



EXPLORING THE VAX POTENTIAL

Real-Time Dashboard for
Virginia COVID-19 Report and Vaccination

Presented by: Crystal Huang
Metis Bootcamp Project VII

INTRODUCTION

The Washington Post

Democracy Dies in Darkness

Spread of delta coronavirus variant exposes poorly vaccinated regions to renewed danger

By [Ariana Eunjung Cha](#), [Karla Adam](#),

[Ben Guarino](#) and [Lenny Bernstein](#)

June 23, 2021 at 11:06 a.m. EDT



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D-19

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Coronavirus
Vaccine

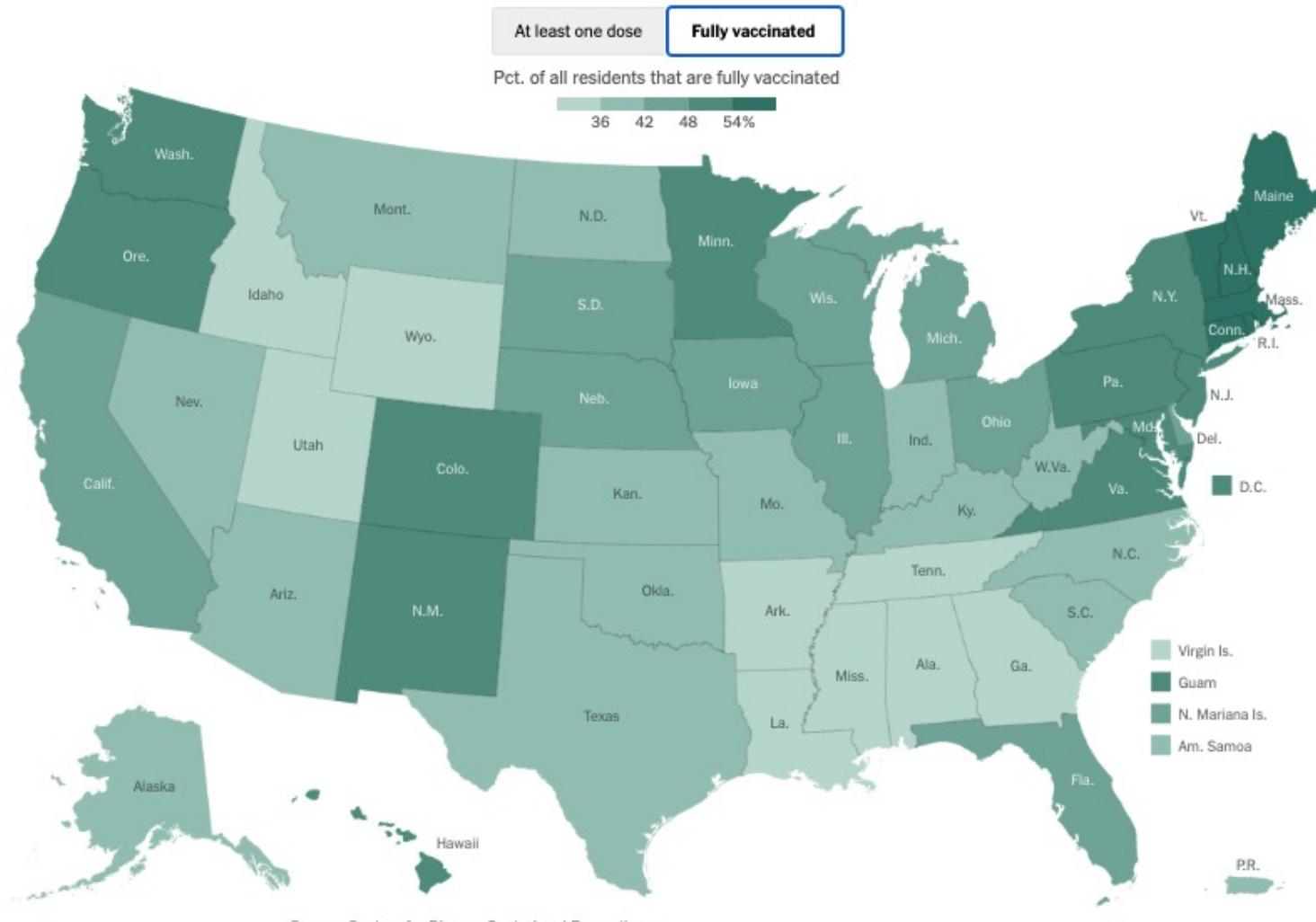
Vaccine

08/15/2020-290v217

INTRODUCTION

How Is Each State Doing?

Some jurisdictions have been more efficient than others at administering their doses from the federal government.



Source: CDC and
The New York Times

Name	Percent of people					
	Given at least one shot	Fully vaccinated	Doses delivered	Shots given	Doses used	
U.S. total*	53%	45%	377,935,390	316,048,776	84%	
Palau	77%	70%	24,600	24,408	99%	
Vermont	73%	64%	910,980	832,904	91%	
Massachusetts	69%	59%	9,605,260	8,612,018	90%	
Hawaii	69%	51%	1,922,410	1,653,891	86%	
Connecticut	66%	58%	4,660,855	4,288,566	92%	
Maine	66%	60%	1,835,190	1,577,123	86%	
Rhode Island	63%	57%	1,493,905	1,241,067	83%	
New Jersey	63%	54%	11,368,015	9,799,660	86%	
Pennsylvania	62%	48%	15,458,235	13,535,439	88%	
New Hampshire	61%	54%	1,803,430	1,491,368	83%	
Maryland	60%	54%	8,342,780	6,640,011	80%	
New Mexico	60%	52%	2,334,725	2,272,676	97%	
Washington	60%	52%	9,265,975	8,273,921	89%	
California	60%	48%	48,498,755	41,189,877	85%	
Washington, D.C.	60%	50%	1,053,115	834,262	79%	
New York	59%	52%	23,576,255	21,067,193	89%	

