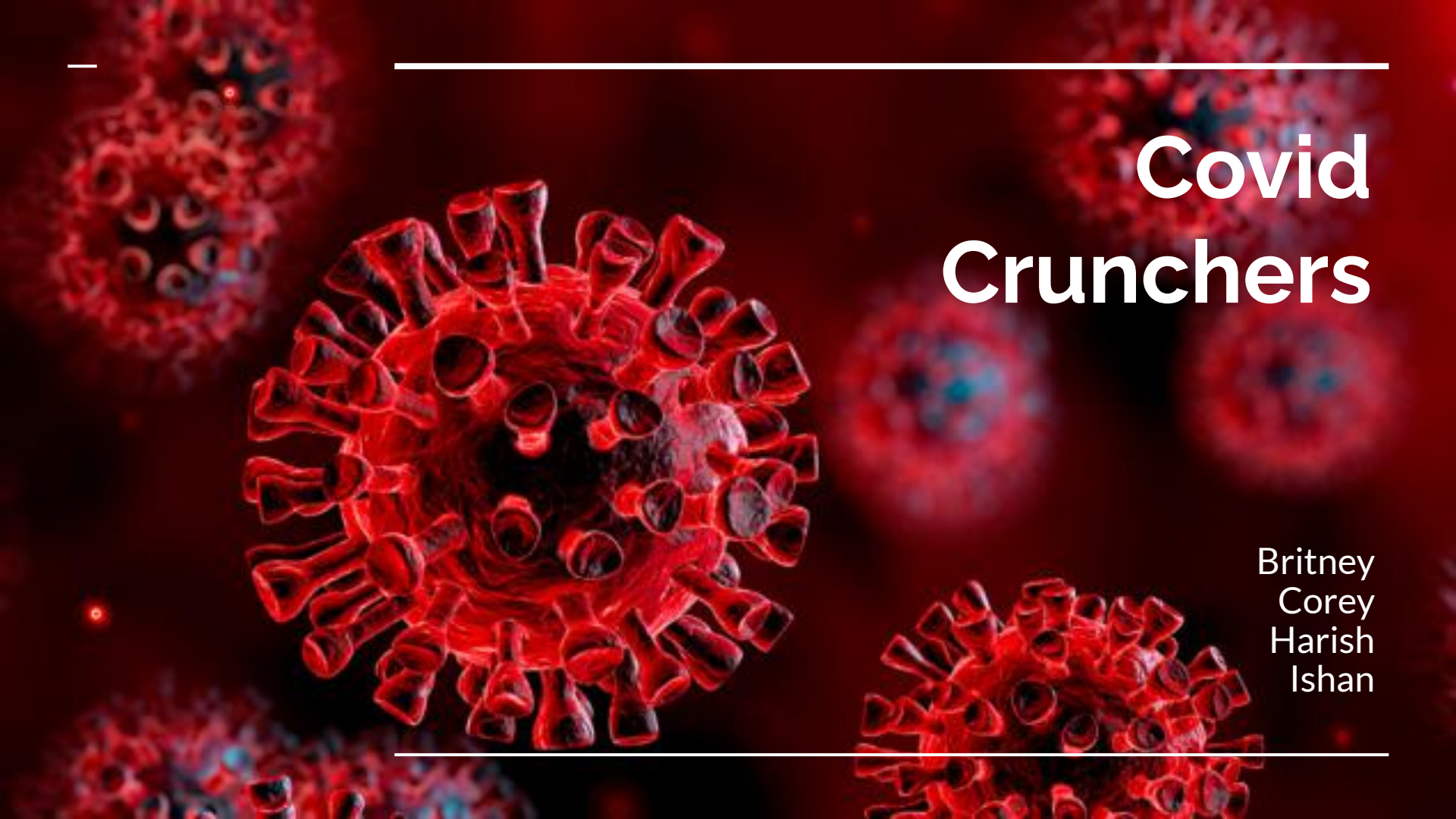
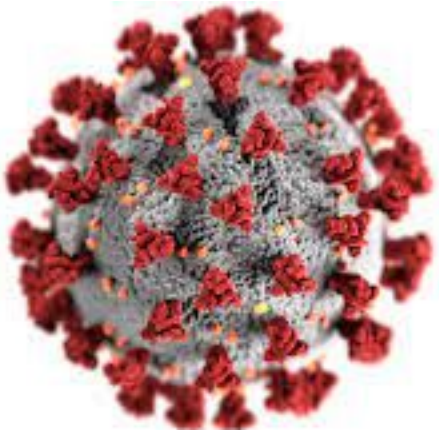


