Traffic crashes and precipitation relationship obtained by multivariate analysis

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Objective. This research aimed to explore the existence of a relationship between the occurrence of traffic crashes, in the km 644+000 m to km 661+000 m in the BR-376 highway (state of Parana, Brazil), and the weather conditions, especially daily precipitation.

Method. Precipitation data came from pluviographs P1 and P5, which covers segments from km 661 through 656 and 644 through 654, respectively. The crash data consisted of information concerning road structure, severity and road direction (ascending or descending, in terms of kilometers). In order to check if there was a correlation between the daily number of crashes and daily precipitation, it was applied a Spearman correlation. In addition, the probabilistic behavior of the daily crashes count was described by a negative binomial distribution. At last, to determine the relationship among the crash variables and the precipitation, it was used a multiple correspondence analysis.

Results. The Spearman correlation indicated statistical significance when relating the daily crash count and daily precipitation, confirming the initial hypothesis. Besides, the probability fitting showed itself adequate in describing and predicting the number of crash occurrence. In its turn, the multiple correspondence analysis allowed the creation of a perceptual map, grouping the variables that are similar among themselves. The map suggested that the intensity of the rain was not a significant factor; however, the presence of rain was a conditioning circumstance.

Conclusion. The research confirmed that there is a relationship between daily accident count and precipitation. Additionally, data concerning precipitation were associated with crashes occurrence variables.