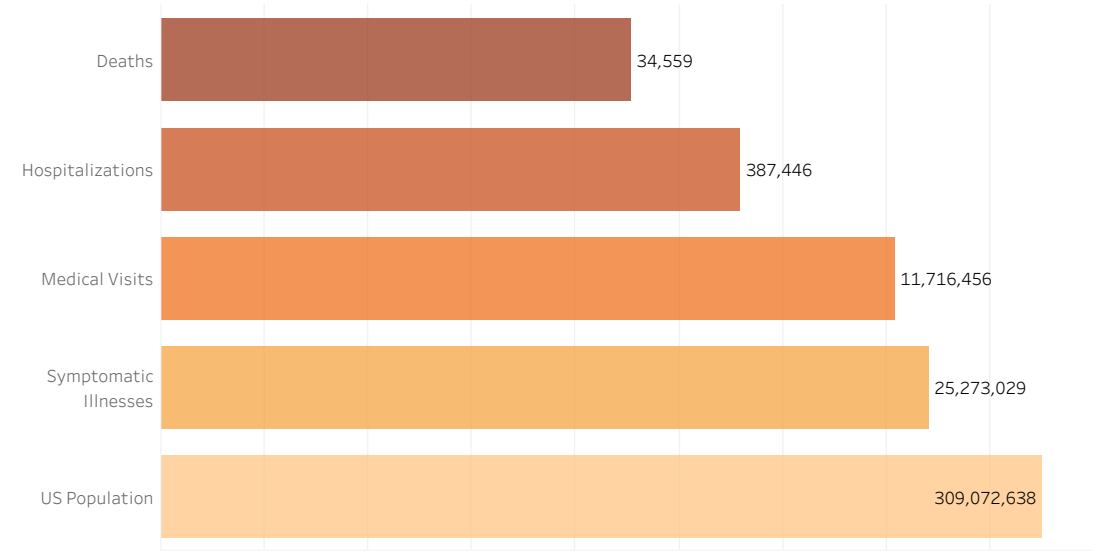
Ready for Another Influenza Season?

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

US Influenza at a Glance (yearly average figures between 2011-2017)

