Preparing for Influenza Season - Interim Report

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 over 65 years, then there are more chances to die from influenza.

Data overview

1. Data source - Integrated data
2. Population - Sample data representing age groups under 65 years and over 65 years.
3. Variables - Number of people under the age of 65 and over 65 years old. Flu deaths for under the age of 65 years and over 65 years.

Data limitations

- Data is limited to the year 2009 to 2017.
- In influenza deaths, low counts were suppressed; replacing them with random values.
- Population numbers are estimated. Sums across age groups may not equal totals.

Descriptive analysis

	Deaths 65+ years	Deaths <65 years	Population 65+ years	Population <65 years
Sample or population	Sample	Sample	Sample	Sample
Normal distribution	2.65	2.99	2.30	2.71
Variance	933,082.54	15,501.68	782,861,195,554.67	35,093,709,819,338.90

Standard deviation	965.96	124.51	884,794.44	5,923,994.41
Mean	890.69	490.76	824,208.53	5,235,709.57
Upper value SD	2,822.62	739.77	2,593,797.40	17,083,698.40
Lower value SD	-1,041.23	241.75	-945,380.34	-6,612,279.26
Outliers	18	26	31	18
Outliers percentage	4%	6%	7%	4%

Correlation

Variables	Deaths 65+ / Population 65+	Deaths <65/Population <65
Proposed relationship	Higher number of people aged 65 and older, higher the rate of influenza deaths	Higher the number of people aged under 65 years, lower the rate of influenza deaths
Correlation coefficient	0.94	0.92
Strength of correlations	Strong relationship	Strong relationship
Usefulness / Interpretation	A strong positive relationship indicates that larger 65+ populations are associated with higher influenza mortality; staffing should be increased accordingly.	A strong relationship suggests that influenza mortality is lower in the people aged under 65 years.

Statistical summary

Hypothesis	If a person is over 65 years, then there are more chances to die from influenza
Independent variable	Age of person

Dependent variable	Influenza deaths
Null hypothesis	People over 65 years are not more likely to die from influenza
Alternate hypothesis	People over 65 years are more likely to die from influenza
Type of test	One tailed - testing influenza death rate between under 65 years and over 65 years old people.
Significance level	0.05
Results interpretation	The p value is below the significance level so we can reject the null hypothesis.
Next steps	Results show that 65+ have a much higher flu death rate, which makes us confident on alternate hypotheses. Medical staffing agencies can make informed decisions on staff allocation.

List of remaining analysis to create visualization

- Charts to design visualization
- Visualization that look at the correlation between variables
- Create a narrative to communicate research findings and insights in relation to research goal

Next steps

- To use these results to build models that predict flu patterns.
- Develop strategies for sending more medical staff to states with more people aged 65+.

Resource links

https://wonder.cdc.gov/ucd-icd10.html
https://www.census.gov/
https://gis.cdc.gov/grasp/fluview/fluportaldashboard.html