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.

Data Cleaning (Python)

```python
import pandas as pd

# Load the data
asthma_df = pd.read_csv(r"C:\Users\parme\OneDrive\Desktop\project_3\US chronic Asthma.csv")

# Filter for 2021
data_2021 = asthma_df[asthma_df['YearStart'] == 2021]

# Extract specific data
flu_data = data_2021[data_2021['Question'] == 'Influenza vaccination among noninstitutionalized adults aged 18-64 years with asthma']
pneumo_data = data_2021[data_2021['Question'] == 'Pneumococcal vaccination among noninstitutionalized adults aged 18-64 years with asthma']
prevalence_data = data_2021[data_2021['Question'] == 'Current asthma prevalence among adults aged >= 18 years']

# Inspect the data
print(flu_data.head())
print(pneumo_data.head())
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 (SQL)

```python
import pandas as pd
import numpy as np
pd.set_option('max_colwidth', 400)
import regex as re
from sqlalchemy import create_engine, Column, Integer, String, Float
from sqlalchemy.sql import text
from sqlalchemy.ext.declarative import declarative_base
from pathlib import Path

Base = declarative_base()
```

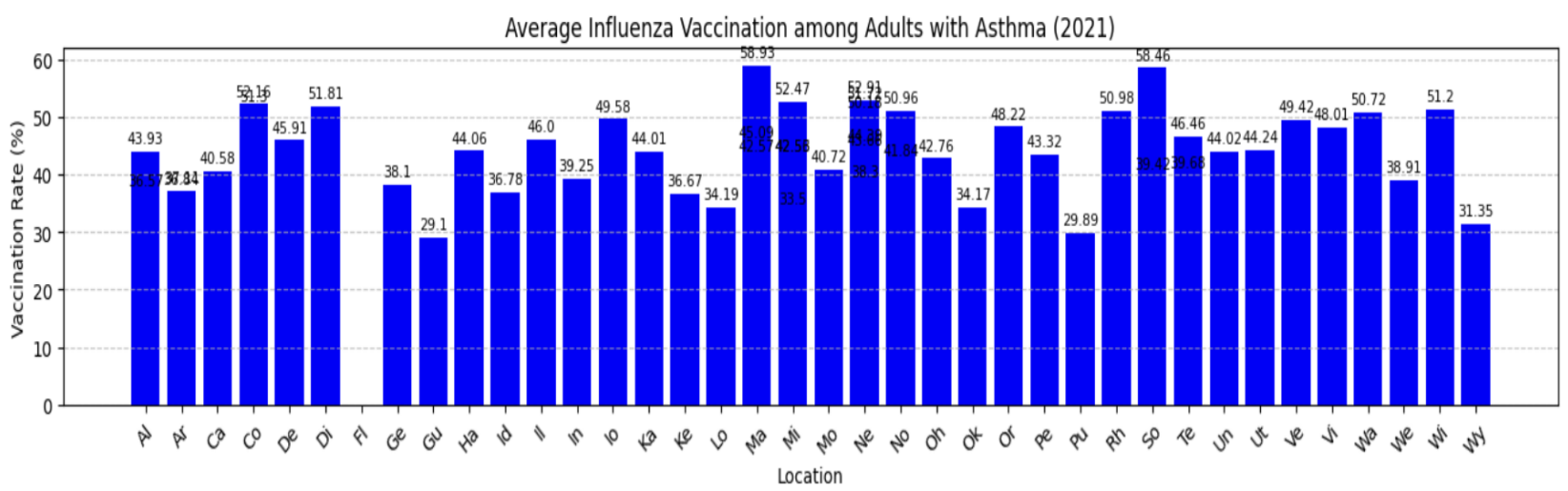
```python
engine.execute(text('select * from us_chronic_asthma')).fetchall()
```

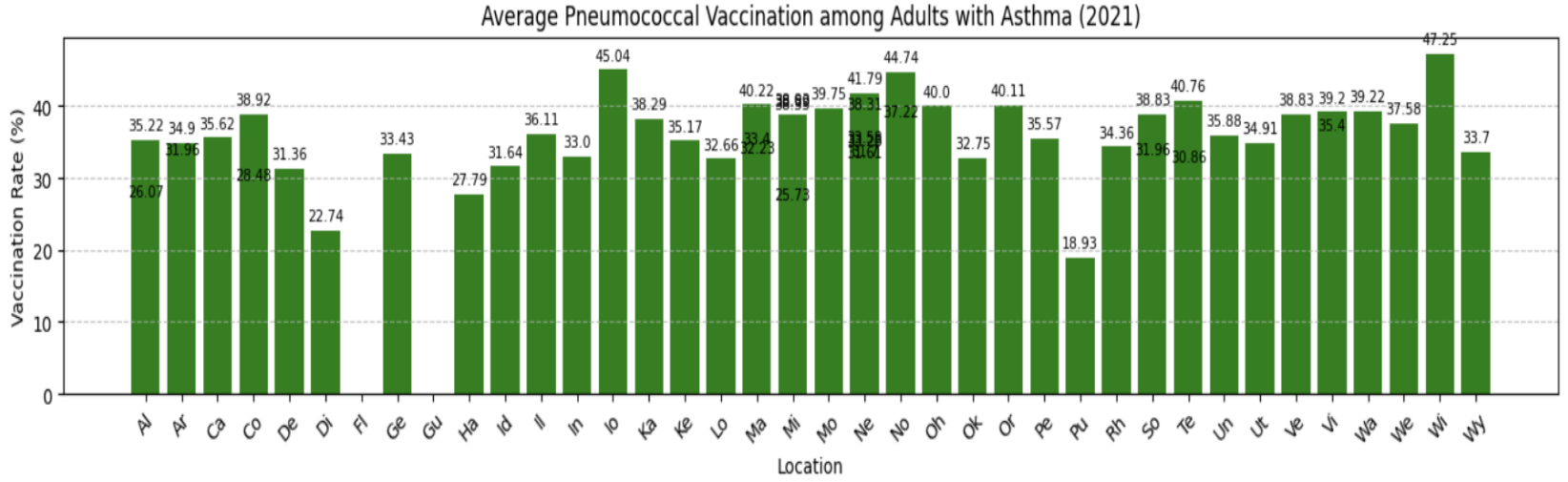
```
[(1, 2021, 2021, 'OH', 'Ohio', 'BRFSS', 'Asthma', 'Current asthma prevalence
 (2, 2021, 2021, 'OR', 'Oregon', 'BRFSS', 'Asthma', 'Pneumococcal vaccinatio
 (3, 2021, 2021, 'PA', 'Pennsylvania', 'BRFSS', 'Asthma', 'Influenza vaccina
 (4, 2021, 2021, 'ND', 'North Dakota', 'BRFSS', 'Asthma', 'Asthma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

```python
session.close()
```

