The Opioid Crisis & the Impact on Unemployment in the U.S.

By Rishi Hebbar, Katelyn Burke, Xuan He, & Ashraf Al Mamun

Background Information

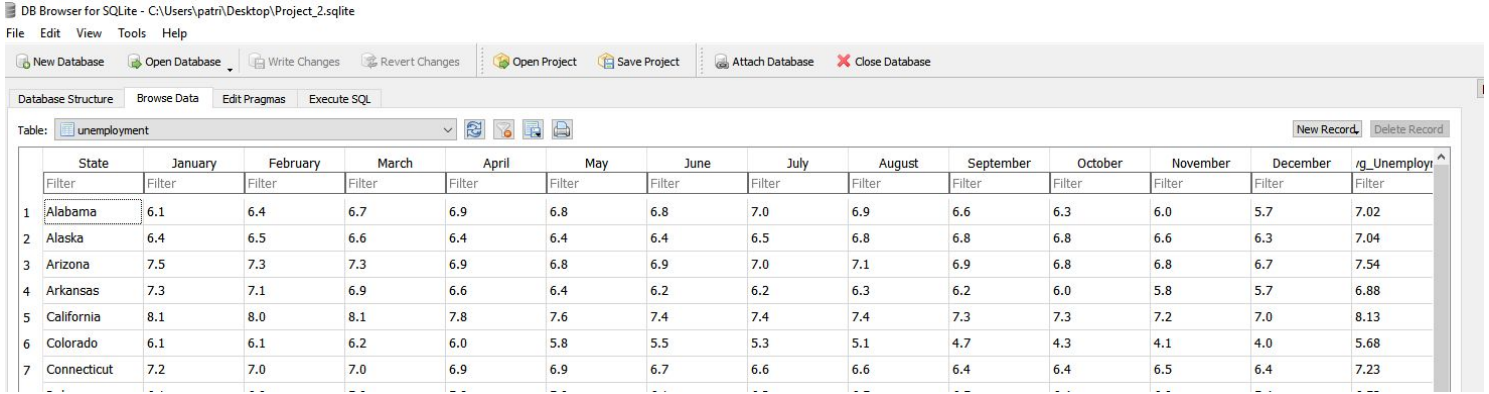
Researching trends between opioid deaths and the unemployment rate in by state. According to the National Institute on Drug Abuse:

- More than 130 people in the U.S. die each day from an opioid overdose
- The opioid crisis has an economic burden of approximately $78.5 billion per year
- Costs of healthcare, loss of productivity, treatment, criminal justice
- Midwestern region saw opioid overdoses increase 70 percent from July 2016 through September 2017

Data Sources

- Called Overdose data API from Kaggle.com - *U.S. Opiate Prescription Data*
- CSV File for state unemployment rates from *The National Conference of State Legislatures*
- CSV File for average income by state from Kaggle.com
- Loaded data into an SQLite database using an app called BD Browser

SQLite Database



	State	January	February	March	April	May	June	July	August	September	October	November	December	/g_Unemploy
	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	Alabama	6.1	6.4	6.7	6.9	6.8	6.8	7.0	6.9	6.6	6.3	6.0	5.7	7.02
2	Alaska	6.4	6.5	6.6	6.4	6.4	6.4	6.5	6.8	6.8	6.8	6.6	6.3	7.04
3	Arizona	7.5	7.3	7.3	6.9	6.8	6.9	7.0	7.1	6.9	6.8	6.8	6.7	7.54
4	Arkansas	7.3	7.1	6.9	6.6	6.4	6.2	6.2	6.3	6.2	6.0	5.8	5.7	6.88
5	California	8.1	8.0	8.1	7.8	7.6	7.4	7.4	7.4	7.3	7.3	7.2	7.0	8.13
6	Colorado	6.1	6.1	6.2	6.0	5.8	5.5	5.3	5.1	4.7	4.3	4.1	4.0	5.68
7	Connecticut	7.2	7.0	7.0	6.9	6.9	6.7	6.6	6.6	6.4	6.4	6.5	6.4	7.23

Coding Approach

- Our goal was to create an informative and interactive dashboard
  - Overdose rate and unemployment rate over the Leaflet map
  - Using ‘Lollipop’ graphs to illustrate average income
  - Using the Flask webserver to hold the index page

