

Asthma Prevalence & Vaccination Rates of Asthma Patients throughout the United States in 2021

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Research Purpose

- ▶ The prevalence of asthma in each state
- ▶ Which state has the highest prevalence of asthma?
- ▶ Between the two vaccines (influenza and pneumococcal) researched, which vaccine has a higher rate of adoption for those diagnosed with asthma?

Dataset to be Used

U.S. Chronic Disease Indications (CDI), 2023 Release

https://data.cdc.gov/Chronic-Disease-Indicators/U-S-Chronic-Disease-Indicators-CDI-2023-Release/g4ie-h725/data_preview

This dataset is sourced from the Center for Disease Control and Prevention (CDC) and includes data from 2010 to 2021 about chronic disease states for the entire United States including Puerto Rico and Guam.

```

1 import pandas as pd
2
3 # Load the data
4 asthma_df = pd.read_csv(r"C:\Users\parme\OneDrive\Desktop\project_3\US chronic Asthma.csv")
5
6 # Filter for 2021
7 data_2021 = asthma_df[asthma_df['YearStart'] == 2021]
8
9 # Extract specific data
10 flu_data = data_2021[data_2021['Question'] == 'Influenza vaccination among noninstitutionalized adults aged 18-64 years with asthma']
11 pneumo_data = data_2021[data_2021['Question'] == 'Pneumococcal vaccination among noninstitutionalized adults aged 18-64 years with asthma']
12 prevalence_data = data_2021[data_2021['Question'] == 'Current asthma prevalence among adults aged >= 18 years']
13
14 # Inspect the data
15 print(flu_data.head())
16 print(pneumo_data.head())
17 print(prevalence_data.head())

```

	YearStart	YearEnd	LocationAbbr	LocationDesc	DataSource	Topic	\
4	2021	2021	DC	District of Columbia	BRFSS	Asthma	
12	2021	2021	AK	Alaska	BRFSS	Asthma	
25	2021	2021	AL	Alabama	BRFSS	Asthma	
30	2021	2021	AL	Alabama	BRFSS	Asthma	
31	2021	2021	AK	Alaska	BRFSS	Asthma	

	Question	\
4	Influenza vaccination among noninstitutionalized adults aged 18-64 years with asthma	
12	Influenza vaccination among noninstitutionalized adults aged 18-64 years with asthma	
25	Influenza vaccination among noninstitutionalized adults aged 18-64 years with asthma	
30	Influenza vaccination among noninstitutionalized adults aged 18-64 years with asthma	
31	Influenza vaccination among noninstitutionalized adults aged 18-64 years with asthma	

	Response	DataValueUnit	DataValueType	...	LocationID	TopicID	\
4	NaN	%	Age-adjusted Prevalence	...	11	AST	
12	NaN	%	Age-adjusted Prevalence	...	2	AST	
25	NaN	%	Crude Prevalence	...	1	AST	
30	NaN	%	Age-adjusted Prevalence	...	1	AST	
31	NaN	%	Crude Prevalence	...	2	AST	

	QuestionID	DataValueTypeID	StratificationCategoryID1	StratificationID1	\
4	AST5_1	AGEADJPREV	OVERALL	OVR	
12	AST5_1	AGEADJPREV	OVERALL	OVR	
25	AST5_1	CRDPREV	OVERALL	OVR	
...					
9		NaN			
11		NaN			

[5 rows x 34 columns]

Output is truncated. View as a [scrollable element](#) or open in a [text editor](#). Adjust cell output [settings...](#)

Data Cleaning (Python)

