

Preparing for Influenzas season in the U.S

A medical staffing agency that places temporary workers to clinics and hospitals on an as-needed basis requires forecasting for the next Flu season so that it can be determined when to send staff, and how many, to each state.



Objective Analyze historical influenza trends in the U.S to assist the medical staffing agency prepare and provide recommendations.



Data

- Influenza deaths data [here](#)
- Population data [here](#)



Limitations

- The Influenza deaths numbers are estimates and not actual counts of deaths.
- Datasets are only dated from 2009 to 2017.
- Information on hospital sizes and staffing capacity is unknown.
- Influenza deaths data comprises of 82% of death count below 10 years were suppressed for data privacy.



Skills Data profiling and integrity, data cleaning, data transformation and integration, statistical analysis, and hypothesis testing.



Tools MS Excel, Tableau

MS Excel: Pivot tables and VLOOKUP, Tableau: Data visualization, forecasting and storytelling.



- Check the Tableau Storyboard in- [here](#)
- Check the Influenza Presentation Outline [here](#)
- Check the Video Recording Presentation <https://vimeo.com/770096062>

Initial Analysis- Hypothesis Testing

- Interpreted the business requirements and data to derive a Null Hypothesis.
- Explored the datasets and conducted a Statistical Analysis using T-tests to find the correlation between age and flu mortality.
- Merge cleaned data sets to ready it for the final Analysis.

Results and Insights		
t-Test: Two-Sample Assuming Unequal Variances		
	% of Influenza death of 85 year and older	% of Influenza death < 85 year
Mean	0.0235086	0.008770759
Variance	0.000805484	8.91907E-05
Observations	459	459
Hypothesized Mean Difference	0	
df	558	
t Stat	10.55620227	
P(T<=t) one-tail	3.56062E-24	
t Critical one-tail	1.647588963	
P(T<=t) two-tail	7.12E-24	
t Critical two-tail	1.964224446	