Covid Crunchers

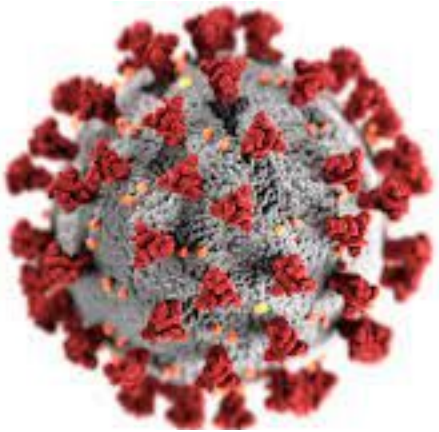
Britney
Corey
Harish
Ishan

Why COVID-19?



Focus of study:

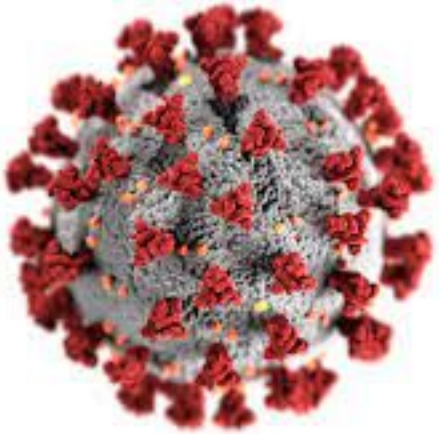
- Death impact by demographic
- US geographical hotspots
- Impact of vaccination on death rates



Questions to Answer:

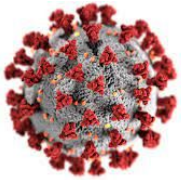
- Which demographic groups were most impacted with COVID-19 mortality?
- Do summary demographics show a significant variance amongst COVID-19 casualties?
- How are vaccines impacting death rates in the US?
- Can we demonstrate a correlation between vaccines and covid deaths?

