PREPARING FOR INFLUENZA SEASON – 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.

RESEARCH HYPOTHESIS

If a person is older than 65, then they are at a higher risk of influenza mortality.

DATA OVERVIEW

INFLUENZA DEATHS BY GEOGRAPHY, TIME, AGE, AND GENDER

- This data contains monthly death counts for influenza-related deaths in the US from 2009-2017. Counts are broken into two categories: state and age.

POPULATION DATA BY GEOGRAPHY

- This data contains population count for each county in the US from 2009-2017. Variables included are county, year, and total population broken down by age ranges and gender.

DATA LIMITATIONS

- Both data sets are limited to the most recent year being 2017. COVID-19 has provided an extra level of difficulty in planning and having data for these past few years can contribute to the analysis.

INFLUENZA DEATHS BY GEOGRAPHY, TIME, AGE, AND GENDER

- The deaths on the death certificate only list one cause of death. This could create some discrepancies within vulnerable populations.

- Citizens are required to input their information electronically or through mail, which can be prone to human error or families not given the correct count.

DESCRIPTIVE ANALYSIS

	Mean	Standard Deviation
Influenza Deaths 65+ years	826	1013
Influenza Deaths Total Population	905	1153

- The influenza deaths of those 65+ years had a strong correlation (.99) with the total influenza deaths, meaning that those 65+ years has a higher mortality rate.

RESULTS AND INSIGHTS

- **Null Hypothesis:** The influenza mortality rate for those 65+ years is less than or equal to those less than 65 years of age.
- **Alternative Hypothesis:** The influenza mortality rate for those 65+ years is greater than those less than 65 years of age.
- At an alpha of 0.05 (95% confidence level) I found that there is a significance difference in the influenza mortality rates between those younger than 65 years and those 65+ years. (see Appendix "Hypothesis Test of Mortality Rates")

REMAINING ANALYSIS AND NEXT STEPS

- Additional analysis will be conducted on data set: "Counts of influenza laboratory test results by state". This analysis could further assist in the planning of the influenza season and ensure staff is adequately distributed amongst the states.
- Further analysis will be conducted to include composition, statistical, spatial, and temporal visualizations. A final presentation will be conducted to provide conclusions, recommendations, and proposed next steps.

APPENDIX

PROJECT GOAL

To help a medical staffing agency that provides temporary workers to clinics and hospitals on an as-needed basis. The analysis will help plan for influenza season, a time when additional staff are in high demand. The final results will examine trends in influenza and how they can be used to proactively plan for staffing needs across the country.

STAKEHOLDER IDENTIFICATION

- Medical agency frontline staff (nurses, physician assistants, and doctors)
- Hospitals and clinics using the staffing agency's services
- Influenza patients
- Staffing agency administrators

SUCCESS FACTORS

The project's success will be based on:

- A staffing plan that utilizes all available agency staff per state requirements, without necessitating additional resources
- 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%)

DATA SETS

1. **Influenza deaths by geography, time, age, gender**
   Source: CDC
2. **Population data by geography**
   Source: US Census Bureau
3. **Counts of influenza laboratory test results by state (survey)**
   Source: CDC (Fluview)

HYPOTHESIS TEST OF MORTALITY RATES

t-Test: Two-Sample Assuming Unequal Variances

	Influenza Deaths % less than 65 years	Influenza Deaths % 65+ years
Mean	9.91426E-06	0.000819725
Variance	1.26119E-10	1.82717E-07
Observations	51	51
Hypothesized Mean Difference	0	
df	50	
t Stat	-13.52472734	
P(T<=t) one-tail	1.24E-18	
t Critical one-tail	1.675905025	
P(T<=t) two-tail	2.48121E-18	
t Critical two-tail	2.008559112	

- A one-tailed test was conducted because I am assuming directionality in that there is a higher mortality rate for those over 65 years of age. As the p-value is less than the significance value, this shows that there is a significance difference in mortality rates between those younger than 65 years and those 65+ years.

- The data that I tested was from 2017 of 51 states, which is considered the most recent data collected. Additional analysis for years 2009-2016 could be conducted to look for trends throughout each of the states.