USA Influenza Season Analysis & Staffing

USA Influenza Deaths 2009 - 2017

Winter?	Spring?	Summer?	Fall?
the young?	males or females?	which states?	the old?

Challenge

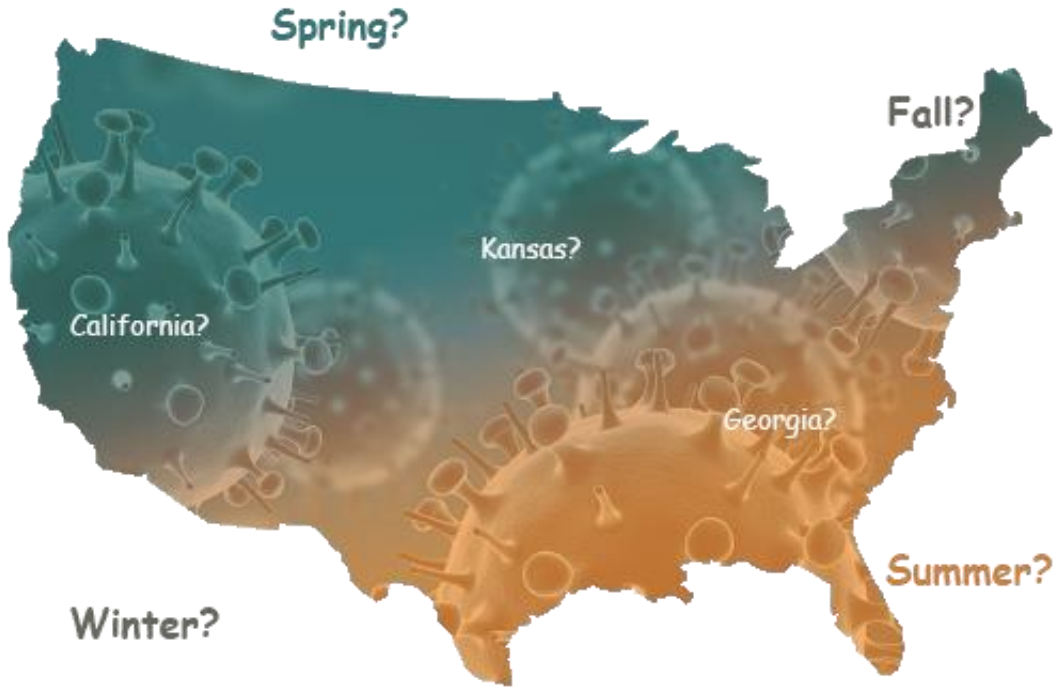
Hospitals and clinics need additional temporary staff to adequately treat vulnerable elderly and young populations who develop serious flu complications and end up in the hospital during the Influenza season. Placing medical staff when and where needed, helps to adequately treat the most vulnerable among us!

Key Questions

- **Who** exactly needs this care, **when**, and **where** should the medical staffing agency send to hospitals and clinics?

- The right number of medical staff in each state, at the right times, will put medical providers in a position to adequately **treat** these **vulnerable patients**.

Who are the most vulnerable?



When and Where do they need medical care?