- **Coding Languages Used:** Python, Javascript
- **Visualization Libraries Used:** D3, Leaflet, Chart.js, JavaScript
- We also used Python Pandas to clean the data

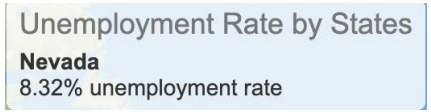
Data Munging Techniques

- Used Pandas to clean and merge data in the CSV files and calculate the overdose rate and the average income by state
- Based on the data in CSV files, SQLite database is made through an app called **BD Browser (SQLite)**
- The SQLite database includes two tables (overdoses and unemployment)
- The SQLite tables are pulled into the Flask app and filtered by state using the Pandas library
- The data is then returned in the form of JSON-ified dictionaries.

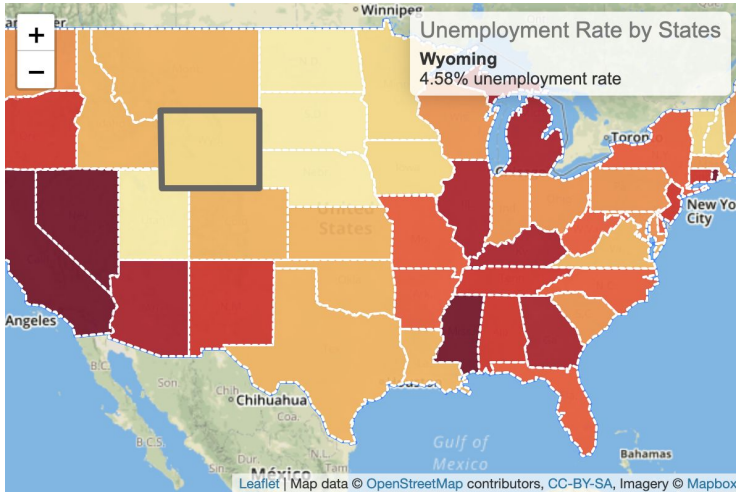

```
{
  "Avg_Unemployments": 6.58,
  "Deaths": 2634,
  "Rate": 0.0135,
  "State": "Florida"
}
```

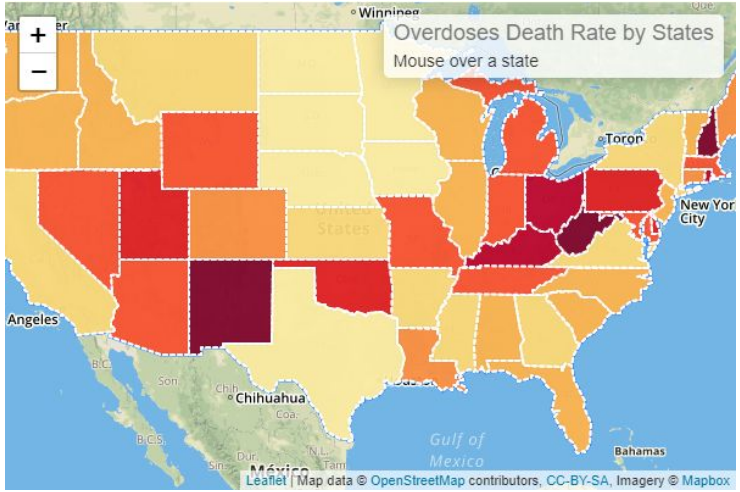
Final Visualizations - Leaflet

- Created heat maps to show possible correlations between overdose death rate and unemployment rate per state
- Closer to red / darker color = more overdose deaths / higher unemployment rate
- Hover over a state with mouse to display state data




```
function getColor(t) {
    return t > 8     ? '#800026' :
           t > 7.5   ? '#BD0026' :
           t > 7     ? '#E31A1C' :
           t > 6.5   ? '#FC4E2A' :
           t > 6     ? '#FD8D3C' :
           t > 5     ? '#FEB24C' :
           t > 4     ? '#FED976' :
                       '#FFEDA0' ;
}
```