Data Cleaning (SQL)

```
1 import pandas as pd
2 import numpy as np
3 pd.set_option('max_colwidth', 400)
4 import regex as re
5 from sqlalchemy import create_engine, Column, Integer, String, Float
6 from sqlalchemy.sql import text
7 from sqlalchemy.ext.declarative import declarative_base
8 from pathlib import Path
9
10 Base = declarative_base()
```

```
1 engine.execute(text('select * from us_chronic_asthma')).fetchall()

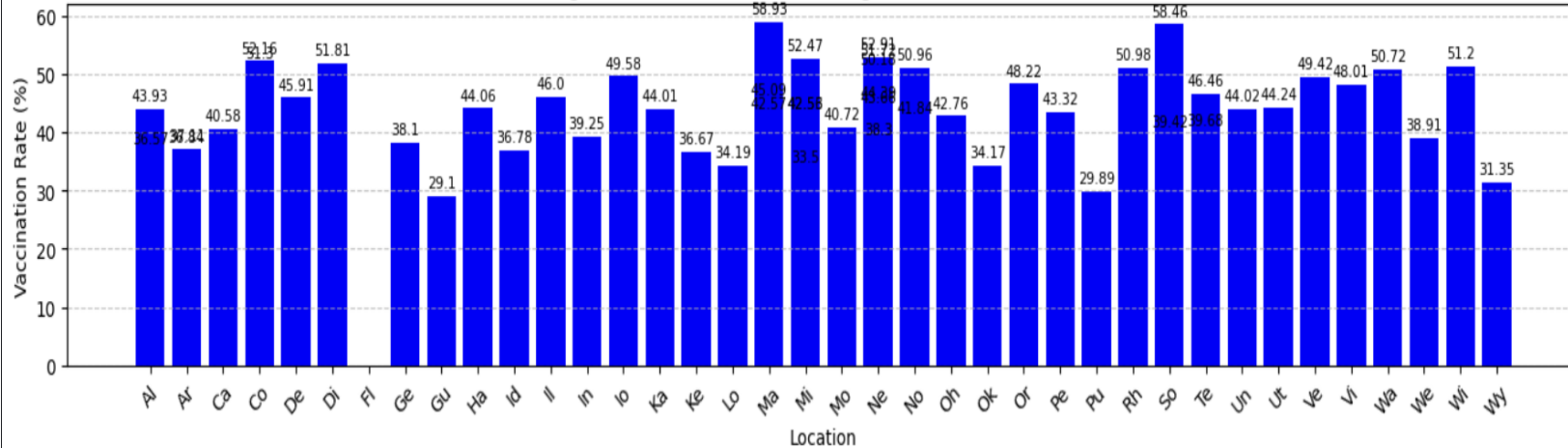
[(1, 2021, 2021, 'OH', 'Ohio', 'BRFSS', 'Asthma', 'Current asthma prevalence
(2, 2021, 2021, 'OR', 'Oregon', 'BRFSS', 'Asthma', 'Pneumococcal vaccination
(3, 2021, 2021, 'PA', 'Pennsylvania', 'BRFSS', 'Asthma', 'Influenza vaccination
(4, 2021, 2021, 'ND', 'North Dakota', 'BRFSS', 'Asthma', 'Asthma prevalence
(5, 2021, 2021, 'AZ', 'Arizona', 'BRFSS', 'Asthma', 'Pneumococcal vaccination
(6, 2021, 2021, 'DC', 'District of Columbia', 'BRFSS', 'Asthma', 'Influenza

1 session.close()
```

