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1.10 Consolidating Analytical Insights Task

Preparing for Influenza Season: Interim Project 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 a state has a higher number of people aged 65 and over then it will require more medical resources and staff during the influenza season.

Data Overview:

- CDC - Influenza deaths by geography, time, age, and gender
    - This data set includes information regarding the number of deaths due to influenza in all 50 U.S. States. This information is also delineating the information by year (2009-2017) and by age group.
- US Census Bureau – Population Data by Geography
    - This data set includes information regarding the population of all of the counties within the 50 U.S. States from the year 2009-2017.

Data Limitations:

- Timeliness - Both data sets only include information from 2009-2017 presenting a limitation as the data does not reflect the more resent years.
- Death Certification list only one cause of death which can exclude/include other causes of deaths that can cause discrepancies in the data collected.
- Census data is collected manually and is therefore exposed to human error.

Descriptive Analysis:

- Core Variable Analysis

	Population – 65 and over	Flu Deaths – 65 and over
Mean	455,485	151
Standard Deviation	487,357	149
Correlation Coefficient	0.945041702	

- Correlation
    - There is a strong positive relationship (0.945041702) between the population of 65 and over and the amount of influenza deaths a state has.
    - As populations of 65 and older increase, the amount of influenza deaths increases as well.

Results and Insights:

- Null Hypothesis: The influenza mortality rate for people 65 or older is less than or equal to the mortality rate for people 64 years or younger.
- Statistical hypothesis: The influenza mortality rate for people 65 or older is greater than the mortality rate for people 64 years or younger.
- Insight:
    - Statistical analysis concluded with 95% confidence that the death rate of people 65 years or older was significantly higher than the death rate of people under 65 years old. Therefore, the null hypothesis was rejected.

Remaining Analysis and Next Steps:

- Remaining Analysis – Now that strong correlation has been identified between the influenza mortality rate and the population of people 65 and over I will begin to analyze the states with the highest amounts of these vulnerable populations in order to further hone in on which states require more resources during the influenza season.
- Next Steps – Final analysis will be delivered to the stakeholders to help them properly allocate medical resources during the upcoming influenza season.

Appendix:

Statistical Analysis and Hypothesis Testing

t-Test: Two-Sample Assuming Unequal Variances		
	Under 65	***65 and over***
Mean	0.002136131	0.006313961
Variance	4.79806E-06	4.56983E-06
Observations	459	459
Hypothesized Mean Difference	0	
df	915	
t Stat	-29.24395355	
P(T<=t) one-tail	1.43E-133	
t Critical one-tail	1.646520646	
P(T<=t) two-tail	2.8676E-133	
t Critical two-tail	1.962560005	

Data Spread		
Variable	65 to 74 years Pop.	65 to 74 years Deaths
Dataset Name	U.S. Census Population Data	CDC Influenza Deaths Data
Sample or Population	Population	Population
Normal Distribution	Normal	Normal
Variance	2.37517E+11	22167
Standard Deviation	487357	149
Mean	455485	151
Outlier Percentage	6.53%	5.56%

Correlation	
Variables	65 to 74 years Population and 65 to 74 years Deaths
Proposed Relationship	Strong positive relationship
Correlation Coefficient	0.945041702
Strength of Correlation	Strong Relationship
Usefulness/Interpretation	As populations of 65 and older increase, the amount of influenza deaths increase as well.

	65 to 74 years Population	65 to 74 years Deaths
Variance	2.37517E+11	22167
Standard Dev.	487357	149
Mean	455485	151
Lower bounds	-519230	-146
Upper bound	1430200	449
Outliers	30	26