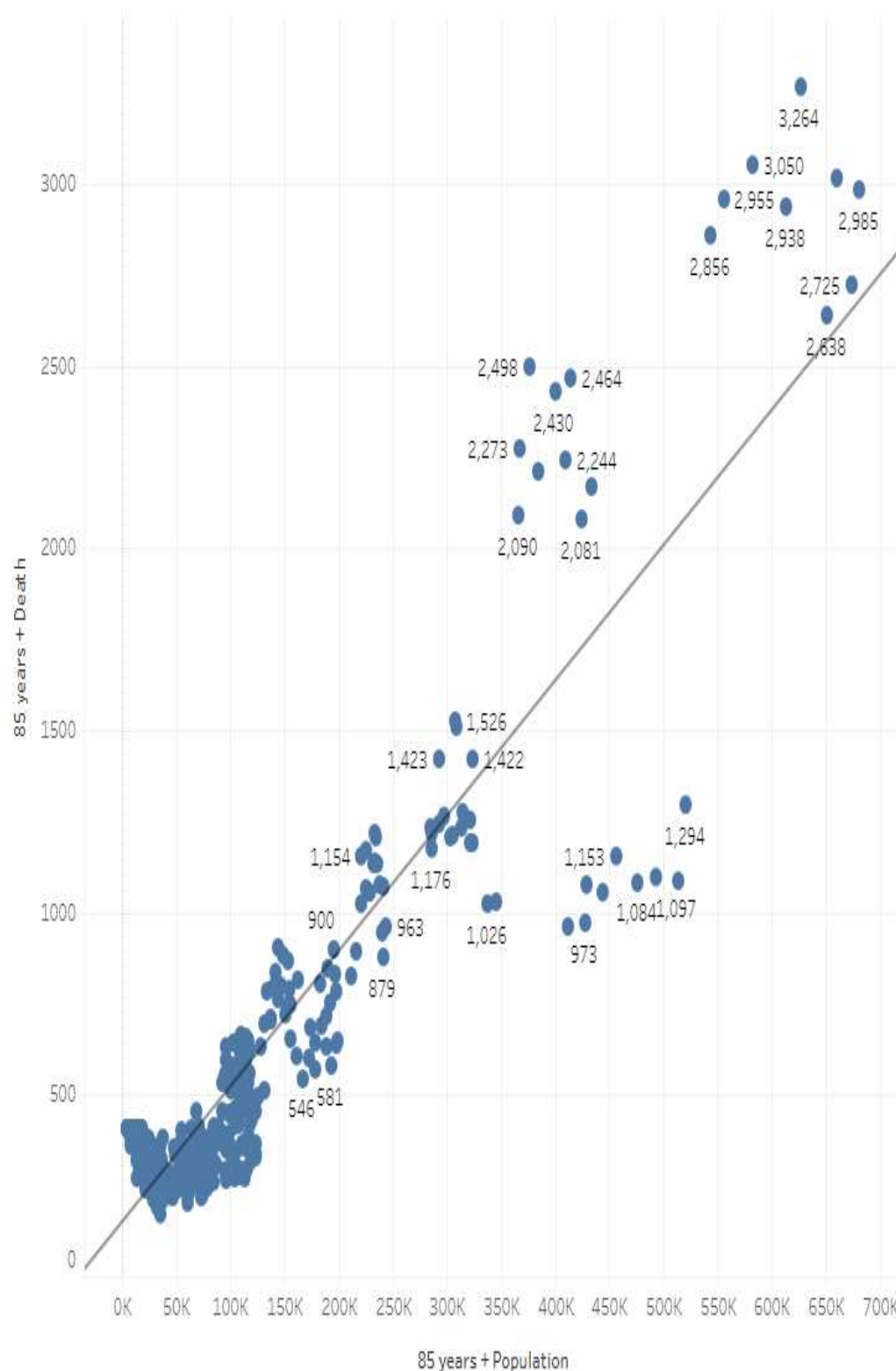
Null Hypothesis- The influenza deaths are equal to or less in vulnerable population than in the non-vulnerable population.

Alternative Hypothesis- The influenza deaths are higher in vulnerable population than in non-vulnerable.

One tailed test and Significant level-0.05

Correlation		
Variables:	Census data set/ death 85 above and Influenza Death /population 85 above	
Proposed Relationship	Rate of increase in death against rate of increase in population	
Correlation Coefficient	0.910691187	
Strenght of Correlation	strong relationship	
Usefulness / Interpretation	Useful/ It means if population of 85 years and above increases, death of 85 years and above also increases.	