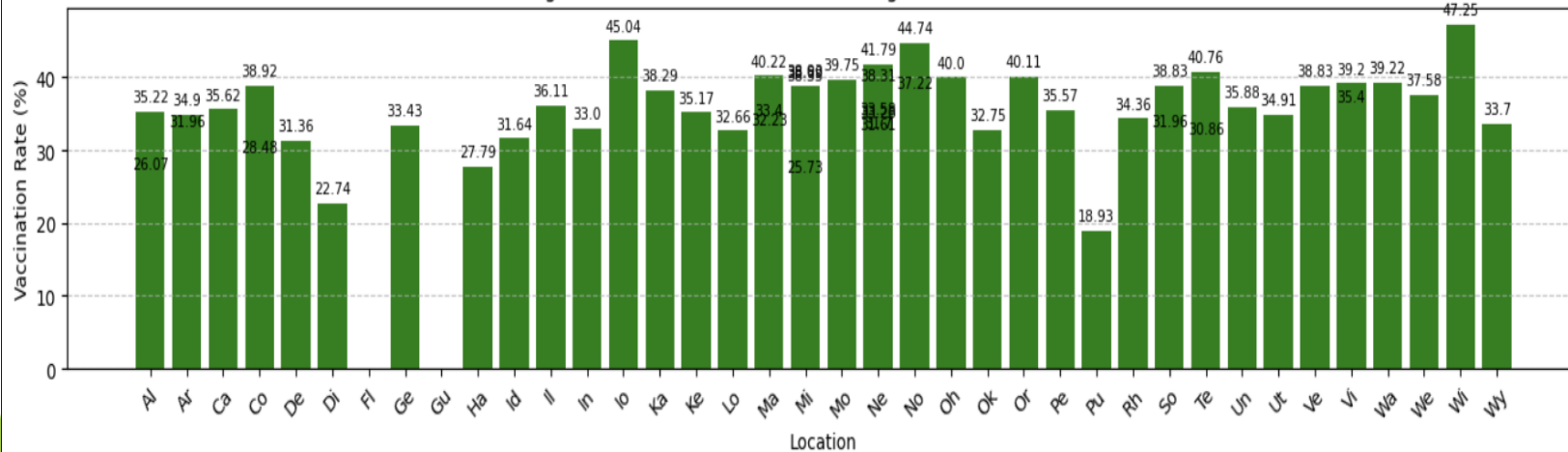
```
1 for row in data_to_import:
2     print(row['Question'])
3     try:
4         existing_entry = session.query(Asthma).filter(Asthma.Question == row['Question']).first()
5     except Exception as e:
6         print(f"Error querying for Question: {row['Question']}, Error: {e}")
7         continue
8
9     if existing_entry:
10
11         continue
12
13     else:
14         new_entry = Asthma(
15             YearStart=row['YearStart'],
16             YearEnd=row['YearEnd'],
17             LocationAbbr=row['LocationAbbr'],
18             LocationDesc=row['LocationDesc'],
19             DataSource=row['DataSource'],
20             Topic=row['Topic'],
21             Question=row['Question'],
22             DataValueType=row['DataValueType'],
23             DataValue=row['DataValue'],
24             DataValueAlt=row['DataValueAlt'],
25             LowConfidenceLimit=row['LowConfidenceLimit'],
26             HighConfidenceLimit=row['HighConfidenceLimit'],
27             StratificationCategory1=row['StratificationCategory1'],
28             Stratification1=row['Stratification1'],
29             GeoLocation=row['GeoLocation'],
30             LocationID=row['LocationID'],
31             TopicID=row['TopicID'],
32             QuestionID=row['QuestionID'],
33             DataValueTypeID=row['DataValueTypeID'],
34             StratificationCategoryID1=row['StratificationCategoryID1'],
35             StratificationID1=row['StratificationID1']
36         )
37         session.add(new_entry)
38
39 session.commit()
```