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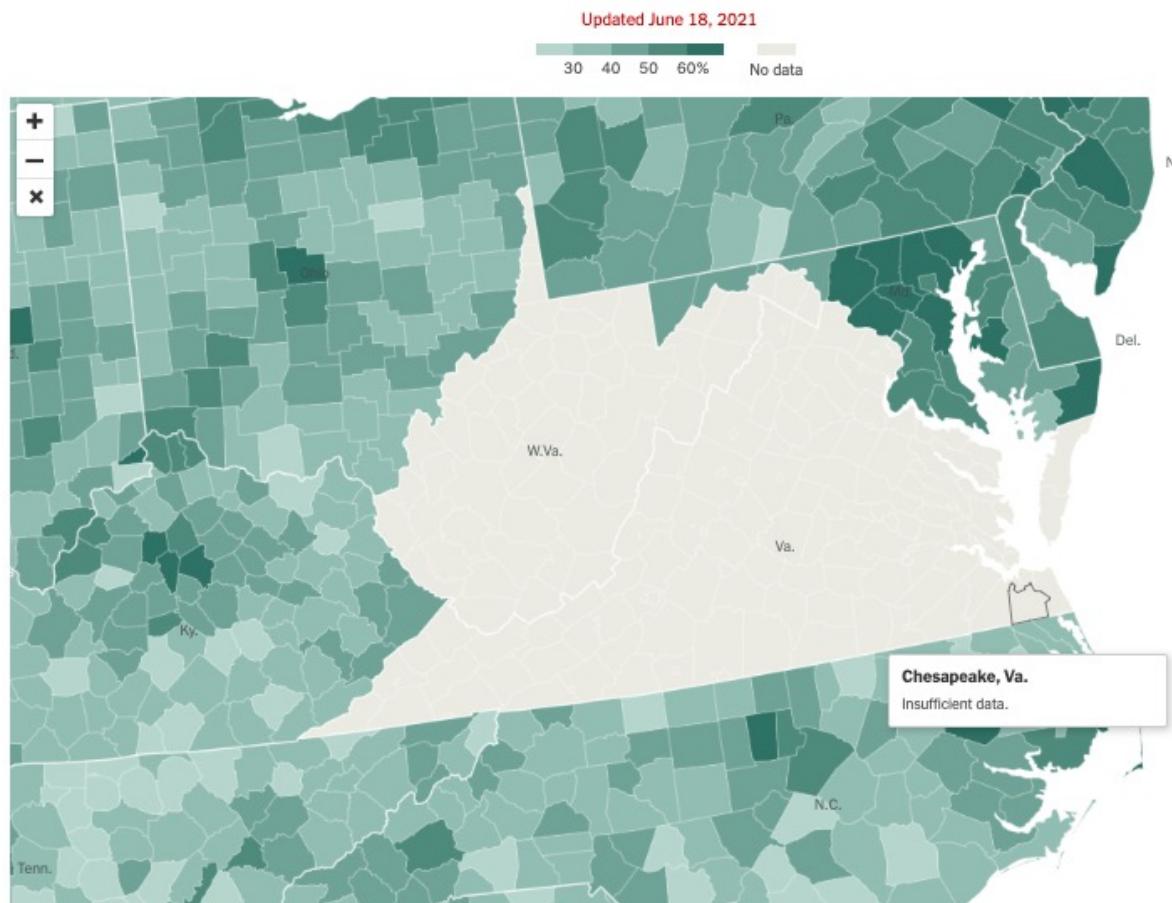
Virginia	58%	50%	10,209,725	8,972,583	88%
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Guam	58%	49%	215,770	177,118	82%
Oregon	57%	51%	5,586,365	4,405,722	79%
Delaware	57%	47%	1,262,455	1,001,204	79%
Colorado	57%	50%	6,931,935	5,992,415	86%
Minnesota	56%	50%	6,466,740	5,712,582	88%
Wisconsin	53%	47%	6,049,145	5,743,485	95%

Source: CDC and
The New York Times

PROBLEM

See How Vaccinations Are Going in
Your County and State



Source: CDC and
The New York Times

PROBLEM

Google virginia covid dashboard

All Images Shopping News Maps More Settings Tools

About 13,000,000 results (0.82 seconds)

COVID-19

Coronavirus disease

Virginia

Overview

Statistics

Testing

Symptoms

Prevention

Coping

Treatments

Share

New cases and deaths

From [The New York Times](#) · Last updated: 19 hours ago

New cases ▾ United States ▾ Virginia ▾ All counties ▾ All time ▾

May 24, 2021
New cases: 76
7-day avg: 377

Jun 26 Sep 21 Dec 17 Mar 14 Jun 9

0 2,000 4,000 6,000 8,000 10,000

● New cases — 7-day average

Each day shows new cases reported since the previous day · [About this data](#)

Cases

From [Wikipedia](#) and [The New York Times](#) · Last updated: 19 hours ago

Total ▾ United States ▾ Virginia ▾

Cases	Deaths
679K +228	11,368 +1

Location Cases Deaths

COVID-19 vaccine

See updates and local info

Map of cases (last 14 days)

From [The New York Times](#) and others

NEW YORK, PENNSYLVANIA, OHIO, MARYLAND, WEST VIRGINIA, KENTUCKY, INDIANA, TENNESSEE, ALABAMA, SOUTH CAROLINA, NORTH CAROLINA, DE, NJ, CT, RI, MA, VT, NH, ME, LI, PR, GU, HI, AK, HI, PR, GU, AK

+ -

Map data ©2021 Google, INEGI · Terms of Use

Cases overview

From [Wikipedia](#) and others · Last updated: 30 mins ago

Virginia

Total cases	Recovered	Deaths
679K	-	11,368

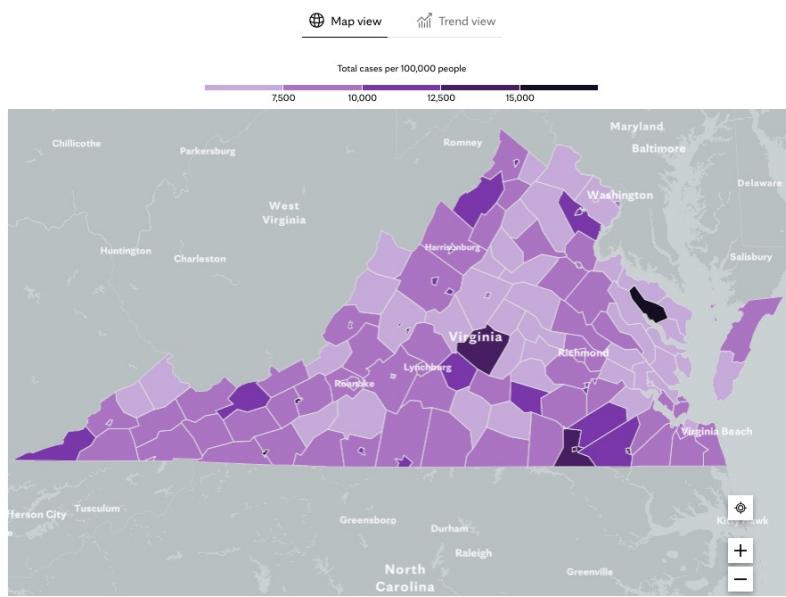
Source: Google

PROBLEM

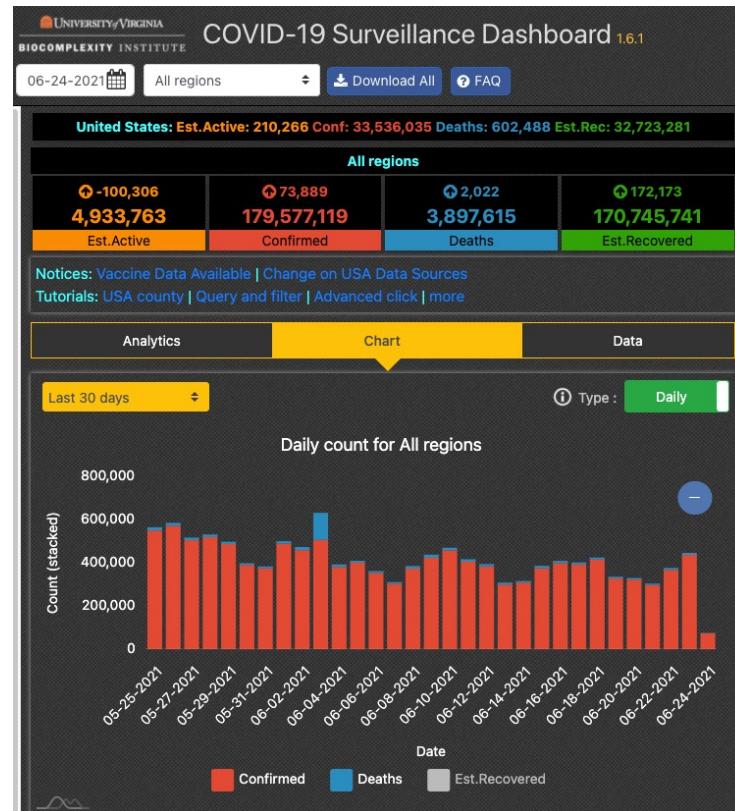
- Mostly Cases Surveillance Dashboard

Total cases for Virginia

This map shows the cumulative number of COVID-19 cases, since the pandemic started. This includes probable cases and cases confirmed by testing.