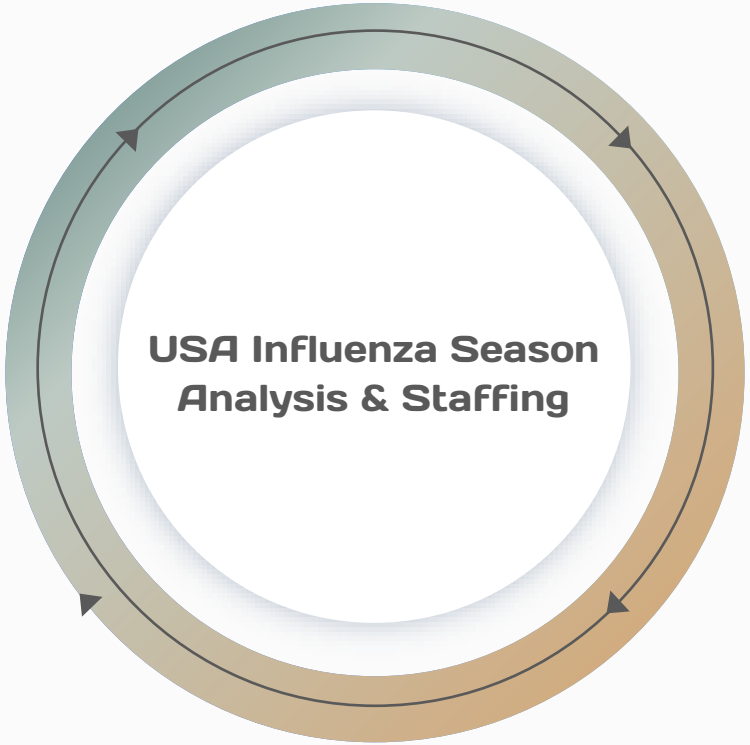
Project Life Cycle

Data Preparation

- Translated business requirements
- Sourced the right data
- Assessed accuracy, quality, consistency
- Assessed completeness, uniqueness, timeliness
- Cleaned, transformed and integrated data
- Profiled the data using basic statistical methods

Statistical Analysis

- There is a strong correlation between population size and deathrates
- 66% of all cases come from just 10 large states
- The older population groups 75+ are especially hard hit
- The death count is especially high during winter and early spring



Data sources

CDC:
- MS Excel File

US Census Bureau
- MS Excel File

Data Exploration

- Addressed research hypothesis
- Used the variable distribution, mean, variance, standard deviation, correlation, and outlier detection methods to support/reject the research hypothesis
- This process included the use of the composition charts, comparison charts, temporal and statistical visualizations, and spatial & textual analysis
- Tools: MS Excel, Tableau dashboards

Challenges

- The Census estimates are based on 2010 boundaries, so the data is not reflective of ongoing urbanization.
- Some data was captured manually, thus subject to errors.
- While the CDC is a reliable source, reporting Influenza is voluntary, so this is a sample, and does not represent the total number of Influenza illnesses in the USA.