Influenza & Pneumococcal Vaccination Rates

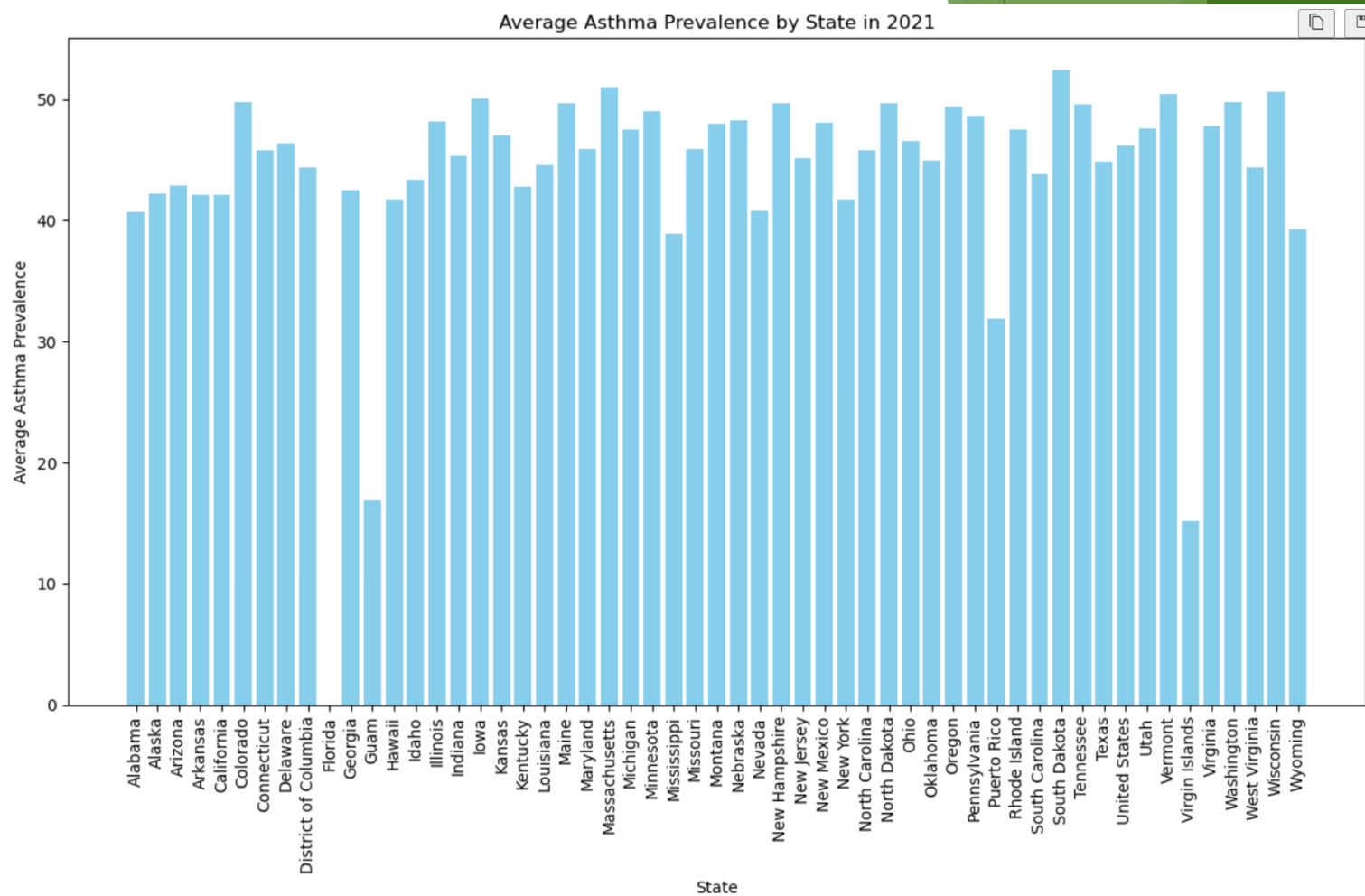
Average Influenza Vaccination among Adults with Asthma (2021)



Average Pneumococcal Vaccination among Adults with Asthma (2021)



- ▶ Highest influenza vaccination rate is Massachusetts at 60.55%
- ▶ Lowest influenza vaccination rate is Guam at 29.1%
- ▶ Highest pneumococcal vaccination rate is Wisconsin at 49.2%
- ▶ Lowest pneumococcal vaccination rate is Pacific Islands at 18.65%



Asthma Prevalence by State in 2021

- ▶ Highest prevalence of asthma is South Dakota
- ▶ Lowest prevalence of asthma is the Virgin Islands

Pneumococcal Vaccination Data Range:

count	53.000000
mean	35.811321
std	5.506060
min	18.650000
25%	32.600000
50%	35.400000
75%	39.400000
max	49.200000

Name: DataValue, dtype: float64

Flu Vaccination Data Range:

count	53.000000
mean	44.299057
std	7.016694
min	29.100000
25%	39.550000
50%	44.650000
75%	49.700000
max	60.550000

