Relationship of Weather-Related Car Crashes with Casualties, Time, Crash Density, and Storm Type

Elijah J. Paciorek[1]- Ohio University

Ewan T. Newbold[2]- St. Cloud State University

Ricardo Nogueira[3]- Plymouth State University

Abstract

The relationships and impacts between weather conditions and traffic accidents is somewhat understood, but beyond its basic scope, it is insufficiently understood. This research looked into expanding this scope by looking into the relationship of weather-related car crashes with some variables like casualties, time variables, crash density, and the type of storm present.

This study analyzes car crash and precipitation data from January 1, 2018, through December 31, 2022. Casualties are divided into no injury, injury, and fatal, and the time variables used were hours, months, and years. Weather conditions were also divided into 3 categories: rain, snow, and other conditions (the latter of which won't be looked at for some of the variables).

For casualties, rain was shown to make up most of the weather-related car crashes compared to snow and a higher percentage of fatalities and injuries occur in rainy conditions instead of snowy conditions. For time variables, the number of weather-related car crashes decreased yearly at a slowing exponential rate, the fall and winter months have the highest monthly number of weather-related car crashes, and the morning and afternoon hours see a peak in weather-related car crashes, with the latter having more than the former. For crash density, the highest densities were in the downtown area, along highways, and along major roads. Also, the rain-related car crash density is more concentrated downtown and more scattered overall while the snow-related car crash density is more scattered downtown and more concentrated overall. Finally, for the type of storm present, in the 9 days studied based on how many weather-related car crashes occurred that day, all of the storm systems present were mid-latitude cyclones. There were also crashes that occurred after precipitation had fallen and there was a decrease in the overall number of weather-related crashes for the days that were post-COVID. These findings are important since they open doors for further and deeper research into some of these variables.