Linear Regression Analysis

The Correlation between state population and death rate in 2017

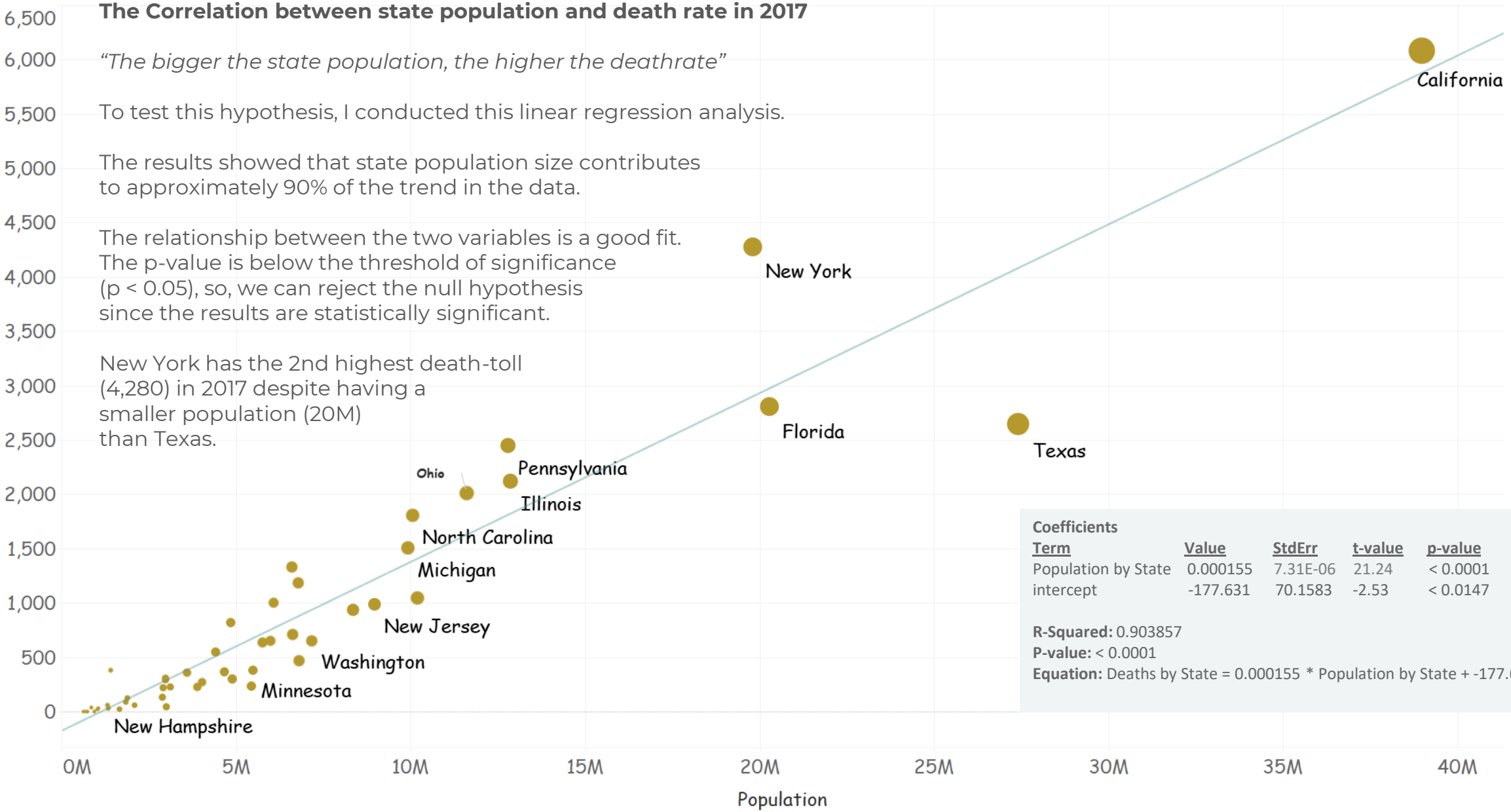
"The bigger the state population, the higher the deathrate"

To test this hypothesis, I conducted this linear regression analysis.

The results showed that state population size contributes to approximately 90% of the trend in the data.

The relationship between the two variables is a good fit. The p-value is below the threshold of significance ($p < 0.05$), so, we can reject the null hypothesis since the results are statistically significant.

New York has the 2nd highest death-toll (4,280) in 2017 despite having a smaller population (20M) than Texas.