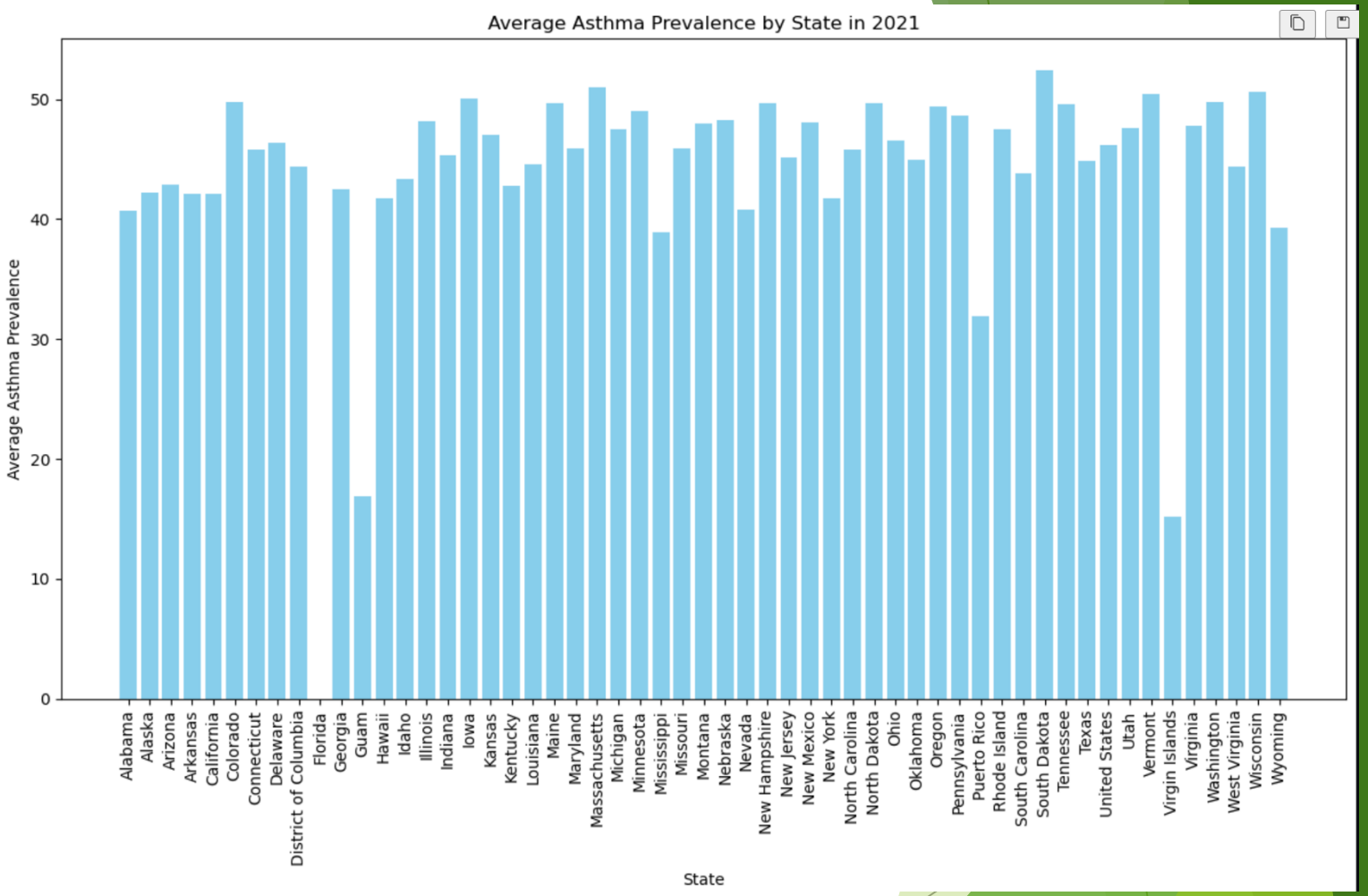
```python
for row in data_to_import:
    print(row['Question'])
    try:
        existing_entry = session.query(Asthma).filter(Asthma.Question == row['Question']).first()
    except Exception as e:
        print(f"Error querying for Question: {row['Question']}, Error: {e}")
        continue

    if existing_entry:

        continue

    else:
        new_entry = Asthma(
            YearStart=row['YearStart'],
            YearEnd=row['YearEnd'],
            LocationAbbr=row['LocationAbbr'],
            LocationDesc=row['LocationDesc'],
            DataSource=row['DataSource'],
            Topic=row['Topic'],
            Question=row['Question'],
            DataValueType=row['DataValueType'],
            DataValue=row['DataValue'],
            DataValueAlt=row['DataValueAlt'],
            LowConfidenceLimit=row['LowConfidenceLimit'],
            HighConfidenceLimit=row['HighConfidenceLimit'],
            StratificationCategory1=row['StratificationCategory1'],
            Stratification1=row['Stratification1'],
            GeoLocation=row['GeoLocation'],
            LocationID=row['LocationID'],
            TopicID=row['TopicID'],
            QuestionID=row['QuestionID'],
            DataValueTypeID=row['DataValueTypeID'],
            StratificationCategoryID1=row['StratificationCategoryID1'],
            StratificationID1=row['StratificationID1']
        )
        session.add(new_entry)

session.commit()
```