The Relationship between Total Population 85+and Total Deaths by Influenza 85+

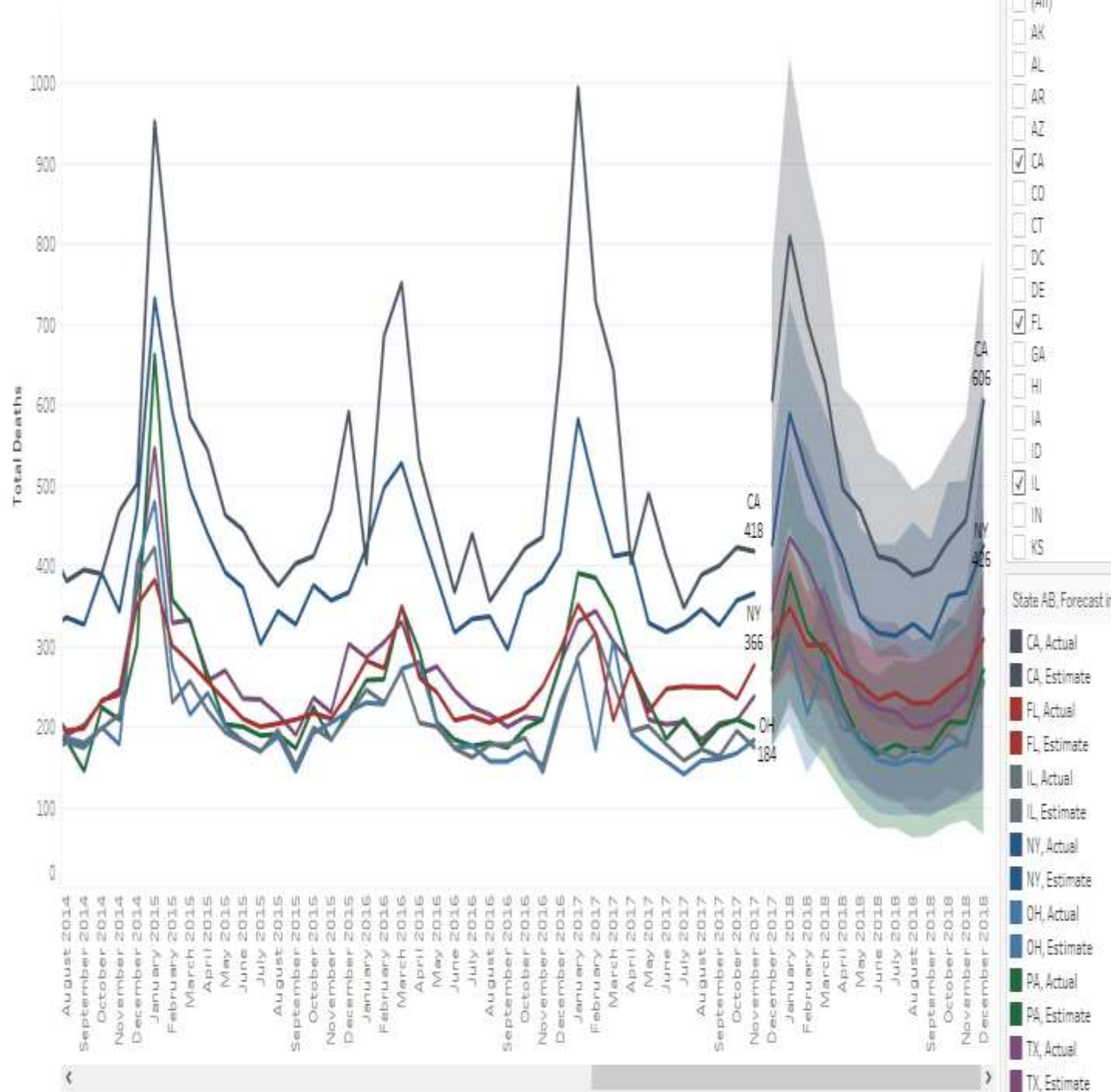


The Scatter plot shows a positive correlation between the variable total death and the age group 85 years +. The scatter plot proves that the 85 years + accounts for more influenza deaths.

