Allison Weese Tue. March 12th

Influenza Data: Interim Report

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 you are 65 or older, then you are more likely to die of the flu. We can identify which areas contain the highest elderly populations and prioritize staffing there if the hypothesis isn't disproved.
- Null Hypothesis (H0): The death rate from influenza for individuals aged 65 years and older is not significantly higher than that for individuals younger than 65 years.

  Alternate Hypothesis (H1): The death rate from influenza for individuals aged 65 years and older is significantly higher than that for individuals younger than 65 years.

  In mathematical notation:

  H0: $\mu 1 \leq \mu 2$

  H1: $\mu 1 > \mu 2$

Where:

• μ1 represents the population mean death rate from influenza for individuals aged 65 years and older.

• μ2 represents the population mean death rate from influenza for individuals younger than 65 years.

This study aims to determine whether there is a statistically significant difference in the death rates from influenza between these two age groups, specifically testing if the death rate for individuals aged 65 years and older is higher than that for individuals younger than 65 years.

Data Overview

- Influenza Deaths By Geography
    - This data set is from the CDC and includes influenza deaths by year, age, and state.
- Population Data By Geography
    - This data set is from the US Census Bureau and includes population data by year, age, sex, county, and state.

Data Limitations

- There was a significant amount of suppressed data in the Influenza Deaths data. This could impact the analysis if the data is incomplete.

Descriptive Analysis

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	Average	Standard Deviation
Under 65 years deaths per state per year	79	151
Under 65 years Population per state per year	5,168,935	5,938,730
65 and over deaths per state per year	826	1,014
65 and over population per state per year	806,529	885,793

t-Test: Two-Sample Assuming Unequal Variances

	Variable 1	*Variable 2*
Mean	7.93264E-06	0.000848313
Variance	9.97201E-11	1.89312E-07
Observations	459	459
Hypothesized Mean Difference	0	
df	458	
t Stat	-41.36943213	
P(T<=t) one-tail	4.33E-157	
t Critical one-tail	1.648187415	
P(T<=t) two-tail	8.6608E-157	
t Critical two-tail	1.965157098	

- Our study aimed to determine if there was a significant difference in the death rates due to influenza of those younger than 65 compared to those 65 and older. We conducted a one-tailed independent samples t-test at a significance level of $\alpha = 0.05$. Since the p-value is less than the significance level, we reject the null hypothesis. This suggests that there is

a significant difference between death rates due to influenza for those under 65 and those 65 and older.

Results and Insights

- Statistical Hypothesis: The chances of dying from the flu for ages 65 and older is higher than the chances of dying if you are under 65.
- According to these findings it would be wise to send staffing into areas of the USA where populations of citizens 65 and older are higher.

Remaining Analysis and next steps

- Moving forward with this project the next steps include creating visualizations of the findings to make the data more digestible. This can include statistical visualizations, temporal visualizations, and spatial analysis.
- Another next step would be to ask for current, past, and present staffing levels by state.

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Appendix

- **Project Brief**