Source: Mayo Clinic



Source: UVA

- Separate Vaccine Dashboard



COVID-19 in Virginia: Vaccine Summary

Dashboard Updated: 6/24/2021

COVID-19 Vaccinations in Virginia

Total Doses Administered - 8,915,179

People Vaccinated with at Least One Dose*	% of the Population Vaccinated with at Least One Dose	People Fully Vaccinated^	% of the Population Fully Vaccinated
4,963,465	58.2%	4,252,807	49.8%

% of the Adult (18+) Population
Vaccinated with at Least One Dose
70.3%

% of the Adult (18+) Population Fully Vaccinated
60.8%

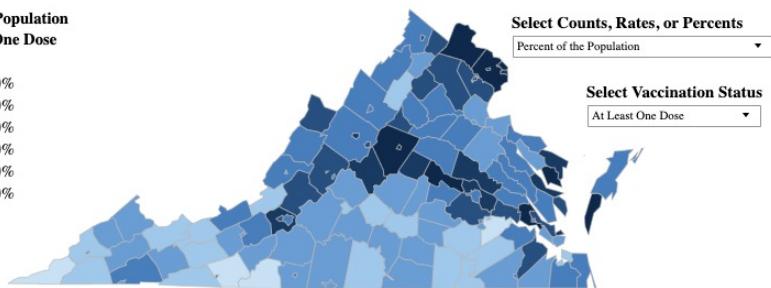
* People vaccinated with one dose of a two-dose vaccine and one dose of a single dose vaccine, including doses administered through the Federal CDC Pharmacy Partnership. Doses on the Federal Doses Administered dashboard are included.

^ People vaccinated with two doses of a two-dose vaccine and one dose of a single dose vaccine, including doses administered through the Federal CDC Pharmacy Partnership. Doses on the Federal Doses Administered dashboard are included.

People Vaccinated by Locality of Residence and Vaccination Status - Percent of the Population

Percent of the Population with At Least One Dose

- 30.1% - 35.0%
- 35.1% - 40.0%
- 40.1% - 45.0%
- 45.1% - 50.0%
- 50.1% - 55.0%
- 55.1% - 60.0%
- 60.1+%



Source: VDH



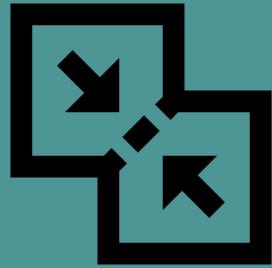
DATA SCIENCE SOLUTION

Build an end-to-end data pipeline for a **dashboard** to visualize Virginia COVID-19 reports and vaccination records with **real-time** data



IMPACT HYPOTHESIS

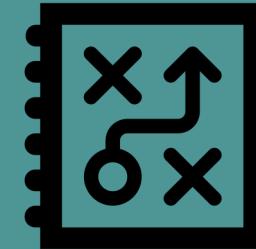
With VAxCOVID, you can...



Have one go-to place for comparing cases and vaccination



Better targeting state resources at counties in need



Identify effective outreach strategy for each county

DATA

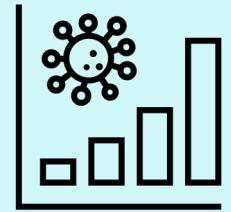
Virginia Open Data



**Vaccine Doses
Administered Dataset**
267 k data points

(Updates every day at 12pm EST)

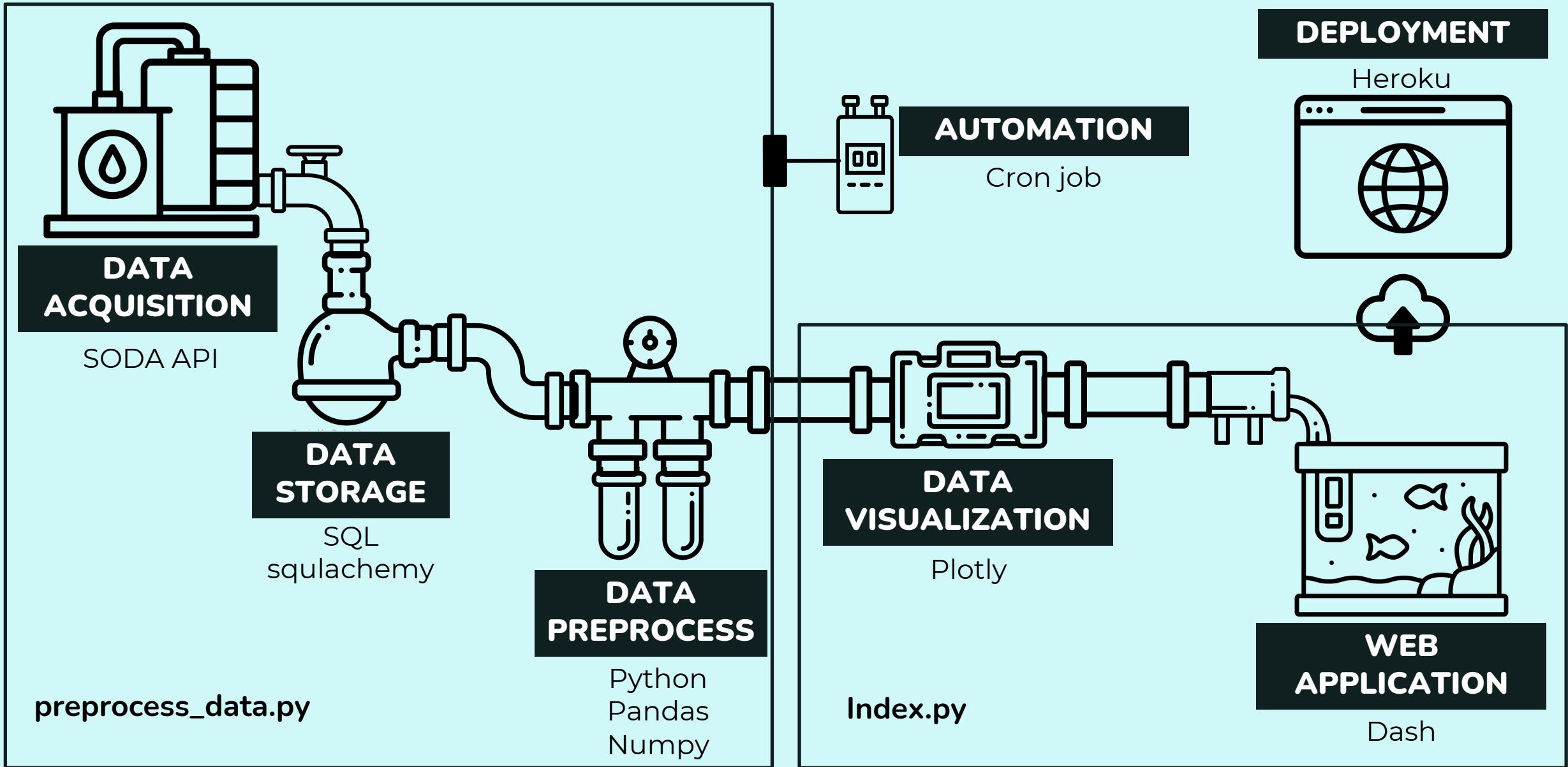
**COVID-19 Cases
Dataset**
61.8 k data points