Chart displayed in a logarithmic scale



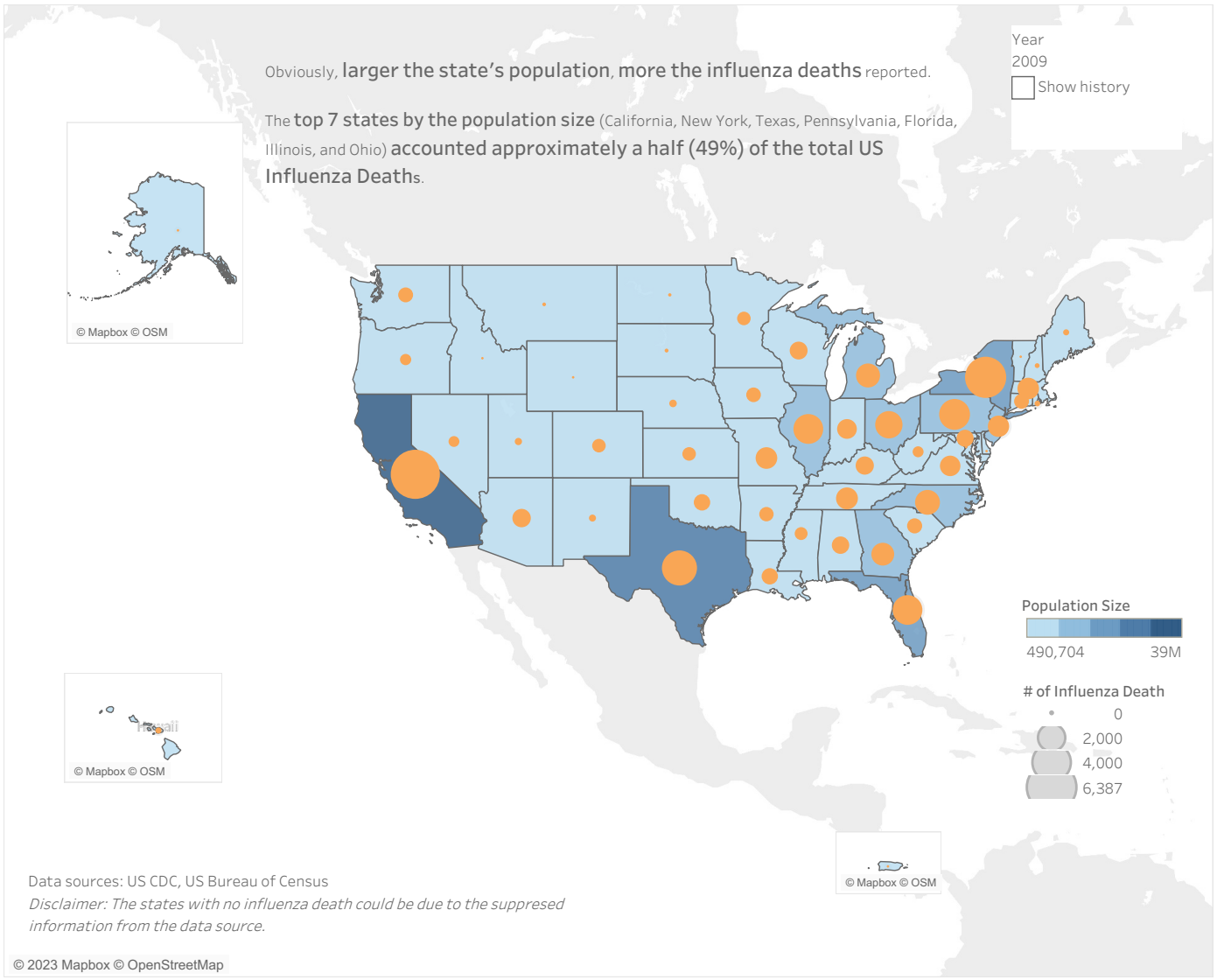
Every year, 8.2% of the US population experience influenza like symptoms

Of the people who experience influenza symptoms, 1.5% of them are hospitalized

8.9% of people who are hospitalized with influenza end up dying

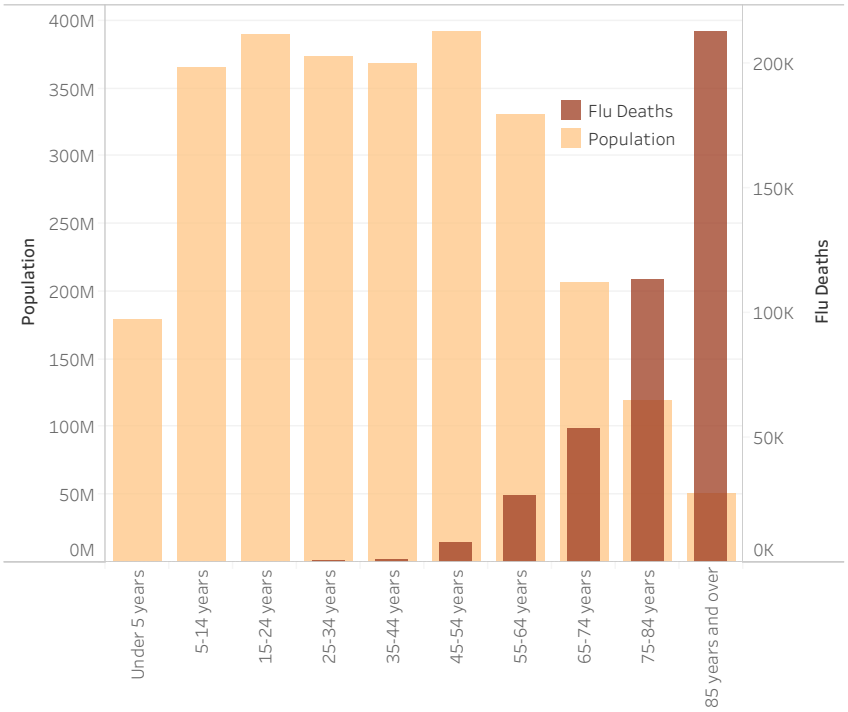
Data source: CDC (Past Seasons Estimated Influenza Burden)

Where are the influenza deaths?