Name: DataValue, dtype: float64

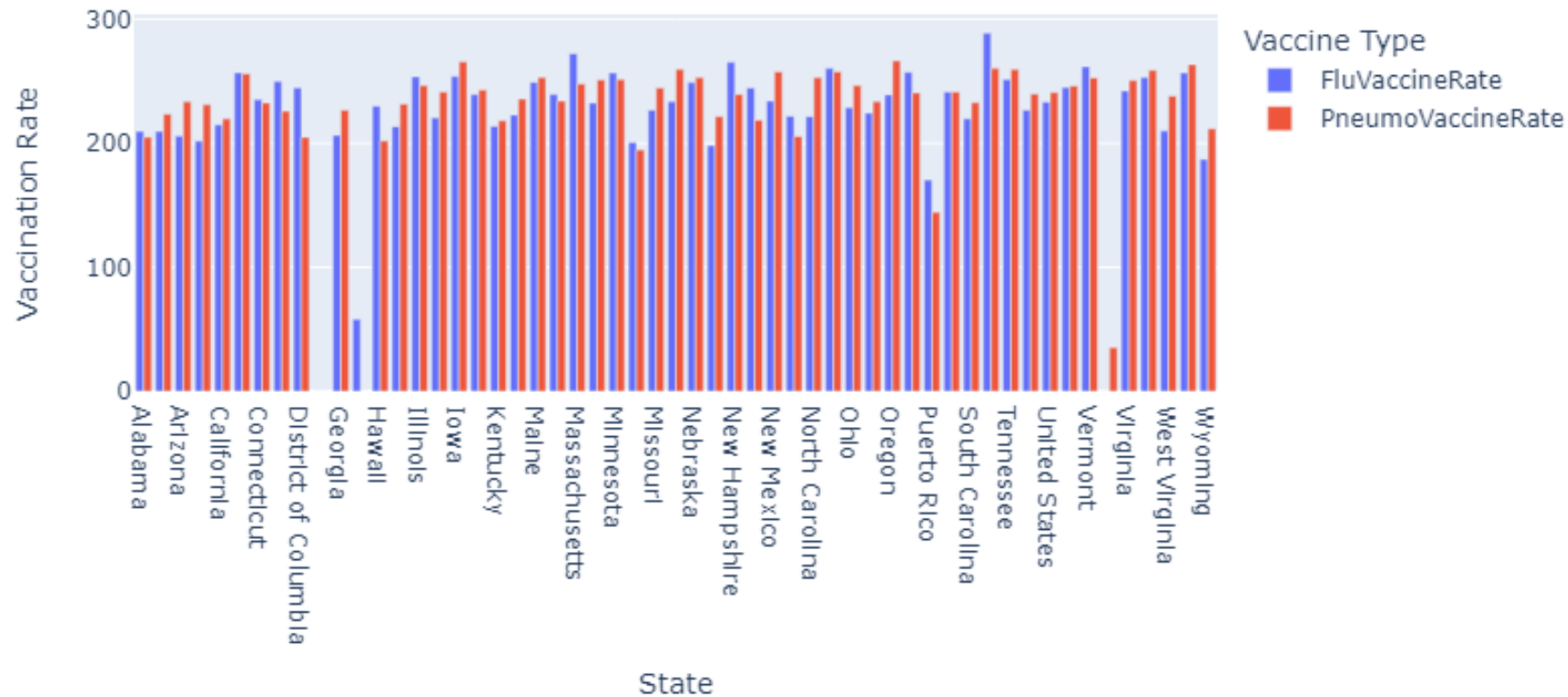
Asthma Prevalence Data Range:

count	54.000000
mean	9.889815
std	1.536486
min	4.650000
25%	9.075000
50%	9.850000
75%	10.637500
max	12.700000