Census Data
Virginia Counties Population

THE PIPELINE

(Disclaimer: Figure not drawn to scale)

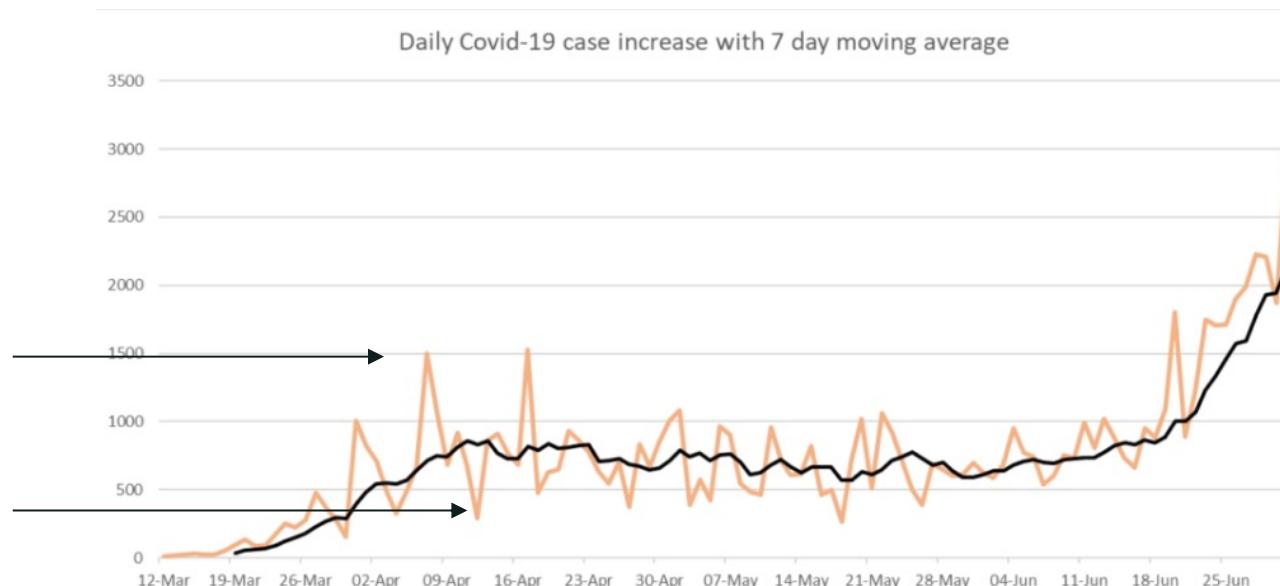


DATA PREPROCESSING

- **Rate per 100,000** – measure of disease frequency

$$\text{Rate per 100,000} = \frac{\# \text{ of cases}}{\text{total population}} \times 100,000$$