Who are more vulnerable?

Average Yearly Influenza Deaths vs. Population Size by Age Groups (2009-2017)



Influenza **death tolls increase exponentially** compared to their population sizes for the **people who are 65 and older**.

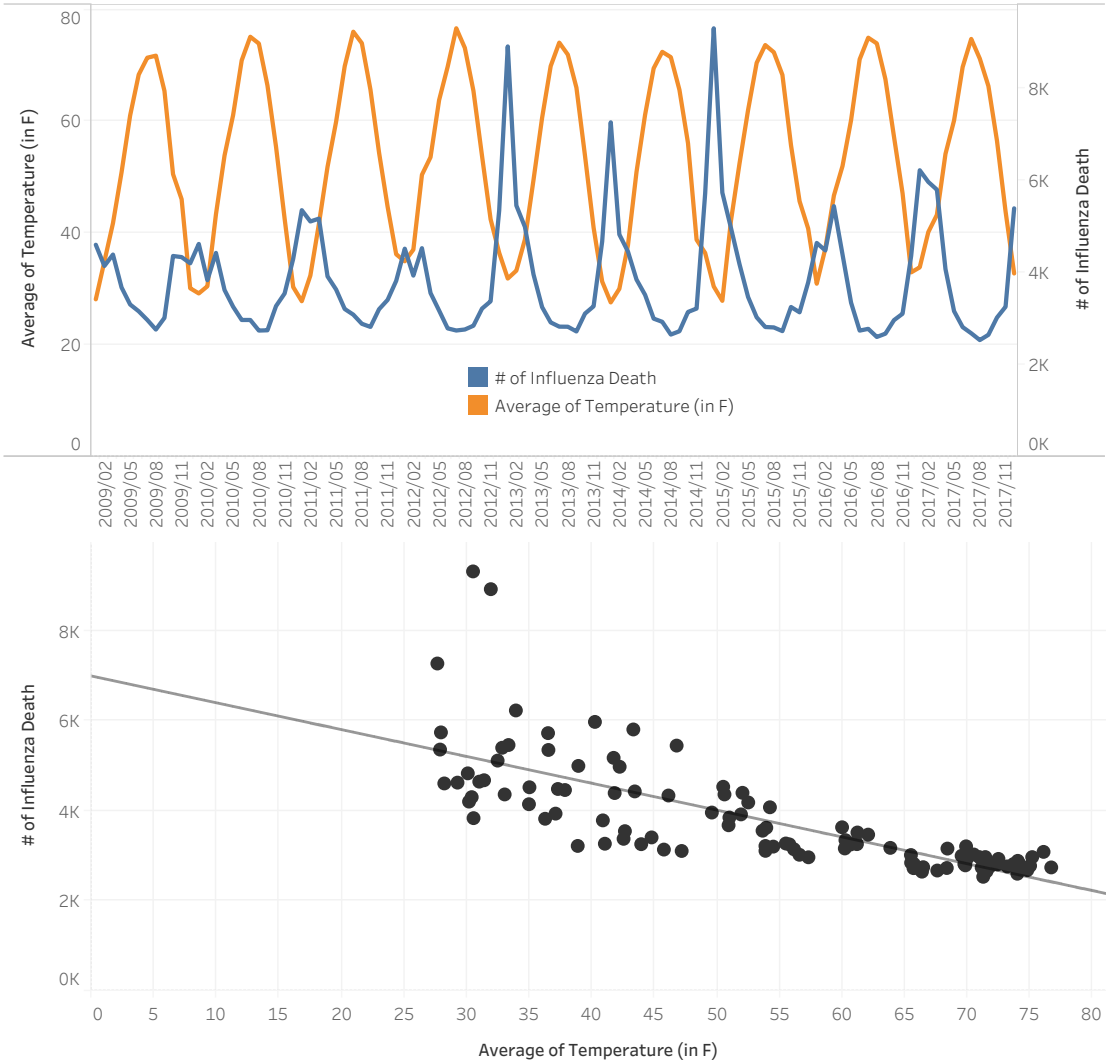
Larger states also have larger number of populations of 65 and older. The trend follows the same as the overall death tolls figures by the state.