Name: DataValue, dtype: float64

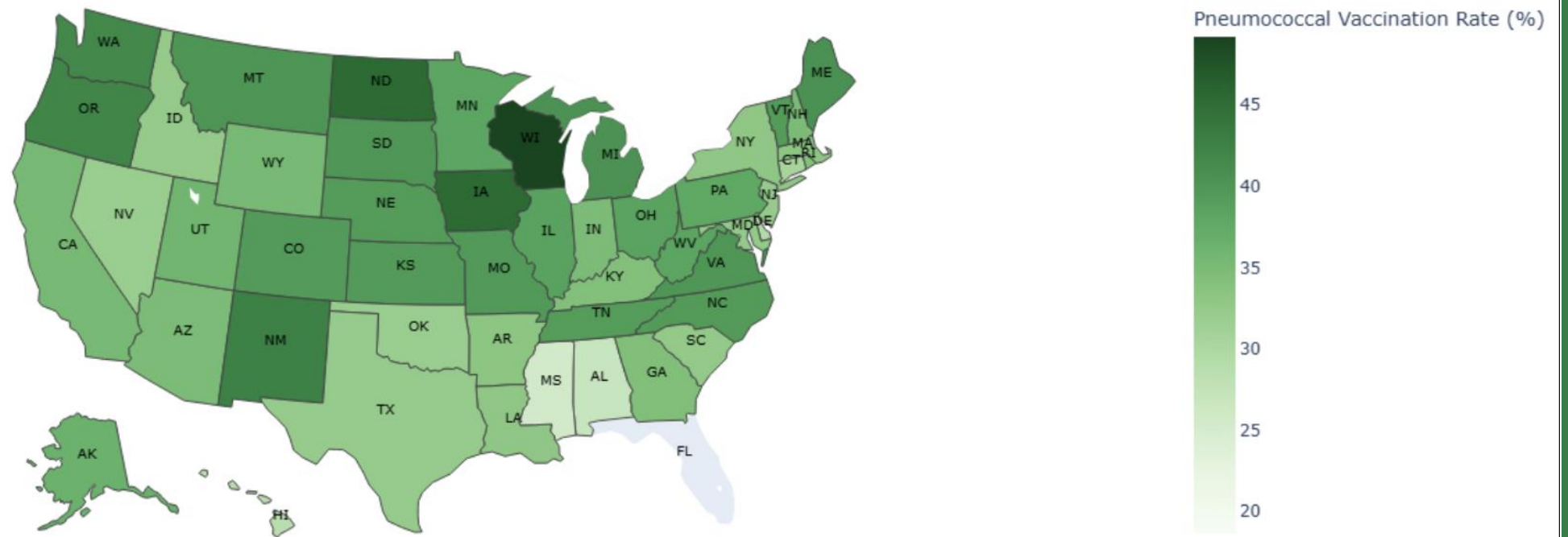
Nationwide average

Flu and Pneumococcal Vaccination Rates by State (2021)