Data Study

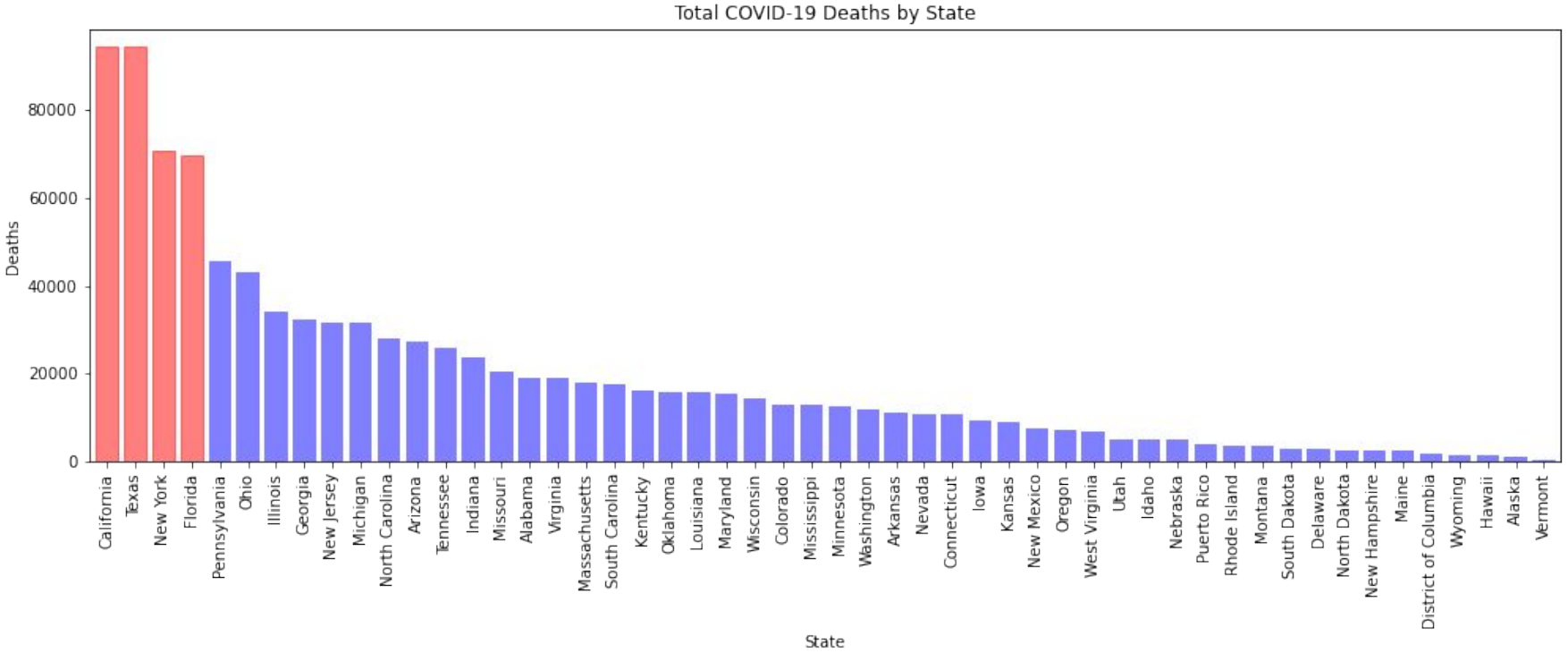


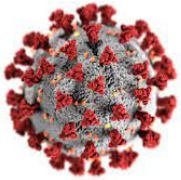
- CDC API:
  - Provisional COVID-19 Deaths by Race and Hispanic Origin, and Age
  - Provisional COVID-19 Deaths by Sex and Age
  - AH Provisional COVID-19 Death Counts by Quarter and County
  - United States COVID-19 County Level of Community Transmission Historical Changes