Data sources: CDC (Influenza Deaths by Age), US Census Bureau

Average Yearly Age 65 and Older Population Figures by State (2009-2017)

1	California	1,494,034
2	Florida	1,137,787
3	New York	903,028
4	Texas	895,698
5	Pennsylvania	666,166
6	Ohio	547,182
7	Illinois	543,968
8	Michigan	459,761
9	North Carolina	419,441
10	New Jersey	410,003
11	Georgia	353,556
12	Virginia	322,014
13	Massachusetts	314,378
14	Arizona	310,415
15	Washington	288,635
16	Tennessee	285,102
17	Indiana	279,168
18	Missouri	271,292
19	Wisconsin	257,385
20	Maryland	247,104
21	Minnesota	225,258
22	Alabama	219,672
23	South Carolina	218,898
24	Colorado	193,832
25	Louisiana	189,599
26	Kentucky	188,665
27	Oregon	182,814
28	Puerto Rico	175,322
29	Connecticut	174,104
30	Oklahoma	165,320
31	Iowa	140,548
32	Arkansas	134,790
33	Kansas	122,985
34	Mississippi	121,561
35	Nevada	115,370

When is the flu season?



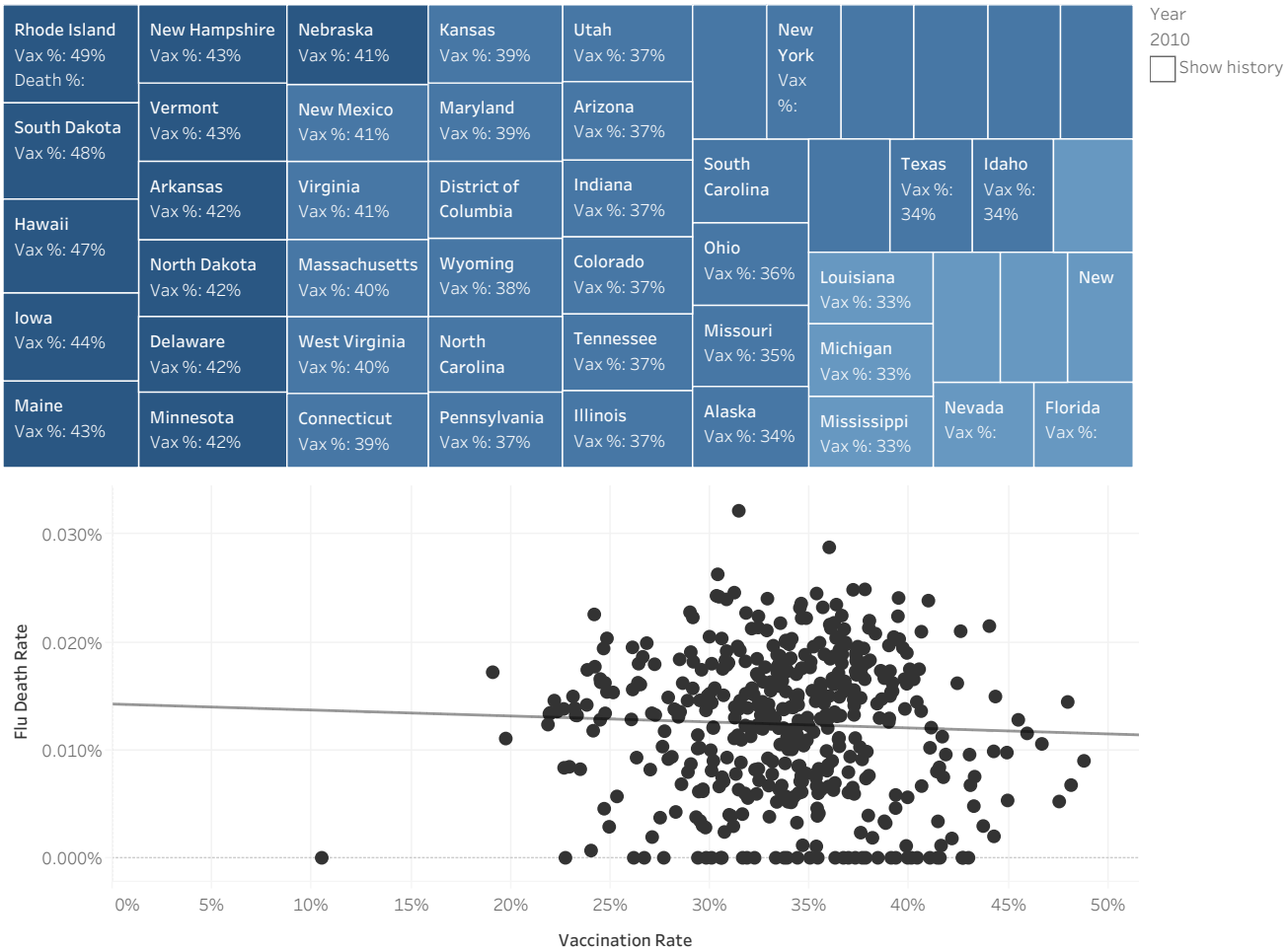
Based on the historical data, the typical influenza season is around the winter time where the influenza related deaths picking usually around in January.