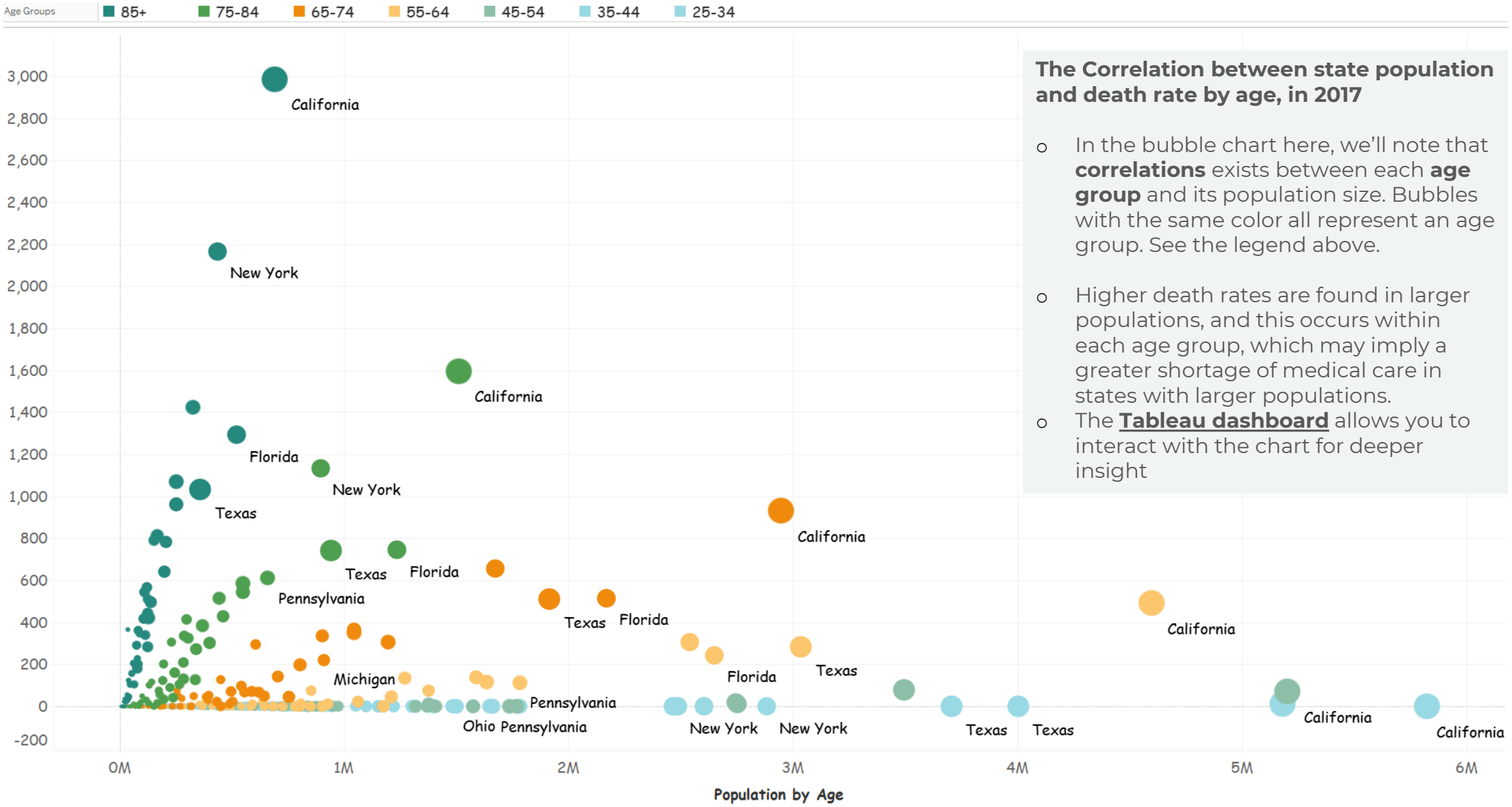


Coefficients

Term	Value	StdErr	t-value	p-value
Population by State	0.000155	7.31E-06	21.24	< 0.0001
intercept	-177.631	70.1583	-2.53	< 0.0147

R-Squared: 0.903857
P-value: < 0.0001
Equation: Deaths by State = 0.000155 * Population by State + -177.631