Identifying Influenza

seasonality and locations

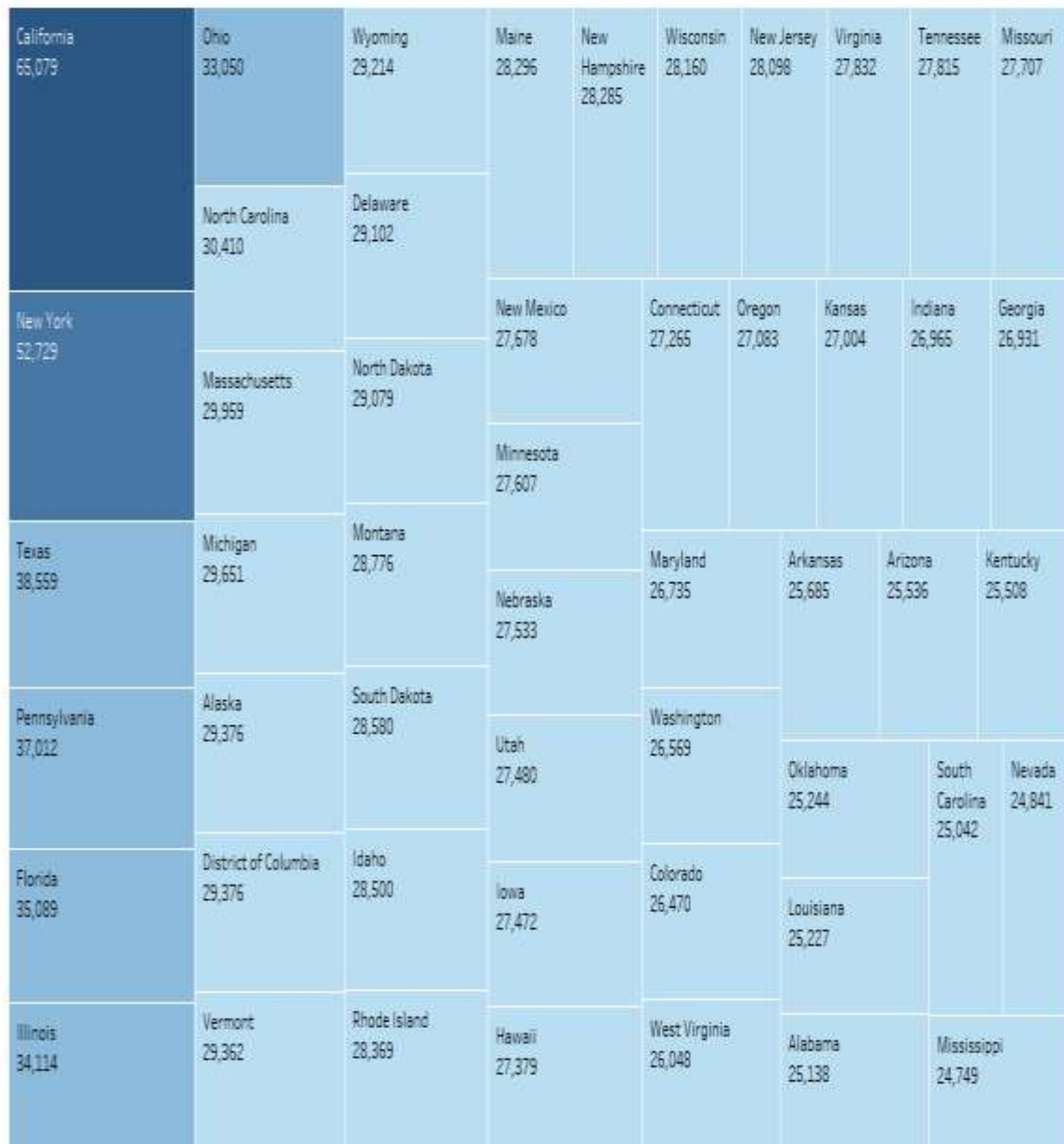
Monthly Forecast Influenza Deaths per State 2009-2017



The line chart and the forecast show that the worst hit months are the winter period from November to March each year.

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Vulnerable vs Non-vulnerable Influenza Deaths for Year 2009 to 2017



The Tree map shows that California, New York, Texas, Pennsylvania, Florida, Illinois, Ohio are the worst hit from influenza deaths.



RECOMMENDATIONS

The staffing agency needs to be ready for the influenza season peak which winter months from December to March. Influenza mortality rate is affected primarily by two factors: age group and climate. The population above 85 years should be considered a risk group, as they are significantly more affected than the younger. The states affected most are California, New York, Texas, Pennsylvania, Florida, Illinois, Ohio, and they should be prioritized.

Prioritization

1. Staffing of areas with high concentration of elderly population during the peak period.
2. A yearly surveillance of influenza cases should be cautiously measured to assist medical workers in planning future seasons.
3. Educating the community on the benefits of vaccination and how to stop influenza from spreading can be the best defensive measure.

