Risk Factors of Fatalities in Motor Vehicle Crashes Happened in Raleigh, NC in 2015- 2020

BIOST 579 Final Presentation
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Aim and Questions

Why study this?

- Motor vehicle crash deaths is one of the leading causes of death from unintentional injuries in the United States
- Important to know what fatality is associated with when crashes occur

Questions

- What are the risk factors associated with fatality when a crash occurs?

- Crash site demographics
- Driver-related issues
- Lack of proper vehicle mechanics

Data Description

Records of all motor vehicle crashes happened in Raleigh, NC in 2015-2020.

Person-level:

Each observation is a single person

Variables:

Age, person type, suspected alcohol/drug status, airbag existence, and belt protection existence

Case-level:

Each observation is a crash case

Variables:

Indicator of fatal crash, primary weather condition and time of crash

Raleigh
OPEN DATA

An open data portal recording public data about the city of Raleigh

Methods

- Crash site demographics
  - Weather
  - Time
- Driver-related issues
  - Teen driver
  - Senior driver
  - Suspected intoxicated driver
  - Child passenger
- Lack of proper vehicle mechanics
  - No airbag
  - No belt protection

Null hypothesis

- There is no association between any factor recorded in the crash report and fatal crashes.

Statistical method: logistic regression

Model selection

- 3 unadjusted models for three categories respectively
- 1 adjusted model including all factors

Results

Variable	Odds ratio (95% CI)	P-value
Cloudy (Ref = Clear)	3.578 (2.373, 5.297)	< 0.001
Fog, smog, smoke (Ref = Clear)	10.486 (1.632, 36.727)	0.0055
Night (Ref = Afternoon)	2.923 (1.894, 4.611)	< 0.001
Intoxicated-suspected Driver	3.527 (2.018, 5.866)	< 0.001
No Belt/Protection	8.753 (5.587, 13.406)	< 0.001

Interpretation:
Crash site demographics: Cloudy weather and foggy weather were associated with 3.6 times and 10.5 times the odds of fatal crashes compared to clear weather; Driving at night was associated with 3 times the odds of fatal crashes compared to driving in the afternoon.
Driver-related issues: Intoxicated drivers was associated with 3.5 times the odds of fatal crashes compared to sober drivers.
Lack of proper vehicle mechanics: Lack of belt protections was associated with 8.8 times the odds of fatal crashes compared to those wearing belt protections.

What we can learn from this study?

Thank you!