- US 2020 Decennial Census API

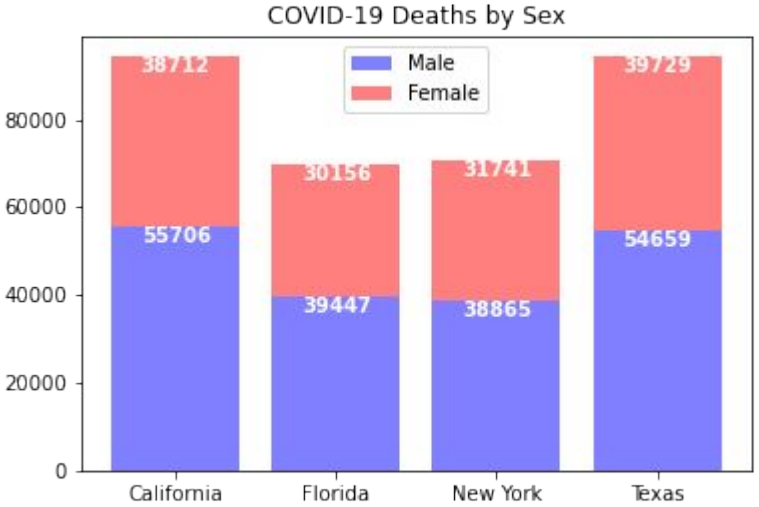


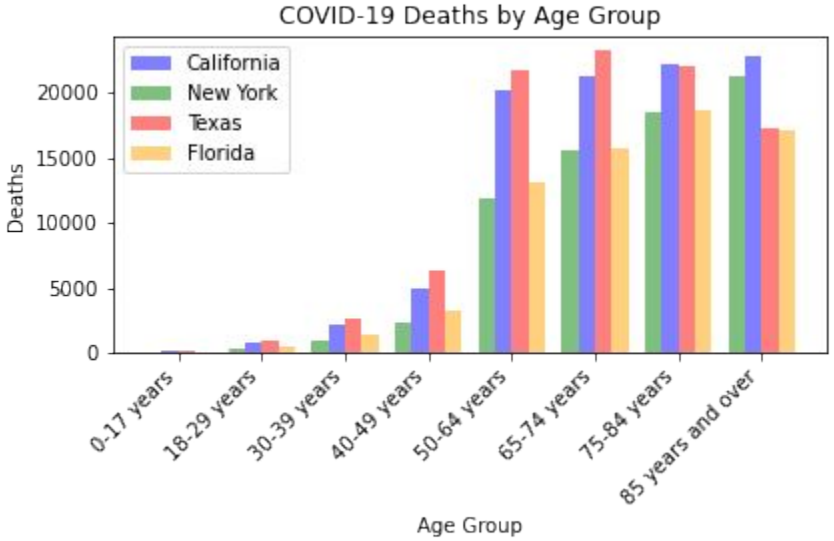
COVID-19 Death Impact: State Level

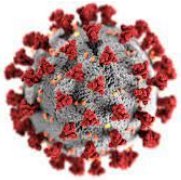




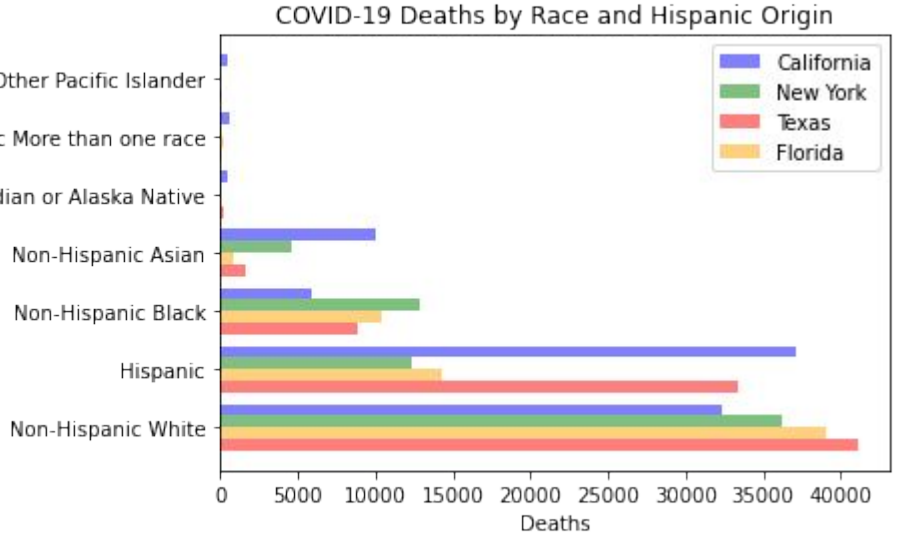
COVID-19 Death Impact - Demographic Impact





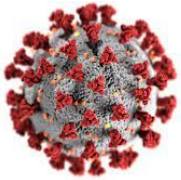


COVID-19 Death Impact - Demographic Impact



	State	Population	COVID-19 Deaths	Death Rate %
0	California	39,314,294	87,033	0.22%
1	Florida	21,400,254	65,011	0.30%
2	New York	20,004,142	66,238	0.33%
3	Texas	29,031,921	85,378	0.29%

