Title: Investigating Rural and Urban Differences in Single-Vehicle Crash Severity Determinants: A Time-of-Day Analysis using Random Parameter (Mixed) Logit Models

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Abstract:
This study investigates the factors associated with single-vehicle crash injury severity accounting for urban-rural differences and time-of-day variations. We estimate mixed (random-parameter) logit models (with the pseudo direct elasticity values) using five-year (2014 – 2018) crash data of Kentucky for five periods: (i) 12 am – 5 am, (ii) 5 am – 9 am, (iii) 9 am – 2 pm, (iv) 2 pm – 7 pm, and (v) 7 pm – 12 am. Log-likelihood ratio tests confirm the statistical validity of the time-of-day grouping of the crash severity models and the urban-rural separation. Estimates from our models indicate that roadway characteristics (e.g., curve and hills, straight and grade) are found to increase the probability of fatal crashes for rural roadways in the 12 am – 5 am and 5 am – 9 am periods. However, these parameters were found insignificant for urban crashes. Factors including daylight presence, age, sex, road surface conditions, and involvement of alcohol (driving under the influence) have shown varying effects (across time-of-day and urban-rural separation) on the crash severity. Further, coefficients for variables including road surface condition, male and female indicator, and age-group indicator were found to have Gaussian distribution with statistically significant standard deviations. The methodology can be transferrable to datasets beyond the state of Kentucky. It can be used to deploy time-of-day and geo-location (urban vs. rural) specific safety countermeasures.

Zoom link for online participants :https://ksu.zoom.us/j/93557081896