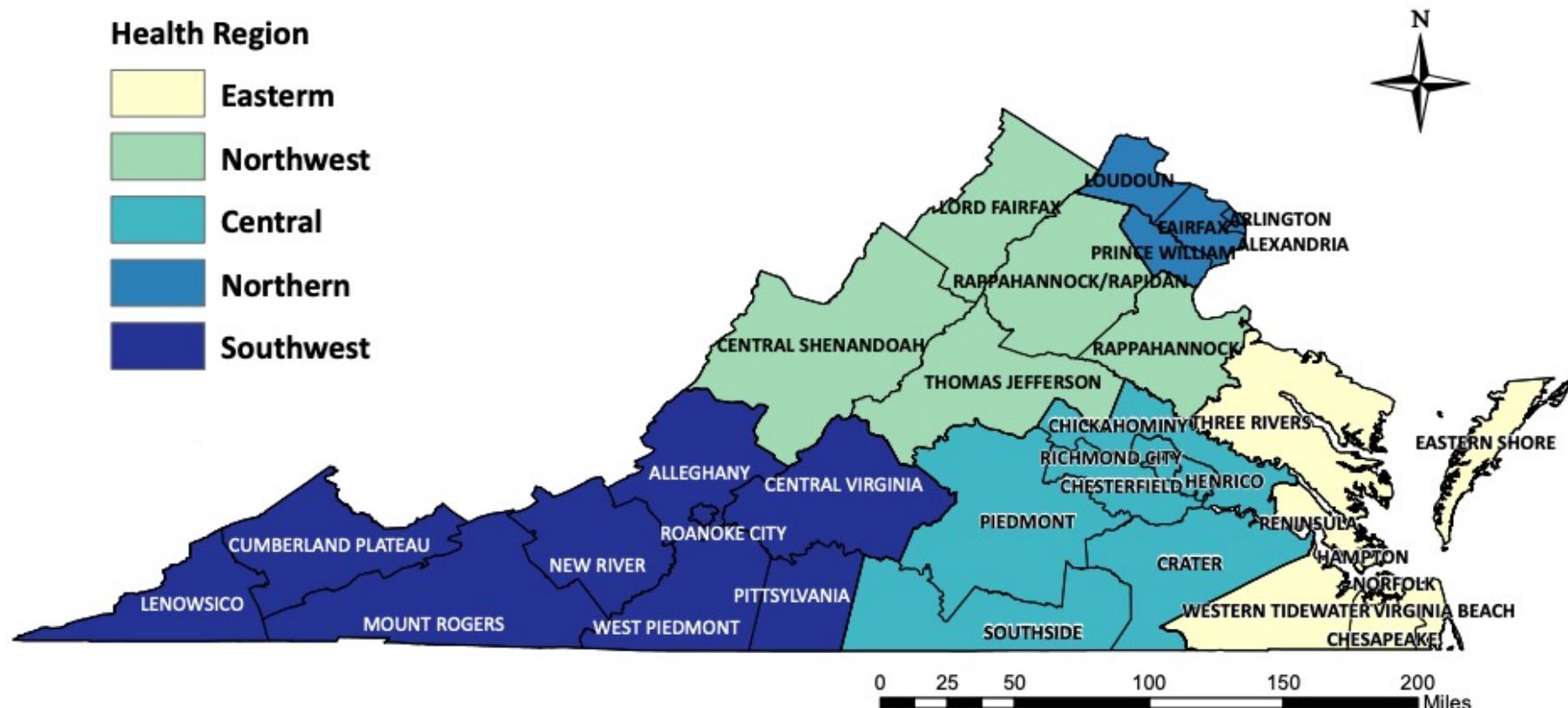
- **7-Days rolling (moving) average**



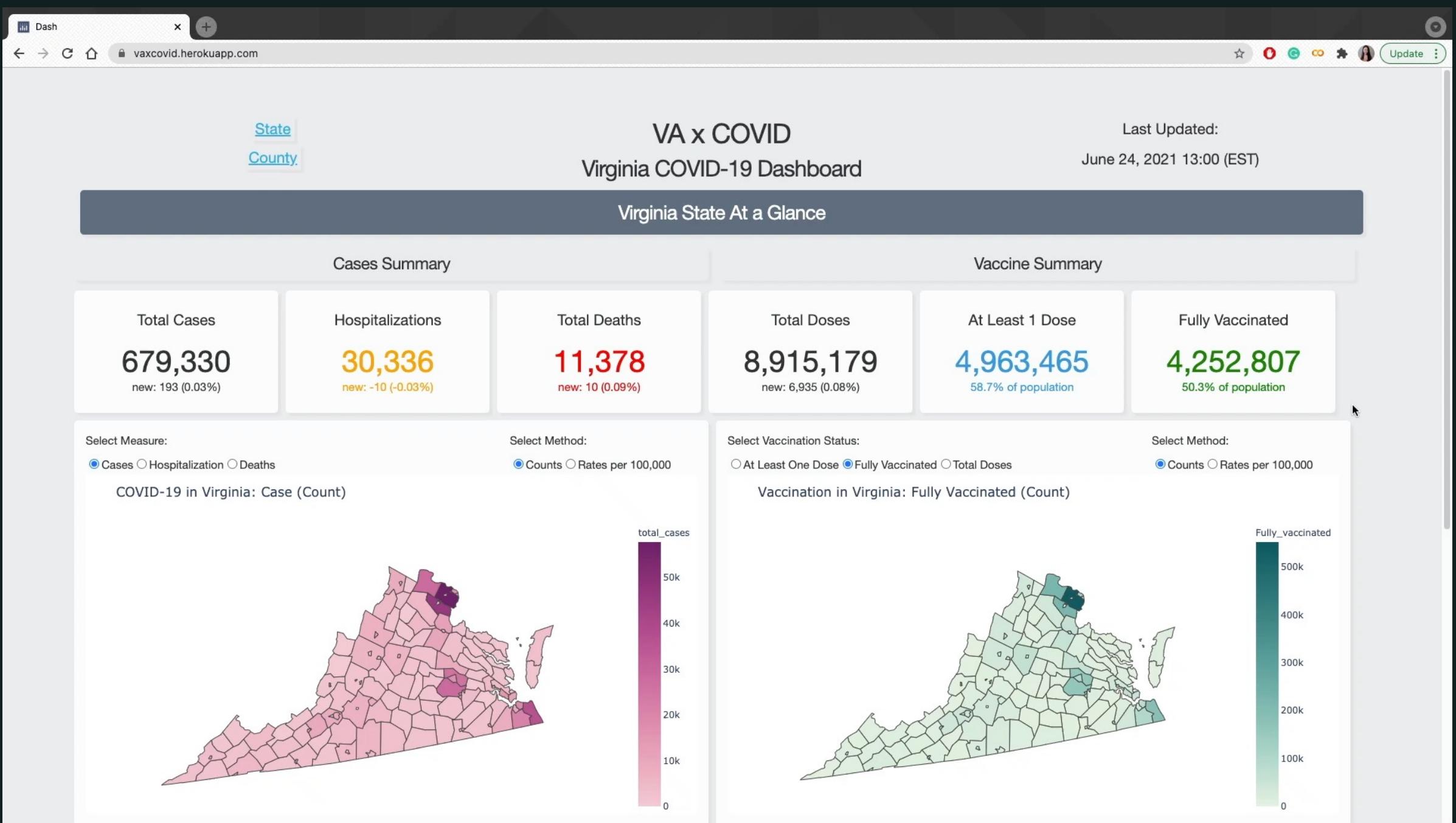
DATA PREPROCESSING

- Map **County** to **Region**

Virginia Health Districts and Regions



THE DASH



PRELIMINARY ANALYSIS

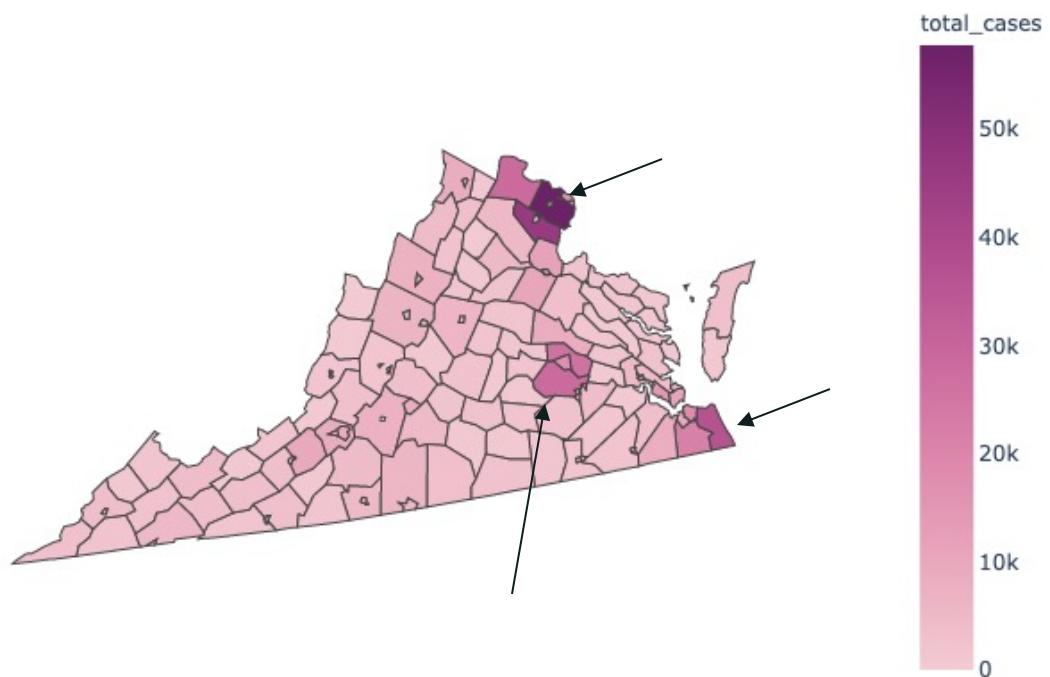
Select Measure:

- Cases Hospitalization Deaths

Select Method:

- Counts
 Rates per 100,000

COVID-19 in Virginia: Case (Count)