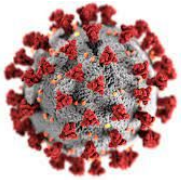
Update: 04/21/2022



COVID-19 Death Impact - Demographic Impact: Race

	CA Deaths %	CA Population %	FL Deaths %	FL Population %	NY Deaths %	NY Population %	TX Deaths %	TX Population %
Non-Hispanic White	37.09	34.88	60.00	51.87	54.74	52.98	48.15	39.90
Hispanic	42.62	39.63	21.99	26.62	18.61	19.74	39.13	39.41
Non-Hispanic Black	6.79	5.39	16.11	14.61	19.38	13.79	10.41	11.87
Non-Hispanic Asian	11.57	15.21	1.38	2.94	6.95	9.58	1.92	5.38
Non-Hispanic American Indian or Alaska Native	0.61	0.40	0.16	0.20	0.15	0.27	0.20	0.29
Non-Hispanic More than one race	0.71	4.14	0.32	3.70	0.17	3.60	0.12	3.05
Non-Hispanic Native Hawaiian or Other Pacific Islander	0.60	0.35	0.03	0.05	0.00	0.03	0.07	0.10

Update: 04/21/2022



COVID-19 Death Impact: Race - Chi-Square

```
critical_value = stats.chi2.ppf(q = 0.95, df = 6)
# The critical value
critical_value
```

Out[16]: 12.591587243743977

```
In [17]: stats.chisquare(dfr['CA Deaths %'], dfr['CA Population %']) # California test
```

Out[17]: Power_divergenceResult(statistic=4.737247309039826, pvalue=0.5779273722180895)

```
In [18]: stats.chisquare(dfr['FL Deaths %'], dfr['FL Population %']) # Florida test
```

Out[18]: Power_divergenceResult(statistic=6.163314362718218, pvalue=0.40514656273731947)

```
In [19]: stats.chisquare(dfr['NY Deaths %'], dfr['NY Population %']) # New York test
```

Out[19]: Power_divergenceResult(statistic=6.461916429225132, pvalue=0.3734802431939379)

```
In [20]: stats.chisquare(dfr['TX Deaths %'], dfr['TX Population %']) # Texas test
```

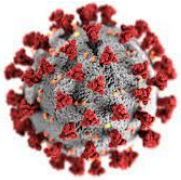
Out[20]: Power_divergenceResult(statistic=6.970548766065622, pvalue=0.32357943018838314)

```
In [21]: # Date stamp for test result
today = pd.to_datetime("today")
print(f"Update: {today:%m/%d/%Y}")
```

Update: 04/21/2022

Conclusion

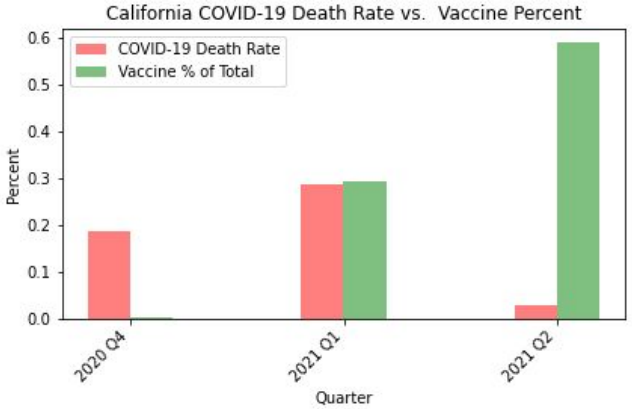
- Since the chi-square values at a confidence level of 95% are much lower than the critical value of 12.6, we conclude that the differences seen across race categories compared to the states' general populations are not statistically significant.