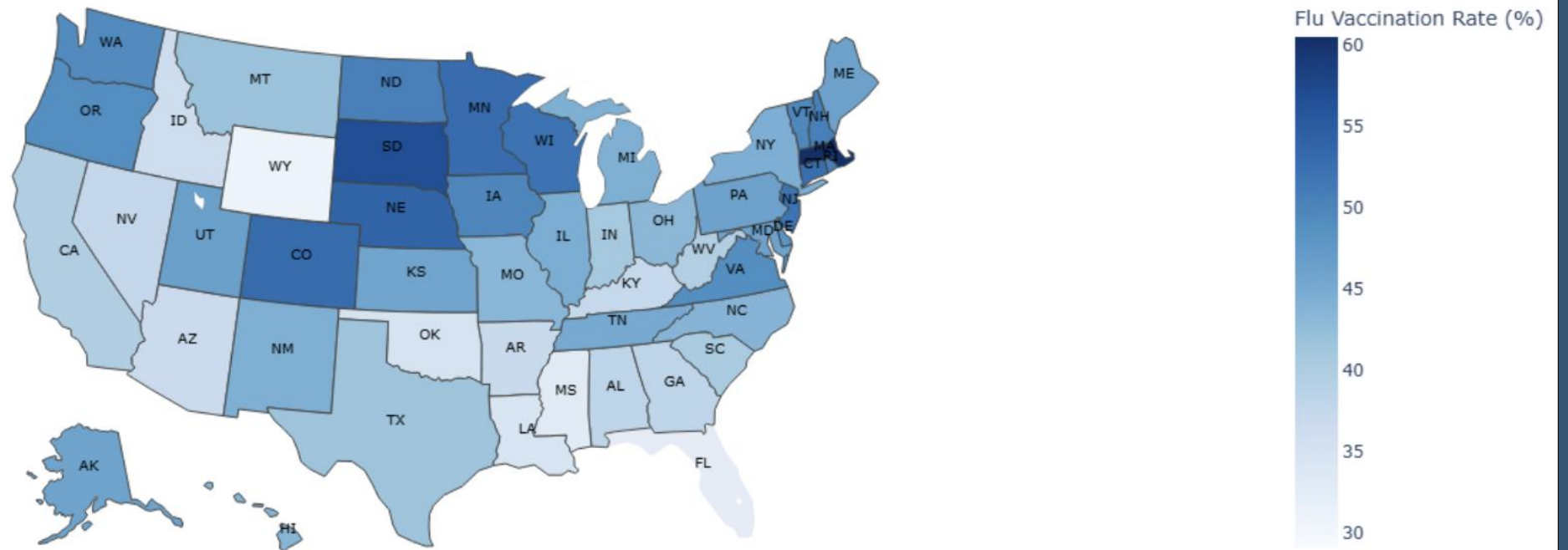


Influenza & Pneumococcal Vaccination Rates by State in 2021

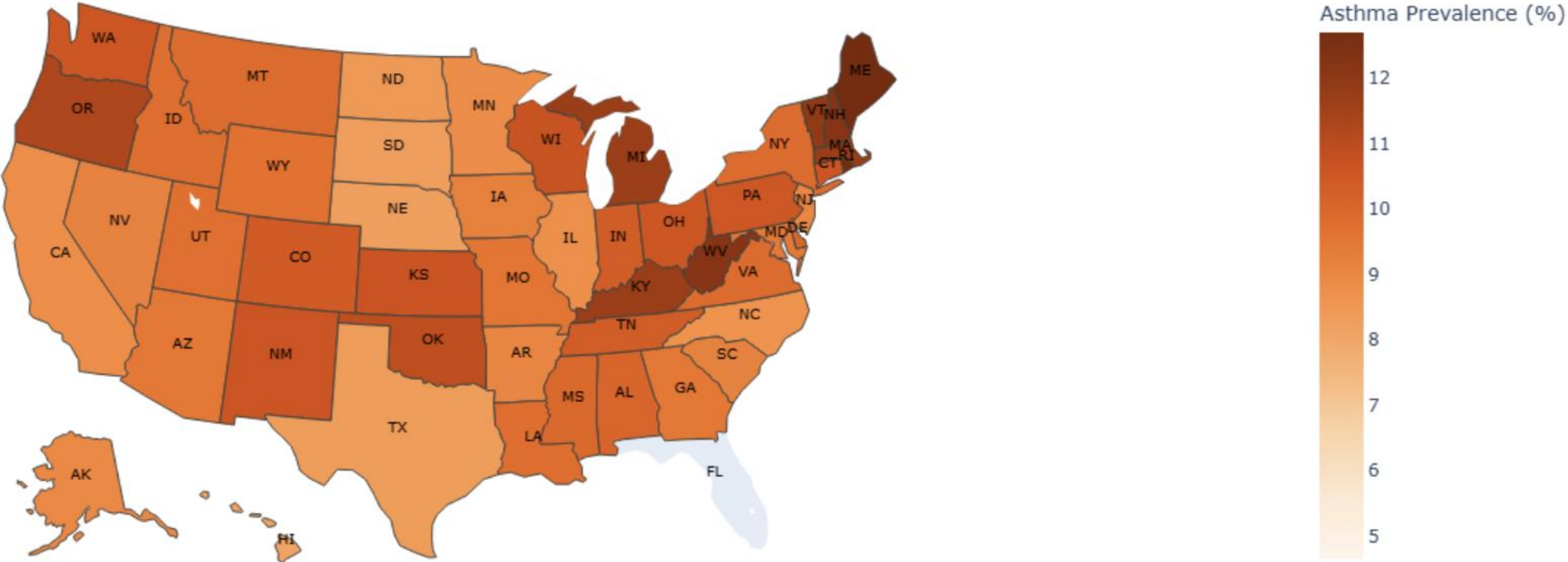
Pneumococcal Vaccination among Adults with Asthma (2021)



Influenza Vaccination among Adults with Asthma (2021)



Current Asthma Prevalence among Adults (2021)





Summary

- ▶ The influenza vaccine has a higher adoption rate than pneumococcal vaccine.
- ▶ Asthma is more prevalent in the north-eastern United States.
- ▶ Approximately 35% of asthma patients over 18 have received the pneumococcal vaccine nationwide.
- ▶ Approximately 44% of asthma patients over 18 have received the influenza vaccine nationwide.

Limitations



Only one year of data was analyzed



There was limited uniformity among the states for providing information. (example: Florida provided no data.)



Due to the large size of the dataset, we limited the project to researching the two vaccination rates and general asthma prevalence in the United States.