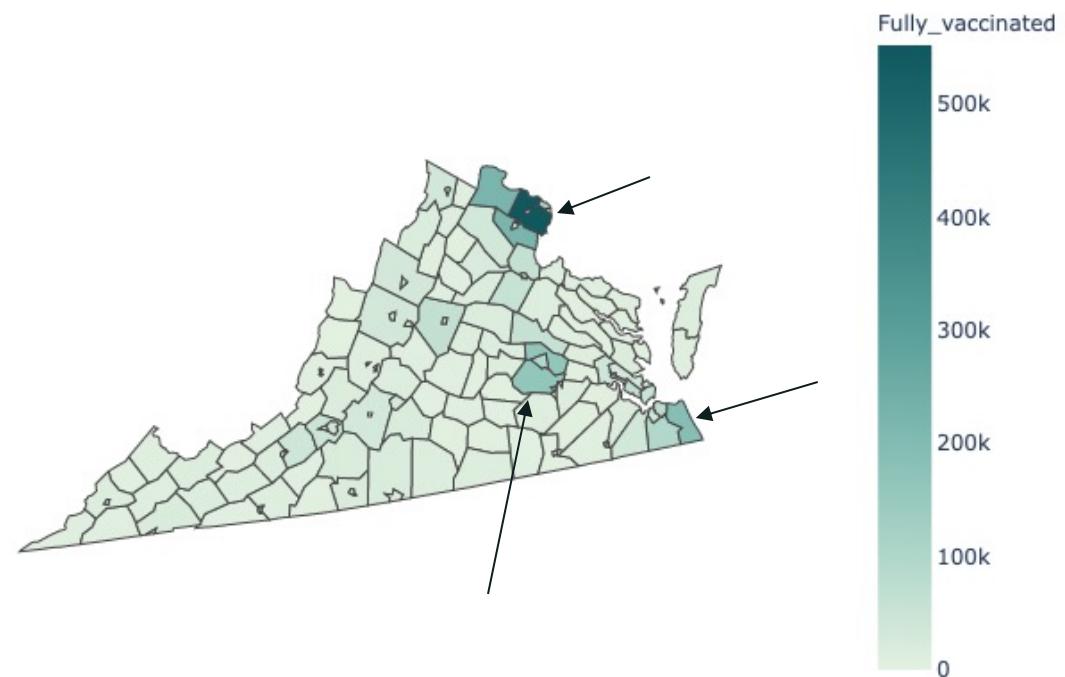
Select Vaccination Status:

- At Least One Dose Fully Vaccinated Total Doses

Select Method:

- Counts
 Rates per 100,000

Vaccination in Virginia: Fully Vaccinated (Count)



PRELIMINARY ANALYSIS

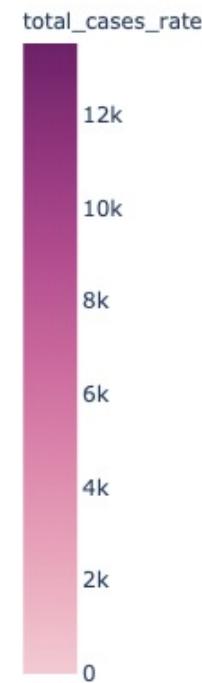
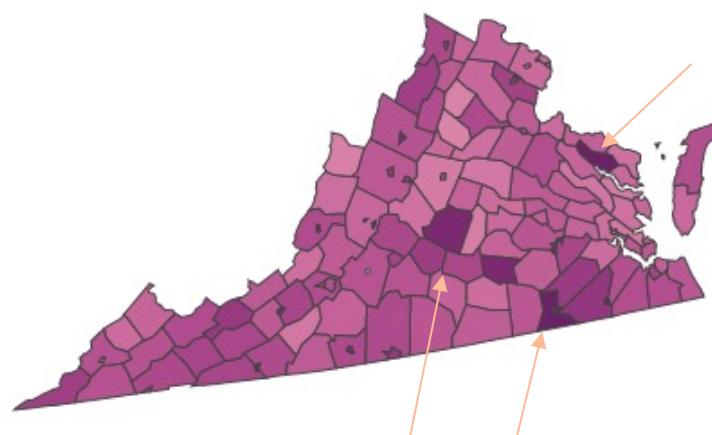
Select Measure:

- Cases Hospitalization Deaths

Select Method:

- Counts
 Rates per 100,000

COVID-19 in Virginia: Cases (Rate per 100,000)



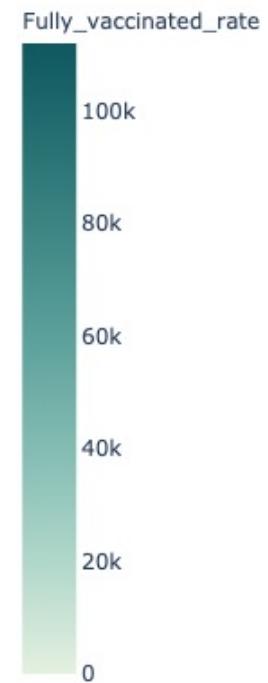
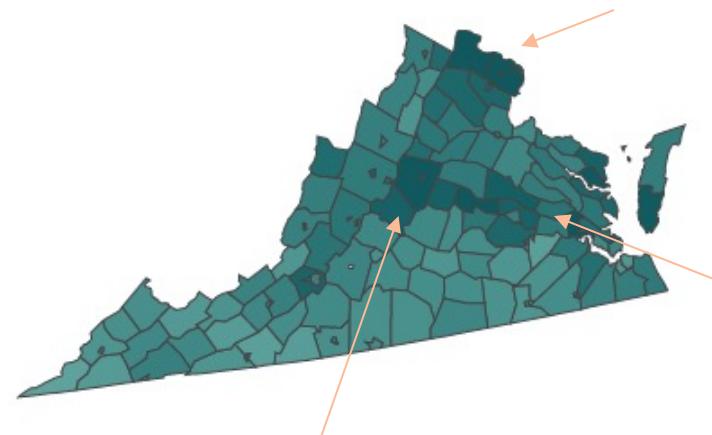
Select Vaccination Status:

- At Least One Dose Fully Vaccinated Total Doses

Select Method:

- Counts
 Rates per 100,000

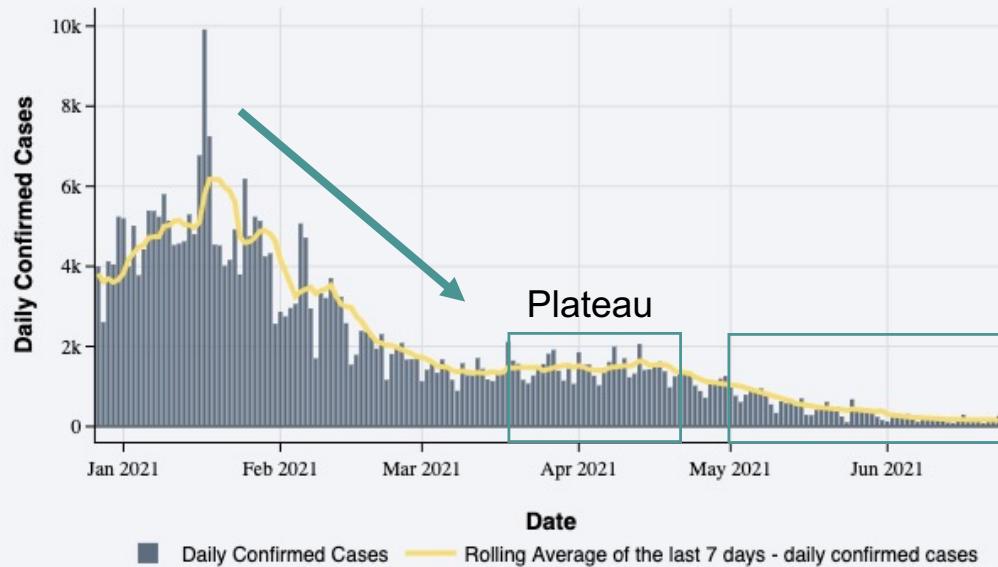
Vaccination in Virginia: Fully Vaccinated (Rate per 100,000)