Influenza & Pneumococcal Vaccination Rates





- 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

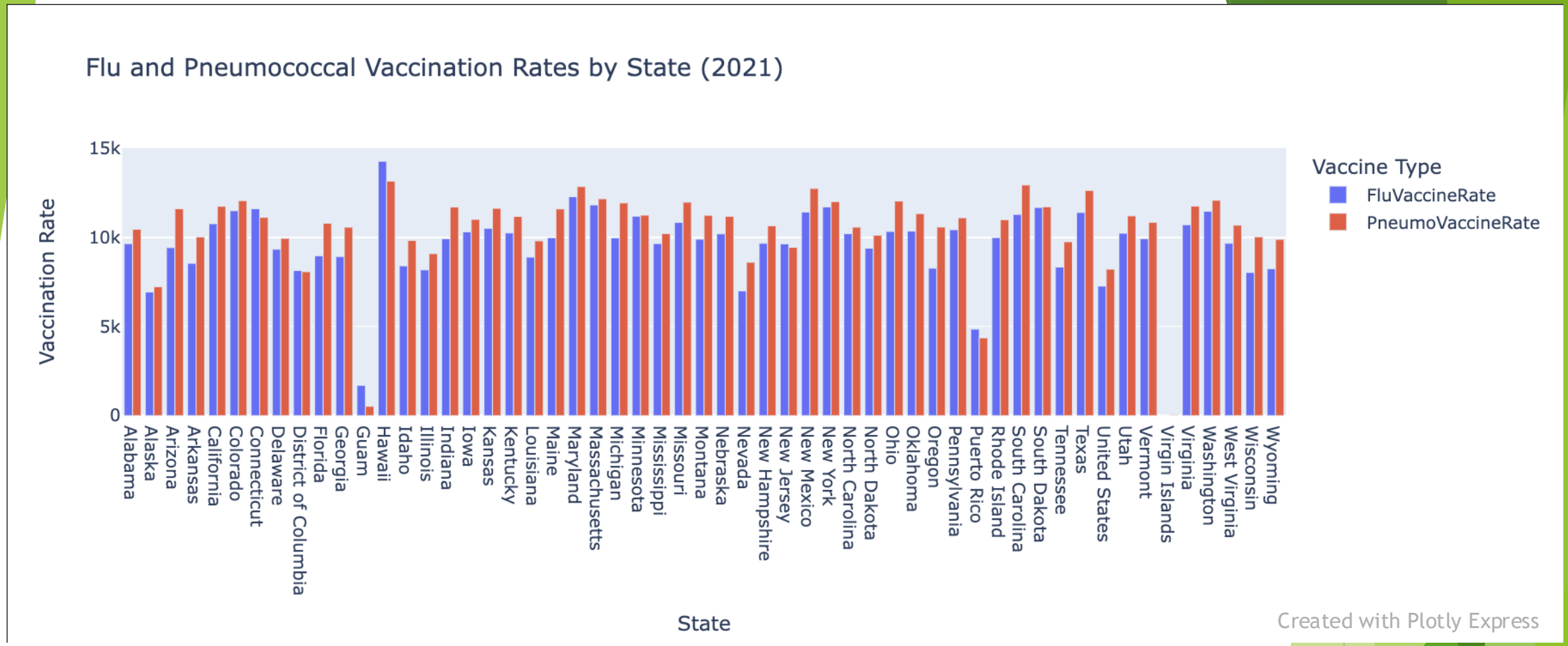
- Highest prevalence of asthma is South Dakota
- Lowest prevalence of asthma is the Virgin Islands

```
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
```

