

Preparing for Influenza Season: Interim Report

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Project Overview

Motivation: The United States has an influenza season where more people than usual suffer from the flu. Some people, particularly those in vulnerable populations, develop serious complications and end up in the hospital. Hospitals and clinics need additional staff to adequately treat these extra patients. The medical staffing agency provides this temporary staff.

Objective: Determine when to send staff, and how many, to each state.

Scope: The agency covers all hospitals in each of the 50 states of the United States, and the project will plan for the upcoming influenza season.

Hypothesis

If a state has a higher percentage of its population over the age of 65, then it will have a higher mortality rate from influenza.

Data Overview

Influenza deaths by geography, time, age, and gender from the CDC

- This data shows the number of influenza-related deaths per month in the US from 2009 to 2017. It is broken down by state and by age group.

Population data by geography from the US Census Bureau

- This data shows yearly US population estimates from 2009 to 2017 broken down by age group and by county in every state. Age groups are arranged in groups of five, except for 85 and older, which gets its own group.

Data Limitations

Influenza deaths by geography, time, age, and gender

- The CDC suppresses the data for 0-9 deaths for privacy reasons. This suppressed data made up around 85% of the data set. I imputed these values to be 0 in order to add the number of deaths and calculate a mortality rate. It is safe to conclude that all of the mortality rates are an underestimation.

Population data by geography

- This data is an estimation based on survey results. Some people may have been hesitant to fill out the survey and reveal personal information. Therefore, the data may not be as accurate as it could be.

Descriptive Analysis

	Average	Standard Deviation
Death Ratio	0.00012958	0.000056
% Pop over 65	13.93%	0.01702427

The death ratio (influenza mortality rate) had a weak correlation (0.11) with percentage of population over 65, which means that they do not have a linear relationship.

Results & Insights

Null Hypothesis: The average influenza mortality rate for a group of states with a higher percentage of its population over 65 will equal the average influenza mortality rate for a group of states with a lower percentage of its population over 65.

Alternative Hypothesis: The average influenza mortality rate for a group of states with a higher percentage of its population over 65 will not equal the average influenza mortality rate for a group of states with a lower percentage of its population over 65.

At an alpha of 0.05, I found a significant difference in the average influenza mortality rate between a group of states with a higher percentage of its population over 65 and a group of states with a lower percentage of its population over 65.

Because states that have a larger percentage of older people have a higher mortality rate from influenza, the medical staffing agency can use this information to allocate more of its staff to states with a larger proportion of older people.

Remaining Analysis & Next Steps

- Perform composition, statistical, spatial, and temporal visualizations using the same data in Tableau.
- Create and give a presentation of the final results to stakeholders.

Appendix

- Business requirements document (PDF)
- Data profiles (Excel)
- Hypothesis testing (Excel)