PRELIMINARY ANALYSIS

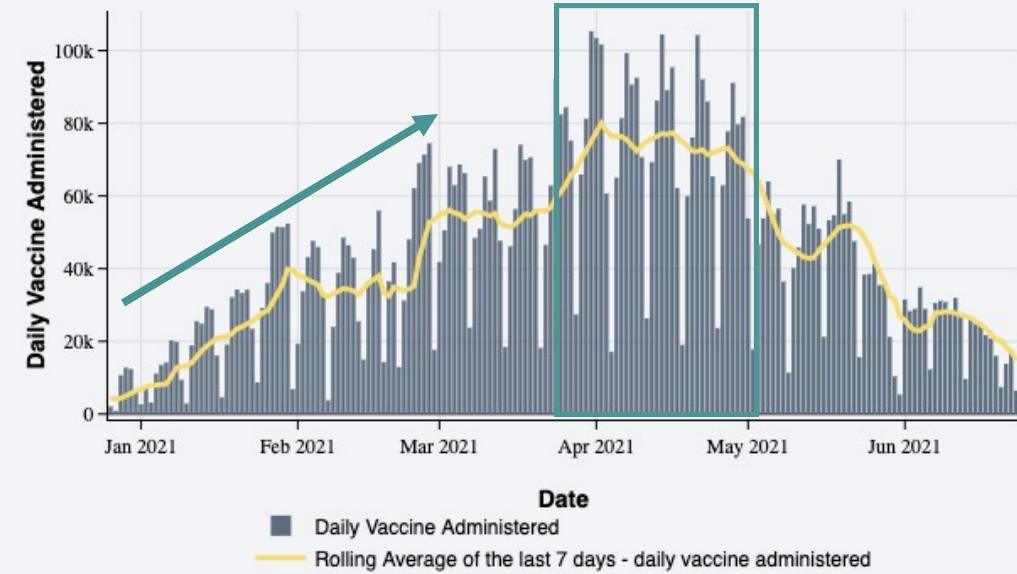
Past 180 Days

Last 180 Days of Daily Cases in Virginia



Past 180 Days

Last 180 Days of Vaccine Administered in Virginia



PRELIMINARY ANALYSIS

[State](#)

[County](#)

VA x COVID

Virginia COVID-19 Dashboard

Last Updated:

June 24, 2021 13:00 (EST)

Virginia Beach

x ▾

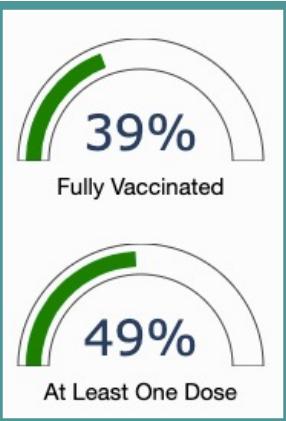
As Of:
June 24, 2021

New Confirmed
9 ▼-15

New Hospitalization
6 ▲6

New Deaths
0 -

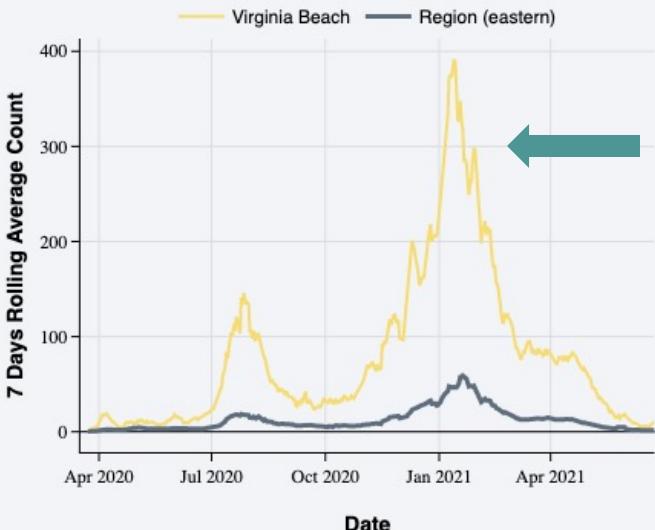
Vaccination Status:



How is the County Doing Compared to the Region Average?

Cases Hospitalization Deaths

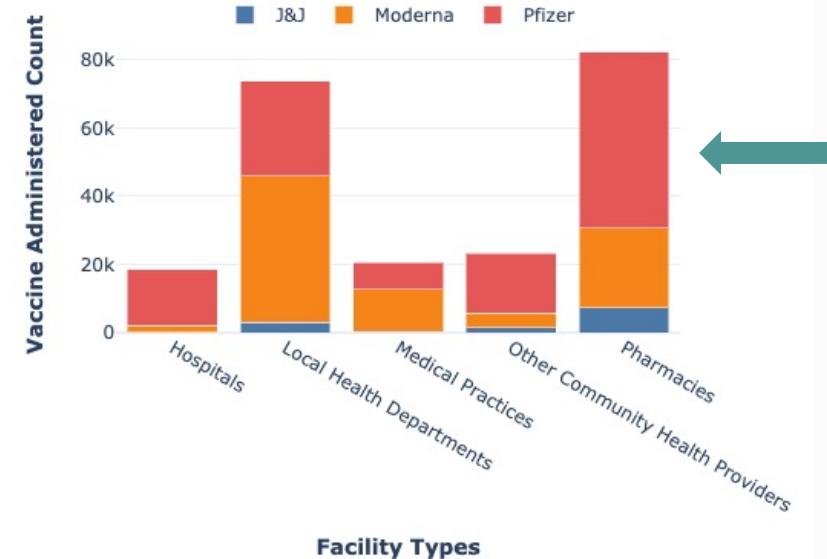
Weekly Rolling Average Count of
Virginia Beach County and Eastern Region



Where and Which Vaccine are People Getting?

First Dose Second Dose

Types of Vaccine Administered at Different Facilities



PRELIMINARY ANALYSIS

[State](#)

[County](#)

VA x COVID

Virginia COVID-19 Dashboard

Last Updated:

June 24, 2021 13:00 (EST)

Northampton

x ▾

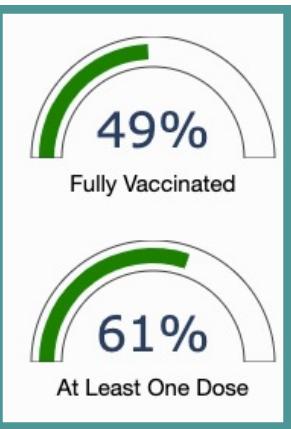
As Of:
June 24, 2021

New Confirmed
0 -

New Hospitalization
0 -

New Deaths
0 -

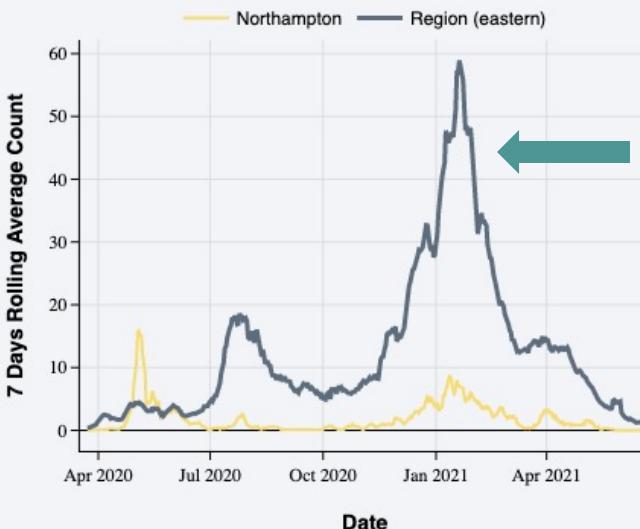
Vaccination Status:



How is the County Doing Compared to the Region Average?