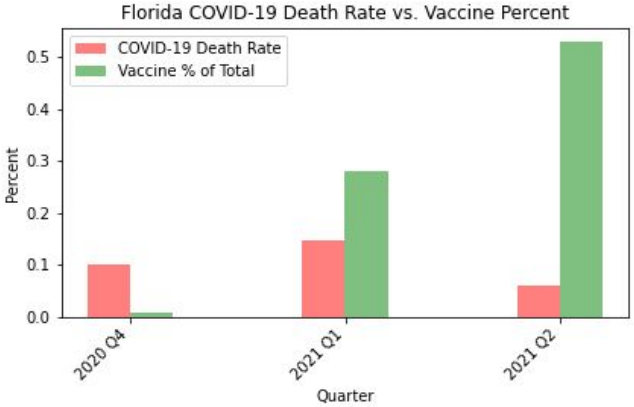


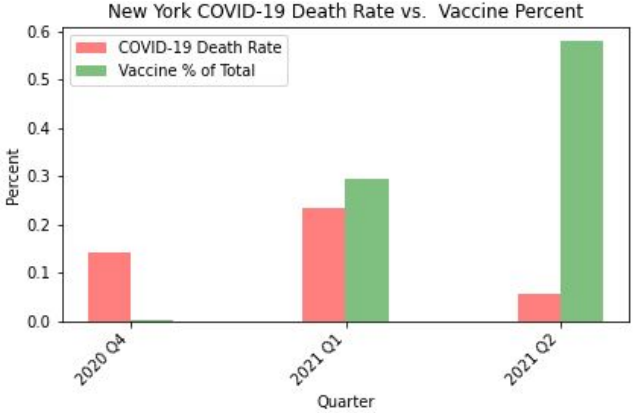
COVID Death Rate vs Vaccine Percent

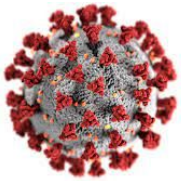
- Death Rate = percent of total covid deaths by quarter
  Vaccine % = cumulative vaccine over total population

