safety issues. International road assessment program (iRAP) model is one of the comprehensive road safety models which accounting for many factors that affect road safety in a cost-effective way in low and middle income countries. In iRAP model road safety has been divided into five star ratings from 1 star (the lowest level) to 5 star (the highest level). These star ratings are based on star rating score which is calculated by iRAP methodology depending on road attributes, traffic volumes and operating speeds. The outcome of iRAP methodology are the treatments that can be used to improve road safety and reduce fatalities and serious injuries (FSI) numbers. These countermeasures can be used separately as a single countermeasure or mix as multiple countermeasures for a location. There is general agreement that the adequacy of a countermeasure is liable to consistent losses when it is utilized as a part of mix with different countermeasures. That is, accident diminishment appraisals of individual countermeasures cannot be easily added together. The iRAP model philosophy makes utilization of a multiple countermeasure adjustment factors to predict diminishment in the effectiveness of road safety countermeasures when more than one countermeasure is chosen. A multiple countermeasure correction factors are figured for every 100-meter segment and for every accident type. However, restrictions of this methodology incorporate a presumable over-estimation in the predicted crash reduction. This study aims to adjust this correction factor by developing new models to calculate the effect of using multiple countermeasures on the number of fatalities for a location or an entire road. Regression models have been used to establish relationships between crash frequencies and the factors that affect their rates. Multiple linear regression, negative binomial regression, and Poisson regression techniques were used to develop models that can address the effectiveness of using multiple countermeasures. Analyses are conducted using The R Project for Statistical Computing showed that a model developed by negative binomial regression technique could give more reliable results of the predicted number of fatalities after the implementation of road safety multiple countermeasures than the results from iRAP model. The results also showed that the negative binomial regression approach gives more precise results in comparison with multiple linear and Poisson regression techniques because of the overdispersion and standard error issues.

Keywords : international road assessment program, negative binomial, road multiple countermeasures, road safety

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