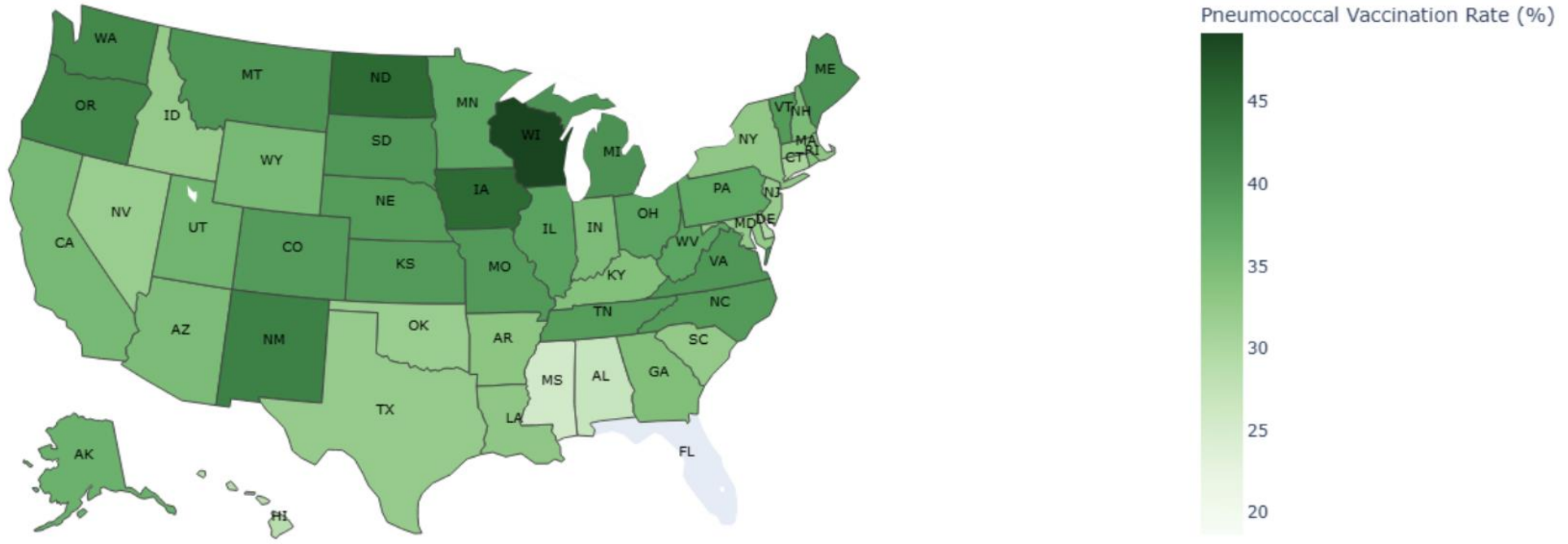
```
Asthma Prevalence Data Range:
count    54.000000
mean      9.889815
std       1.536486
min       4.650000
25%       9.075000
50%       9.850000
75%      10.637500
max      12.700000
Name: DataValue, dtype: float64
```