- Lag in death rate observed in Q1 2021 for every state

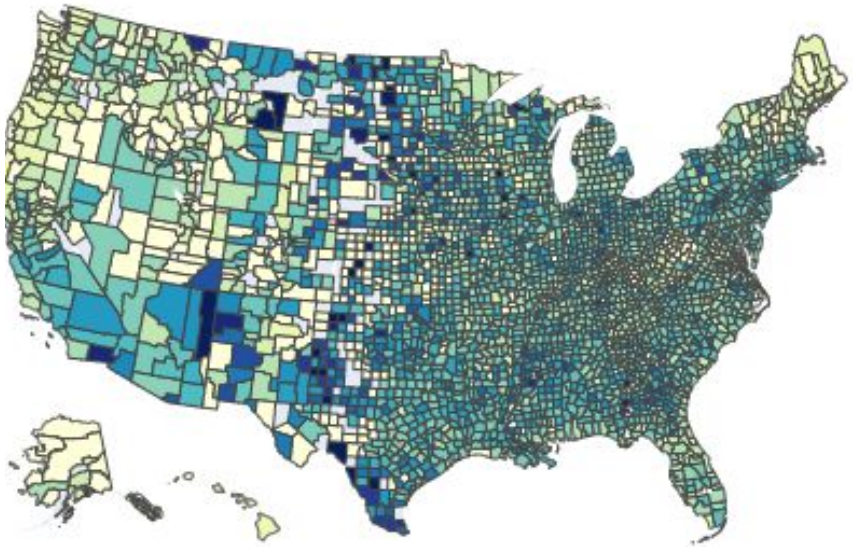


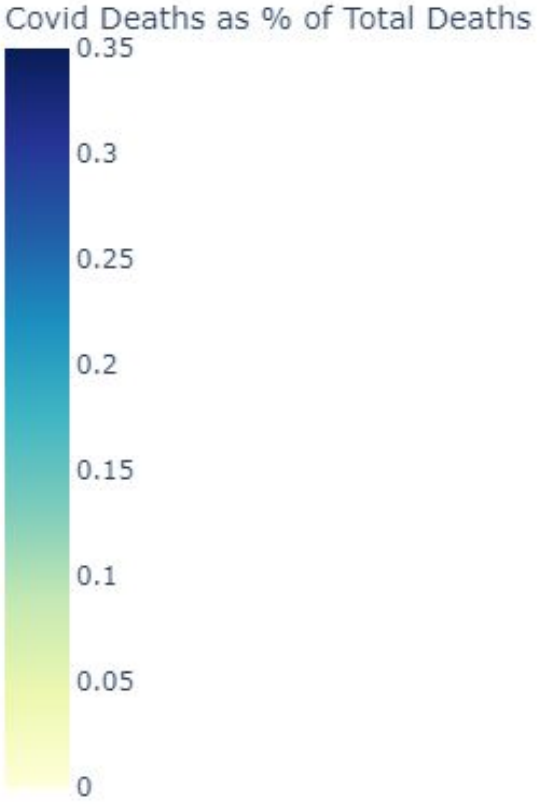


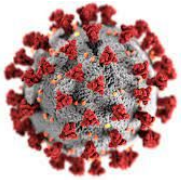




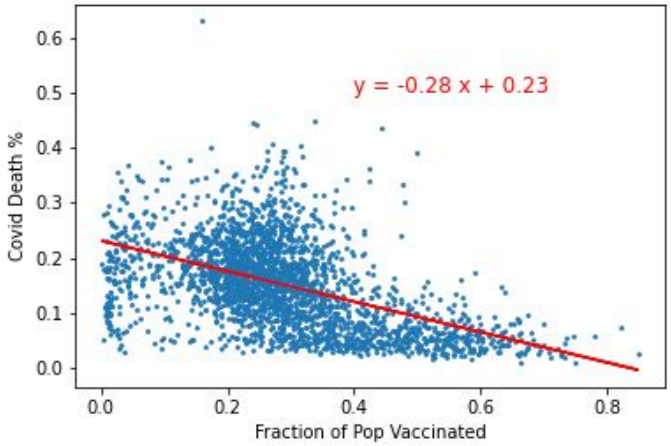
County Level COVID Deaths/Total Deaths

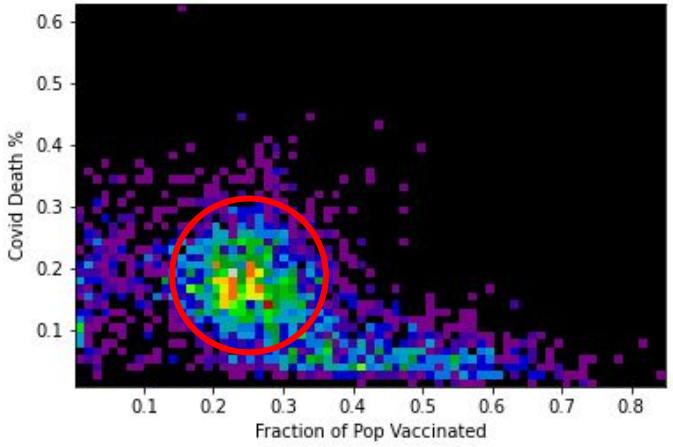






Linear Regression: COVID deaths by fraction of pop. vaccinated

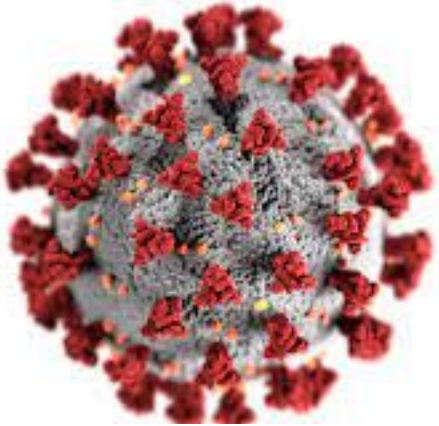





```
The correlation between vaccine percent and the covid death percent is -0.49
```

- The proportion of covid deaths/total deaths is 23% when vaccination rate is 0%.
- For each 10 pt increase in vaccination rate, covid portion of total deaths falls by 2.8%.

Future Enhancements



- Using additional Census API, conduct additional chi-square testing against age, sex demographics
- Conduct further studies on demographic impacts
  - Review ages +65 and overlap sex to see if there is a different distribution
  - Analyze demographic data over time
- Better model selection for regression (logit)
- Regression with more control variables (poverty, age)
- Lag regression analysis by *n* time periods

The End

ahem Tips, please.

Venmo: @covidcrunchhappyhour