Also, the influenza deaths appears to be highly related to the temperature. The number of influenza deaths increases as the temperature falls.

Data sources: CDC (Influenza Deaths by Age), NOAA National Centers for Environmental Information (Climate at a Glance)

What about influenza vaccines? Do they work?

Unlike the general public's belief that vaccination reduces the fatalities from contracting influenza, the analysis showed that there is **almost no correlation** between the vaccination rates and the influenza death rates.



Data sources: CDC (Influenza Deaths by Age, Influenza Vaccination Coverage for All Ages 6 Months and up)

How should we allocate staffs?

What we know so far based on statistical analyses:

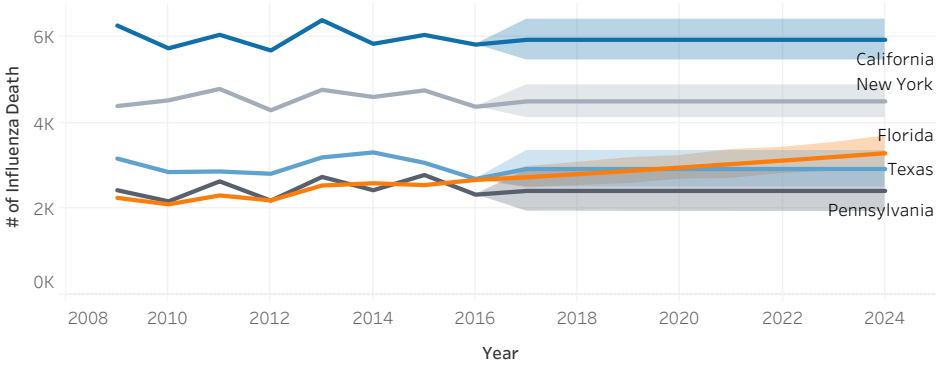
Certain age groups (65 years or older) are more vulnerable to influenza compared to the other age groups

The number of influenza deaths is highly correlated with the temperature. The cold the temperature is, more likely there will be more influenza deahts..

Possible allocation strategies based on the analyses results:

How manys staffs and where: More staffing towards the states that have more elderly (65 and up) populations

When: The temperatures across US states vary. Deploy resources to those states where the temperature drops earlier relative to other states first



Based on the forecast model for the influenza deaths for the upcoming seasons for the top 5 states, the number of influenza deaths will stay the same or increase for a certain states.

Items for further considerations to solidify the deployment strategy

What are the current staffing employment and utilization rates by each state's healthcare facilities?

What is the agency's current capacity and available staffing?

What is the assumed staff-to-patient ratio?

What is the agency prioritizing? Coverage of # of states vs. # of patients?

With this additional information and considerations, a better weight can be assigned for each of identified factor to solidify the final deployment strategy for the upcoming influenza season.