PREPARING FOR INFLUENZA SEASON: MEDICAL STAFF ALLOCATION DURING FLU 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.

Research Hypothesis:

States with high population of Vulnerable people have more mortality rate. If you are older 65+ years or below the age of 5, then your risk of dying from influenza is higher.

Data Overview:

Population Data by geography:

This is an external data source. The data is provided by the US census bureau through their federal statistics program responsible for collecting population data on the American people.

This data shows yearly population sizes of counties of United States divided by gender and age groups for example (under 5 years, 5-9 years, 10-15 years etc.) from 2009 to 2017.

This data counts monthly influenza death rates divided by state, months, and age groups from 2009 to 2017.

Limitations of the population Data set

The dataset might be limited by potential biases because of underreporting of census information or non-response from persons livings in the United States, leading to inaccuracies.

Some manual data entry might also present errors and misinterpretations during collection. Also changes in population post 2009-2017 might affect its relevance for current analysis.

Influenza deaths Data set:

This is an external data source. It is provided by the Centers for Disease Control and Prevention (CDC) through their National Center for Health Statistics.

This data counts monthly influenza death rates divided by state, months, and age groups from 2009 to 2017.

Limitations of the Influenza Data set:

Some states (e.g., Alaska) in the data set contain missing value such as supressed deaths. I figured this would be because of data privacy laws in those states. However, during data cleaning, supressed deaths were replaced by 0.

Data collected manually generally have tendencies for human error.

Statistical Analysis

	Variable 1. Deaths from Vulnerable (Under 5, 65+ years)	Variable 2. Census From Vulnerable
Standard Deviation	913	1333650.734
Mean	813	12223780

Correlation

Variable	Vulnerable age and death increase relative to	
	population	
Proposed Relationship	Vulnerable people increase the rate in each	
	state	
Correlation Coefficient	0.9	

Correlation coefficient 0.9. Data suggests people who are in the vulnerable category increases the death rate from flu. The strength of the correlation is therefore strong.

Note: Notice Here I used two related variables Death from Vulnerable and Census from Vulnerable to conduct my correlation analysis, as I wanted to confirm if there's a close correlation of change in either of the variable.

Statistical Hypothesis:

Null Hypothesis: There is no difference in influenza mortality rates between people aged below 5 years and 65+ years and people aged above 5 to 65 years.

Alternative Hypothesis: There is a significant difference in influenza mortality rates between people aged 65 years and older and people aged 5 to 65 years.

	Variable 1. Deaths from	Variable 2. Deaths from Non-
	Vulnerable Population (Under	Vulnerable Population (5 to 65)
	5, 65+ years)	
Mean	813	77
Variance	998188	21457
Observation	459	459
Hypothesized Mean	0	
df	478	
T Stat	15.61872451	
P(T<=t) one-tail	4.96E-45	
t Critical one-tail	1.648047653	
P(T<=t) two-tail	9.92426E-45	
t Critical two-tail	1.964939272	

Results and findings:

- This is a one tailed test because we want to test if there is a significant difference in one direction (i.e., the Vulnerable age group could have a higher or lower mortality rate compared to the non-Vulnerable age group).
- We interpret the findings of such extremely small p-value as very strong evidence against the null hypothesis.
- Therefore, we reject the hypothesis that suggest There is no difference in influenza mortality rates between people aged below 5 years and 65+ years and people aged above 5 to 65 years.
- We can use this evidence to derive priorities in informing our stakeholders on strategic implementation to help send and allocate staff effectively and better manage the upcoming influenza season.

Remaining Analysis and next steps:

In summarizing this interim report, an analysis of the project was conducted, and some deliverables were carried out. However, we now know that consolidation of hypotheses and Analytical insights sometimes gives room to ask more questions and consider why there are limitations.

Some of the limitations we have encountered are missing data in some states e.g., Deaths in Alaska etc. We would like to know in the next steps if these missing data will be available.

In the coming weeks, we also need to,

- Conduct more hypothesis testing based on our several other hypotheses given.
- Use visual analysis to consolidate our hypotheses.
- Submit a final project report with findings and recommendations through stakeholder presentation.