Leveraging Power Outage Time Series Data to Understand Mortality Rates in Florida.

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Abstract

Power outages impact millions of people by interfering with access to essential resources like clean water, food, and healthcare services.

The goal of this project is to **understand the relationship between power outages and mortality rates in Florida at the county and zip code level.**

We aim to estimate

- how different social and economic factors such as age, sex and demographics
- as well as climate and weather factors influence mortality rate over time given a power outage.

This analysis **will inform communities and stakeholders of areas disproportionately affected by power outages** and allow them to take preventive measures to adapt and respond better to power outages.

Methodology

EAGLE-I dataset for outage data.

- EAGLE-I is a historic dataset, provided by Oak Ridge National Laboratory and the Department of Energy (DOE), it
- includes eight years of power outage information at the county level from 2014 to 2022 at 15-minute intervals.

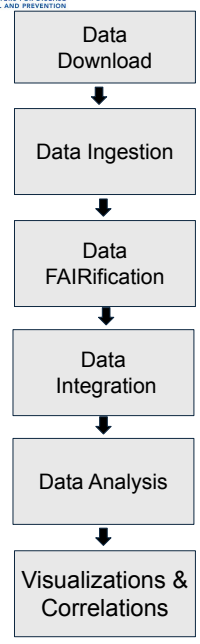
To generate the mortality dataset we aggregated data from the **CDC Wonder database** deaths occurring in years 2018 through last week.

The **CDC Social Vulnerability Index (SVI)** refers to the demographic and socioeconomic factors that adversely affect communities.

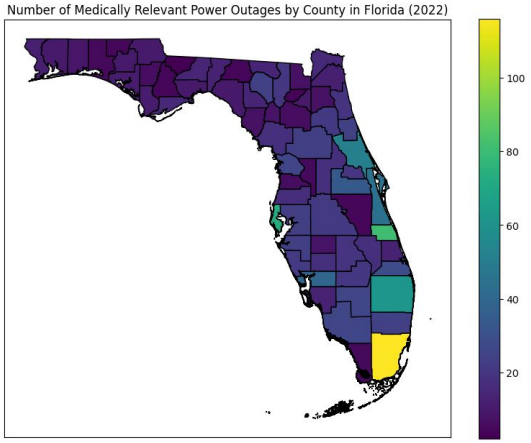
We centered our research around medically relevant outages.

An outage is defined as an event where the percentage of customers without power continuously reaches or exceeds 0.1%

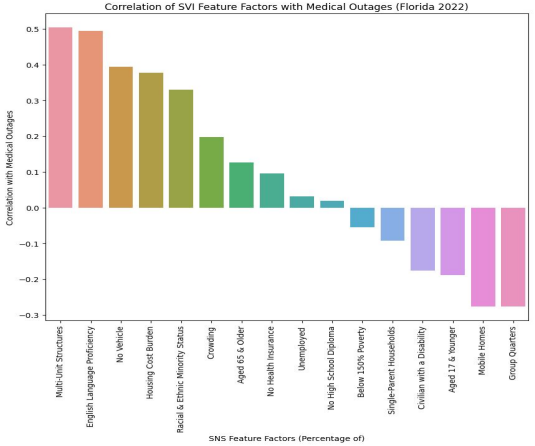
Outages lasting 8 or more hours are considered medically relevant, as they likely impact health by surpassing critical thresholds, such as the maximum battery life for certain durable medical equipment (DME).



Current Results



- We can identify **the exact day a medically relevant power outage occurs at the county level** using the previously mentioned threshold of at least 0.1% of customers reporting outages for 8+ hours.
- The image above shows the number of medically relevant power outages in each county
- By comparing these outages across counties, we can determine which counties are most at risk and require the most immediate attention.



Utilizing the CDC SVI dataset, **we identified five SVI factors that positively** correlate with the number of medically relevant power outages a county experiences:

1. **Multi-Unit Structure:** Percentage of housing units in structures with 10 or more units.
2. **English Language Proficiency:** Percentage of persons (age 5+) who speak English 'less than well.'
3. **No Vehicle**: Percentage of households without access to a vehicle.
4. **Housing Cost Burden**: Percentage of cost-burdened occupied housing units with annual income less than $75,000 (30% or more of income spent on housing costs).
5. **Racial & Ethnic Minority Status:** Percentage of minority populations (including Hispanic or Latino, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, Two or More Races, and Other Races).

Discussion & Future Plans

The significant correlation between 'Multi-Unit Structure' and 'Housing Cost Burden' with the number of medically relevant power outages within a county suggests that

- these outages may be **more prevalent in urban areas with large clusters** of relatively affordable multi-family housing, such as apartments.

The significant correlation of both 'English Language Proficiency' and 'Racial & Ethnic Minority Status' with medically relevant power outages indicates that

- minorities in urban areas with affordable multi-family housing may be at higher risk for these outages.

While further research is needed to fully understand the impact of power outages on mortality rates within Florida counties,

- our current findings highlight the counties and demographics most vulnerable to medically relevant power outages.

The immediate next steps involve **understanding exactly how minorities in urban areas are affected by power outages and determining** whether this influences mortality rates within the demographic.

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