Influenza Analysis-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.

Research Hypotheses

- States with greater populations of people aged 5 and under will have the largest number of deaths of people aged 85+. If we prioritize healthcare resource distribution to states with the greatest population numbers of people aged 5 and under, we can effectively lower the number of deaths of people aged 85+.

Data Overview

- Population Data by State
    - US Census Bureau
    - The data consists of the age and gender makeup of each county in each US State from 2009 through 2017
    - Limitations: This administrative data is primarily collected from state governments in order to provide estimates of population demographics.
- Influenza Deaths by State
    - This administrative data shows the number of deaths by influenza and is organized by state, age, year, and gender.
    - The data is collected via reporting of death certificates
    - Due to the manner in which death certificates are written, where there is only a single cause of death listed, it is possible that instances where influenza is a contributing, but not deciding, factor to death are not represented by this dataset

Descriptive Analysis

The variables included in this analysis are the data for the death count of people aged 85+ for the 5 states with the highest populations of people aged 5 and under, and all the other states' data for influenza deaths in the 85+ age group. For this analysis we used the data from 2017 since it is the most recent. Our analysis tested the null hypothesis that states ***without*** the greatest populations of population of people aged 5 and under would have more influenza deaths in the 85+ age group. We

were able to prove this null hypothesis false with a p-value of ~0.01, meaning we have a confidence level approaching 99%.

t-Test: Two-Sample Assuming Unequal Variances

	Top 5 States Deaths 85+	*Other States 85+ Deaths*
Mean	1709	341.173913
Variance	719633.5	78673.52464
Observations	5	46
Hypothesized Mean Difference	0	
df	4	
t Stat	3.584223	
P(T<=t) one-tail	0.01154	
t Critical one-tail	2.131847	
P(T<=t) two-tail	0.02308	
t Critical two-tail	2.776445	

We also ran tests to determine the strength of correlation between the population of people aged 5 and under, and deaths of people aged 85+. As our correlation coefficient gets closer to 1, the stronger the correlation between the variables. Our tests resulted in a coefficient of .90, indicating a very strong, positive correlation between the two.

Next Steps

- Create groupings of states based upon at-risk population counts for further analysis
- Create visualizations of data using Tableau
    - Use of data from years prior to 2017 to see if there are historical trends
    - Compare/Contrast other age groups to target groups
- Investigate which states typically have the lowest rate of vaccination
- Create reports for future meetings with stakeholders
- Final report for stakeholders with visualizations of data/analysis and recommendations for resource distribution

Appendix

Success Factors:

- Minimal instances of understaffing and overstaffing across states (a state can be considered understaffed if the staff-to-patient ratio is lower than 90% of the required ratio and overstaffed if greater than 110%)

Constraints:

- There's no money to hire additional medical personnel

Other Hypotheses:

- Patients in the at-risk age group(s) (85+ years old) are more likely to die from the flu
- Patients in the 5 and under age group are more likely to transmit the flu