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MORBIDITY and MORTALITY of Texas Tornado Outbreaks

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Introduction

Tornadoes, due in part to limits in forecasting and warning, are a significant cause of disaster-related morbidity and mortality in the United States, especially in Texas.

An improved understanding of the role of tornado outbreaks (informally defined as a grouping of six or more tornadoes) in morbidity and mortality is necessary in order to mitigate future casualties.



Motivation

It is widely known that there is a linear relationship between the strength of a tornado as measured on the Fujita Scale and the number of injuries and deaths that are associated with the event.

However, less is understood about the role that larger tornadoes play in deaths and injuries when they are single tornadoes versus when they are part of an outbreak.

We hypothesize that **major tornadoes** (F3 or greater on the Fujita Scale) **drive morbidity and mortality counts, both as single tornadoes and as a part of an outbreak.**



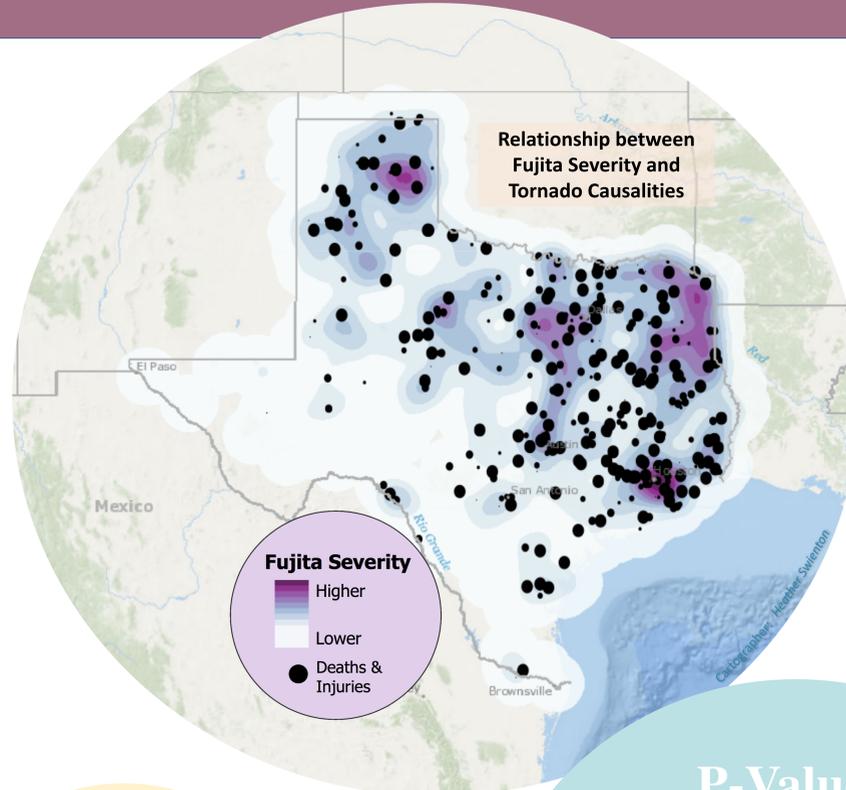
Methods

Utilizing historical data on tornadoes in Texas between 1980 and 2009, we analyzed and compared four grouped classifications using a t-test for unequal variances:

- **Outbreaks:** Outbreaks with Major Tornadoes vs. Outbreaks without Major Tornadoes
- **Non-outbreaks:** Non-outbreaks with Major Tornadoes vs. Non-outbreaks with Minor Tornadoes
- **Major Tornadoes:** Outbreaks with Major Tornadoes vs. Non-outbreaks with Major Tornadoes
- **Minor Tornadoes:** Outbreaks without Major Tornadoes vs. Non-outbreaks with Minor Tornadoes

References:

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Results

Within **outbreaks**, the presence of major tornadoes significantly impacts deaths and injuries. In **non-outbreaks**, major tornadoes still have a significant impact on the number of injuries, but not the number of fatalities.

In the event of **major tornadoes**, it did not matter if it was part of an outbreak or not, the impacts similarly result in deaths and injuries.

In events composed of only **minor tornadoes**, the number of tornadoes (and therefore the presence of outbreaks) is significantly associated to the number of deaths and injuries, i.e., the number of tornadoes matters when analyzing the relationship to morbidity and mortality.

In conclusion, major tornadoes drive morbidity and mortality when part of an outbreak.



Future Work

While remaining public health and emergency management focused, this research provides insights to the different levels of risks specific to Texas, especially to improvements in emergency management funding, severity-specific policy, and public education.

Examples include but are not limited to improving warning systems to warn for occurrence of major tornadoes and improving building codes to prepare for future major tornado occurrence.

Public education campaigns could consist of slogans such as "F3 to 5: Take Shelter to Stay Alive" with the goals of protecting and educating people where major tornadoes have been historically common, subsequently lowering morbidity, and mortality rates.