Age Groups Most Affected



The Correlation between state population and death rate by age, in 2017

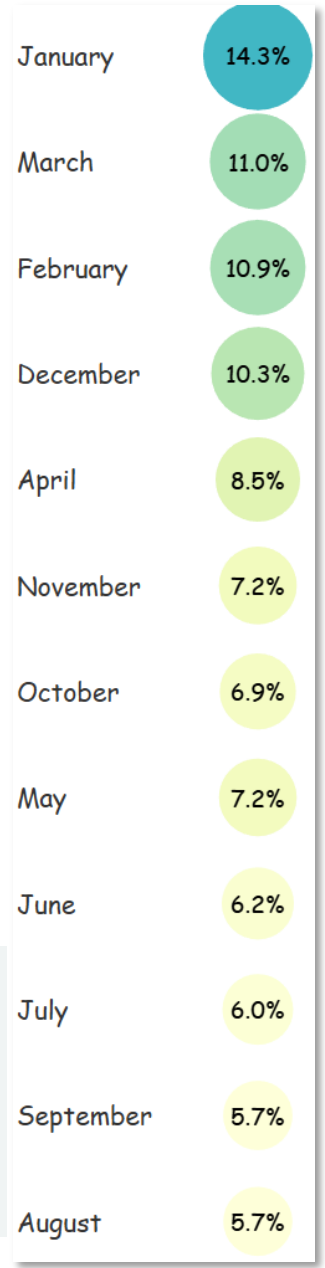
- In the bubble chart here, we'll note that **correlations** exists between each **age group** and its population size. Bubbles with the same color all represent an age group. See the legend above.
- Higher death rates are found in larger populations, and this occurs within each age group, which may imply a greater shortage of medical care in states with larger populations.
- The **Tableau dashboard** allows you to interact with the chart for deeper insight

States & Month of Year With Most Deaths

The Correlation between state population and death rate by age, in 2017

- The map chart shows where we can find the most vulnerable patients. The darker colors indicating states with higher death rates.
- Note that higher death rates are found in states with a larger population size, indicating that there is a shortage of medical care in these states.
- See the **Tableau dashboard** allows you to interact with the chart to for deeper insight.

- The bubble chart to the **right** shows which months are most severe for influenza deaths, **peaking in January**.
- Note that higher death rates occur in the **winter** months and the first month of spring



Conclusions & Recommendations

The older groups need the most focused medical care.

	85+	75-84	65-74	55-64	45-54	35-44	25-34
Female	122,379	46,644	15,712	5,620	1,017	138	34
Male	75,637	49,200	22,431	10,429	1,887	277	47

The Influenza death count is especially high during the winter months!

	January	February	March	April	May	June	July	August	September	October	November	December
Winter	50,249	38,169										36,365
Spring			38,690	29,945	25,318							
Autumn									20,177	24,305	25,403	
Summer						21,814	20,996	20,021				

20,021 — 50,249

We'll find the vast majority of severe Influenza cases in the larger states (TOP 10).

		85+	65-84	25-64	Grand Total
Top 10	California	26,428	21,055	5,350	**52,833**
	Florida	9,784	9,207	1,663	**20,654**
	Illinois	10,101	7,444	874	**18,419**
	Michigan	6,850	5,314	465	**12,629**
	New York	20,454	16,106	3,079	**39,639**
	North Carolina	6,974	6,437	639	**14,050**
	Ohio	8,903	7,582	1,081	**17,566**
	Pennsylvania	11,918	8,180	775	**20,873**
	Tennessee	5,100	5,146	484	**10,730**
	Texas	10,717	11,320	3,335	**25,372**
	Total	**117,229**	**97,791**	**17,745**	**232,765**
Top 20	Alabama	2,884	2,518	163	**5,565**
	Georgia	4,574	4,696	618	**9,888**
	Indiana	4,197	2,001	67	**6,265**
	Kentucky	3,125	1,831	55	**5,011**
	Maryland	3,949	2,075	23	**6,047**
	Massachusetts	6,925	3,066	20	**10,011**
	Missouri	5,265	3,036	88	**8,389**
	New Jersey	5,609	2,718	52	**8,379**
	Virginia	5,310	3,571	117	**8,998**
	Wisconsin	4,799	1,191	36	**6,026**
	Total	**46,637**	**26,703**	**1,239**	**74,579**
Top 30	Arizona	2,285	1,397	109	**3,791**
	Arkansas	2,040	846	11	**2,897**

10 — 26,428

The analysis has **confirmed** the who, where, and when, which can be used as a basis for extrapolating staffing numbers.

However, further analysis of the impact of the lack of medical staff on less populated cities and states will help to offset any potential **bias** towards the larger states.

Explore my **interactive dashboard** for more insights and see my **GitHub repository** for other projects!