Nationwide average

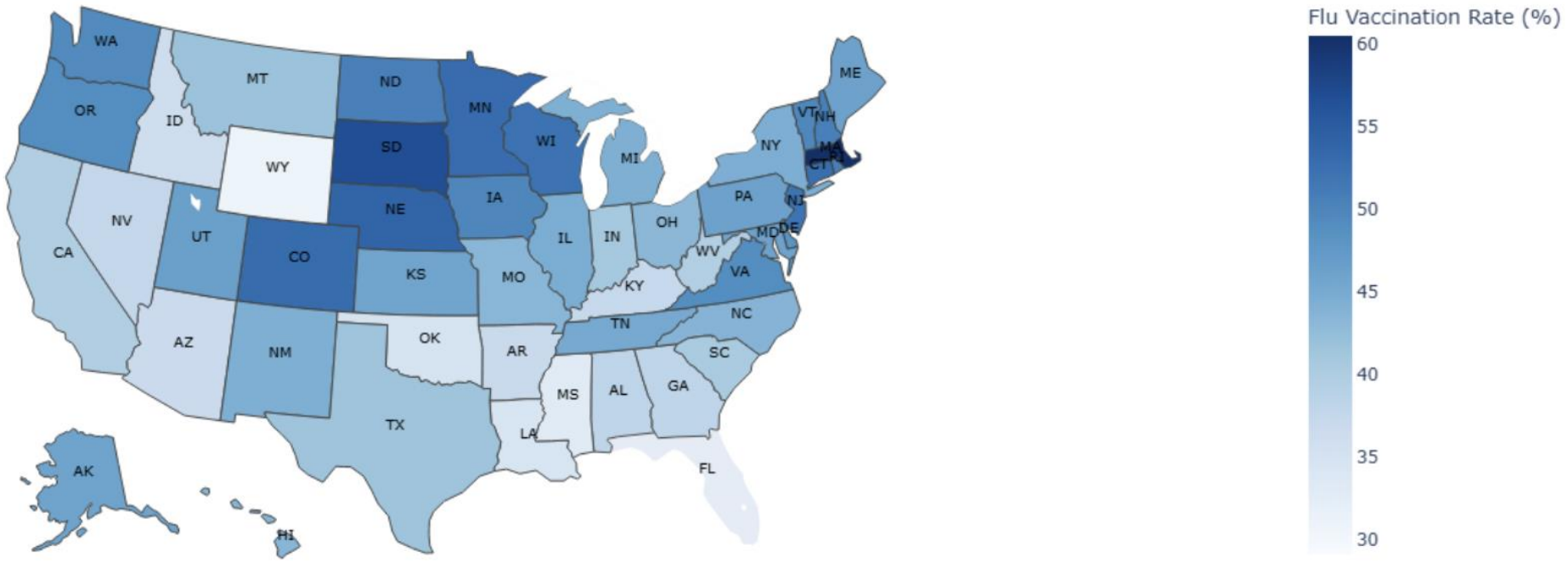


Influenza & Pneumococcal Vaccination Rates by State in 2021

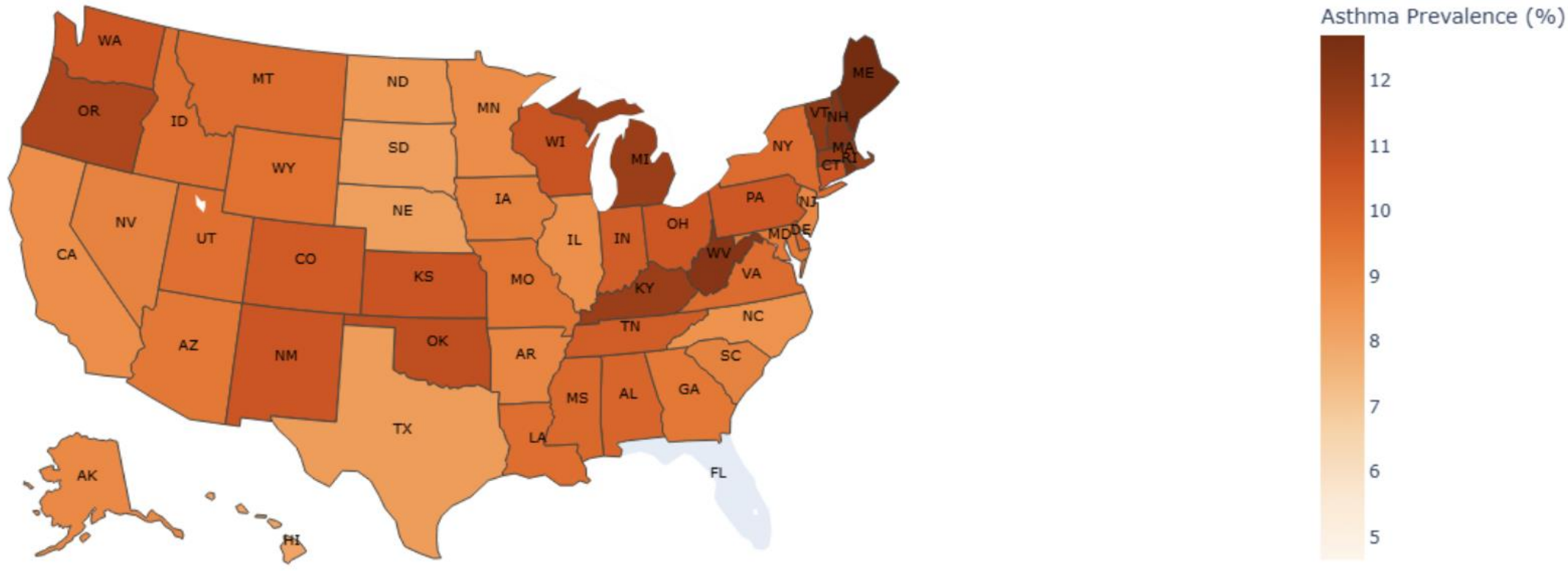
Pneumococcal Vaccination among Adults with Asthma (2021)



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.