

# Influenza Season Temporary Staff Projection

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.

## HYPOTHESIS

If a state has a high proportion of the vulnerable population (children under 5 and adults over 65), then the flu death rate will be high.

## CORE VARIABLES

**Dependent Variable:** Flu Death Rate

**Independent Variable:** Vulnerable Population (children under 5 and adults over 65)

Variables	Number of Flu Deaths	Number of People: Under 5 and Over 65
Mean	907	1,364,684
Standard Deviation	1,155	1,226,234
Outlier % *	4%	5%

\*Outliers: For both variables, the outliers are from states with high populations (CA, TX, NY and VA), and they comprise less than 5% of total records. Since states with high flu rates, especially in relationship to the total population are important to the staffing plan, they are included in the analysis.

## DATA PROFILE

### CENSUS DATA

The data show the population of every state, down to the county level, by age group.

**Limitations:** The annual data are estimates, based on data collected infrequently - every ten years.

### INFLUENZA DEATHS

This dataset shows the flu death rate in every state by month and year, among different age groups from 2009 - 2017.

**Limitations:** Data for two age groups (5 to 14 and 15 to 24 year olds) are missing for all but five states.

## RESULTS & INSIGHTS

**Null Hypothesis:** The flu death rate for the vulnerable population is equal to or less than it is for other populations.

**Alternate Hypothesis:** The flu death rate for the vulnerable population is greater than for other populations.

**NUMBER OF FLU DEATHS:  
VULNERABLE  
POPULATION**

**Mean:** 828  
**Variance:** 1,029,237  
**Observations:** 458

**NUMBER OF FLU DEATHS:  
NON-VULNERABLE  
POPULATION**

**Mean:** 79  
**Variance:** 22,940  
**Observations:** 458

**P(T<=t) one-tail** = 4.58185191573035E-45

# 91%

The percentage of annual flu deaths attributed to the vulnerable population in the United States.

The alpha value is  
<0.05, so the null  
hypothesis is rejected.  
The flu death rate is  
statistically higher in  
the vulnerable  
population.

# 0.83

Strong correlation between  
flu deaths and number of  
people in the vulnerable  
population.

## NEXT STEPS

- 1** Determine the proportion of vulnerable populations by state.
- 2** Identify priority states, based proportions of the vulnerable population, to determine **where** to deploy staff.
- 3** Determine timeframe for flu season to determine **when** to deploy staff.

## DATA SOURCES

**Census:** Externally sourced from the US Census Bureau, collected via survey.

**Flu Deaths:** Externally sourced from the US Centers for Disease Control and Prevention (CDC), based on death certificates for US residents.

# Appendices

## APPENDIX 1

### PROJECT GOAL

To help the staffing agency provide temporary workers to clinics and hospitals on an as-needed basis. By planning for influenza season, a time when additional staff are in high demand, and by examining trends in influenza, the agency can proactively plan for staffing needs across the country.

## APPENDIX 2

### STAKEHOLDERS

- Medical agency frontline staff
- Hospitals and clinics using the agency's services
- Influenza patients
- Staffing agency administrators

## APPENDIX 3

### STAKEHOLDER QUESTIONS

#### Clarifying Questions

- What months have the highest instances of the flu? When is flu season?
- Which states have the highest flu rates?
- Which vulnerable populations have the highest mortality rate from the flu?

#### Funneling Questions

- Are the months with the highest flu rates the same every year? In every state?
- Is there a higher number of people from vulnerable populations in the states with historically high flu rates?

#### Ethical Questions

- What are the potential consequences of inaccurate staffing projections?
- Are there specific privacy laws protecting data collection and storage from specific vulnerable populations (children, pregnant women, and individuals with HIV/AIDS for example)?
- Are there ethical concerns in identifying a state as high risk for flu mortality?