Cases Hospitalization Deaths

Weekly Rolling Average Count of Northampton County and Eastern Region

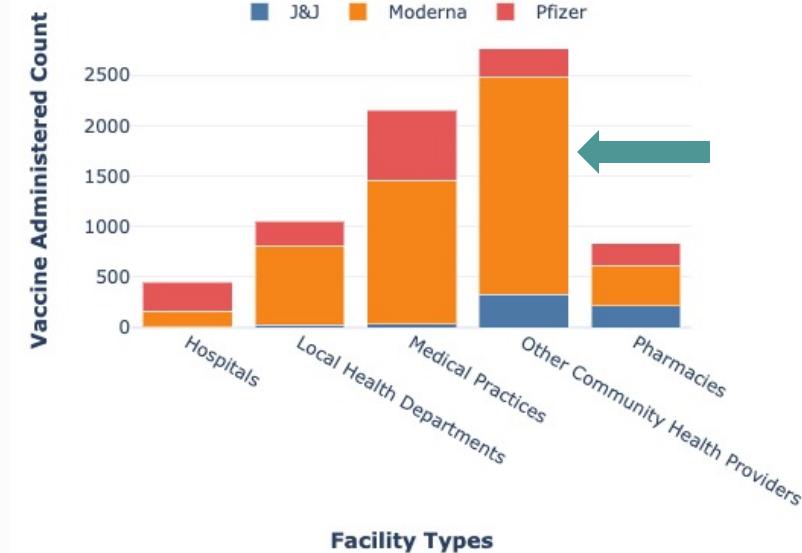


Where and Which Vaccine are People Getting?

First Dose Second Dose



Types of Vaccine Administered at Different Facilities



INSIGHTS

注射器图标 Focus on counties with **High case rates** and **low vaccination rates**

注射器图标 There is a trend of **decreasing** number of **cases** coincided with **increasing** number of **vaccination**

注射器图标 **County dashboard** can be used to decide outreach/education strategy/planning

FUTURE POTENTIAL

1

Build a Predictive Model

Using Timeseries algorithm

2

Apply More Filters on the App

Dates, Regions etc.

3

Update Dashboard Graphs and Visual

Based on user feedbacks

THANKS!

Questions?
Give it a shot!



<https://vaxcovid.herokuapp.com>

STAY IN TOUCH!



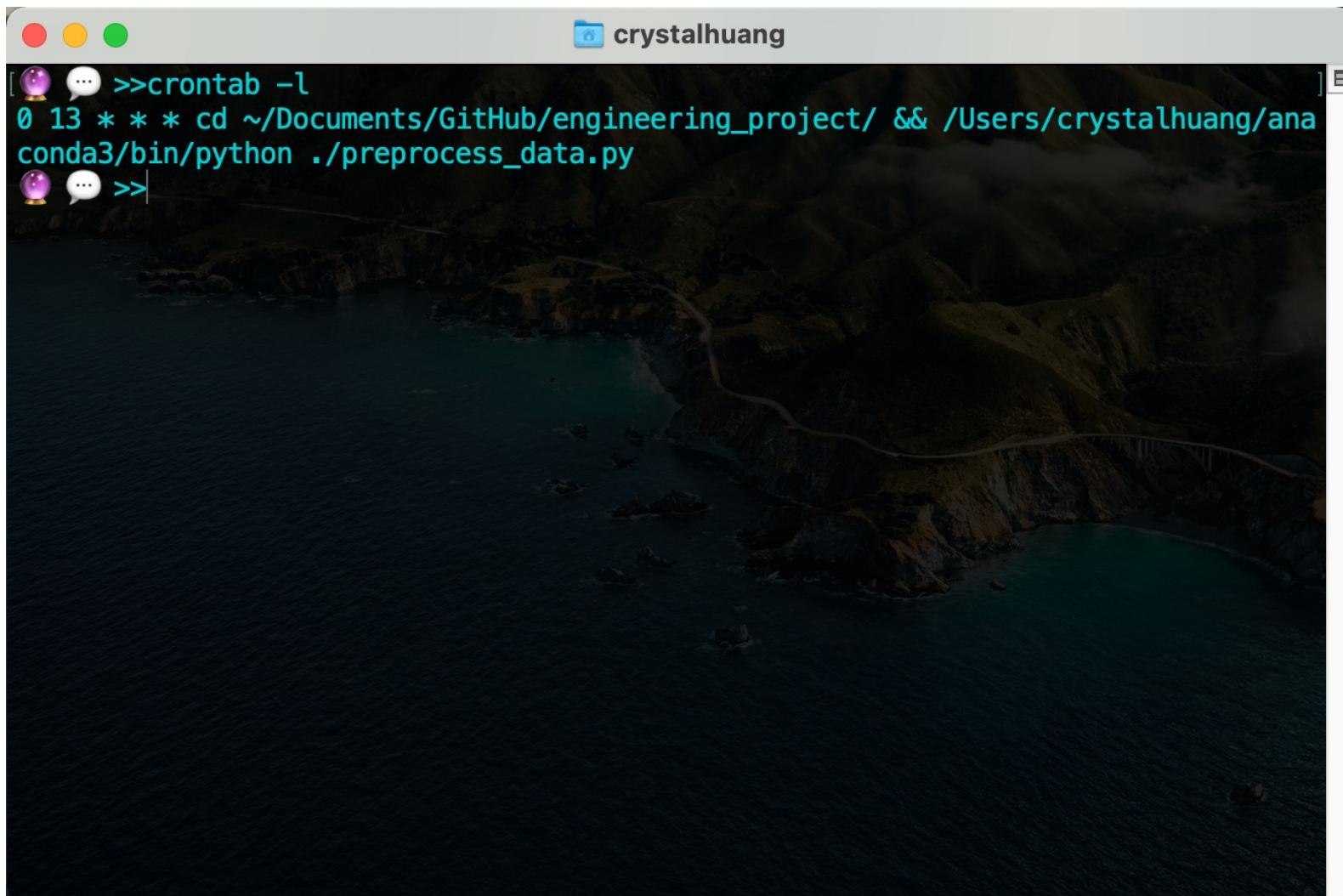
crystal-ctrl



crystal-huang-ds

crystaldatasy.medium.com

APPENDIX 1



```
crontab -l
0 13 * * * cd ~/Documents/GitHub/engineering_project/ && /Users/crystalhuang/anaconda3/bin/python ./preprocess_data.py
>>
```

APPENDIX 2

Purpose	Connects	Main script	Function library
Update content database	API -> Database	preprocess_data.py	collect_data.py
Launch Dash app	Database -> App	Index.py	App.py State.py County.py
Deploy app on Heroku	App -> Web	Procfile	Requirements.txt