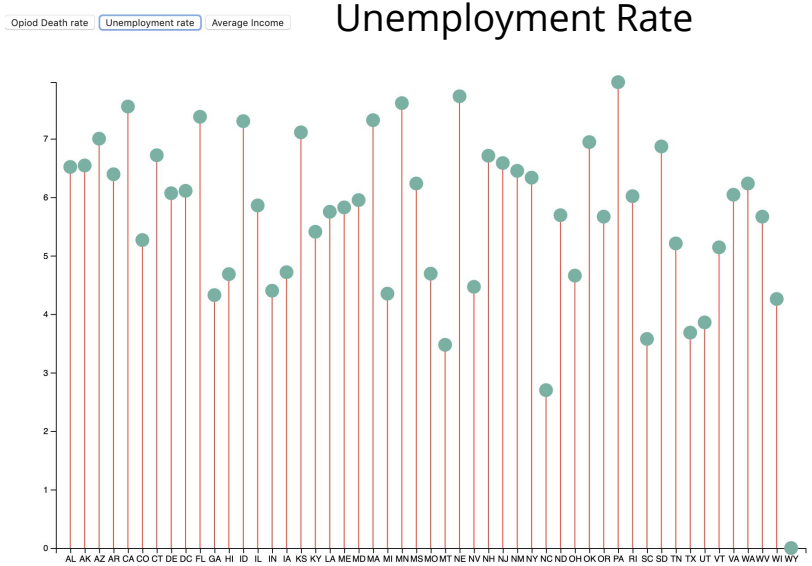




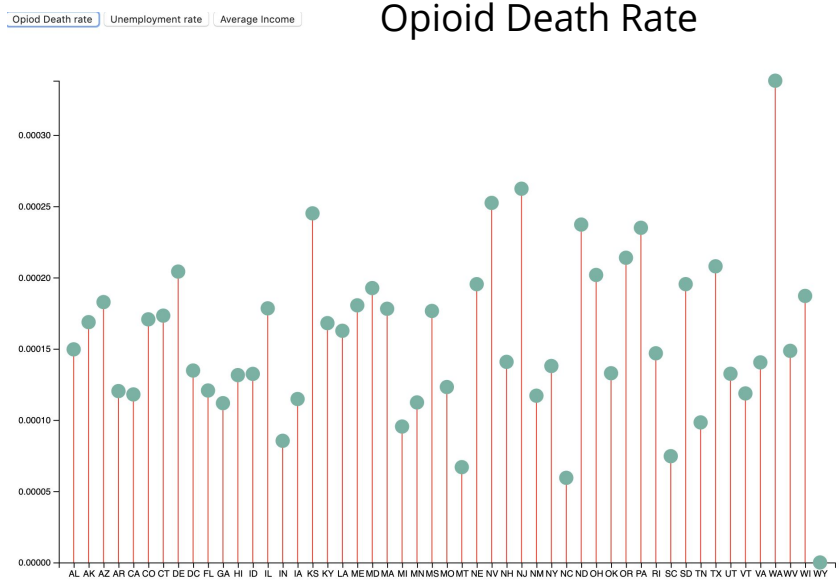
Final Visualizations - D3

- Created three D3 ‘Lollipop’ graphs to illustrate average income, unemployment rate and number of opioid overdose deaths by state
- Click the buttons at the top to change the data

Unemployment Rate

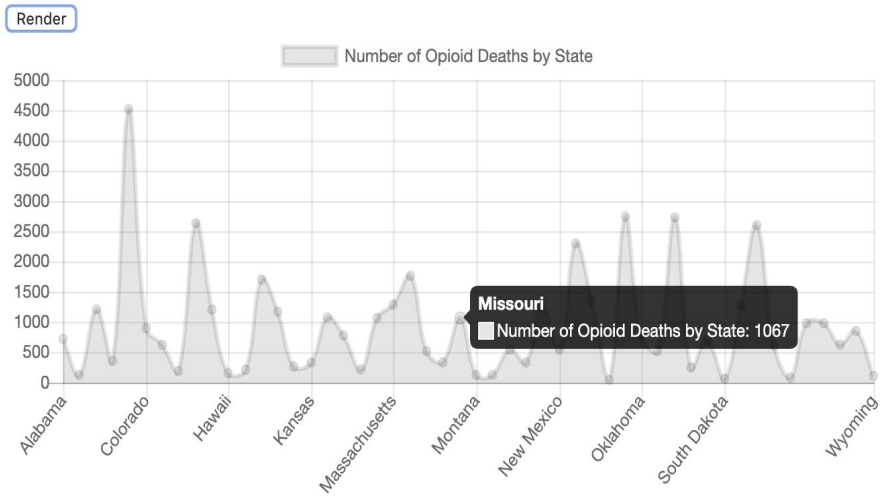


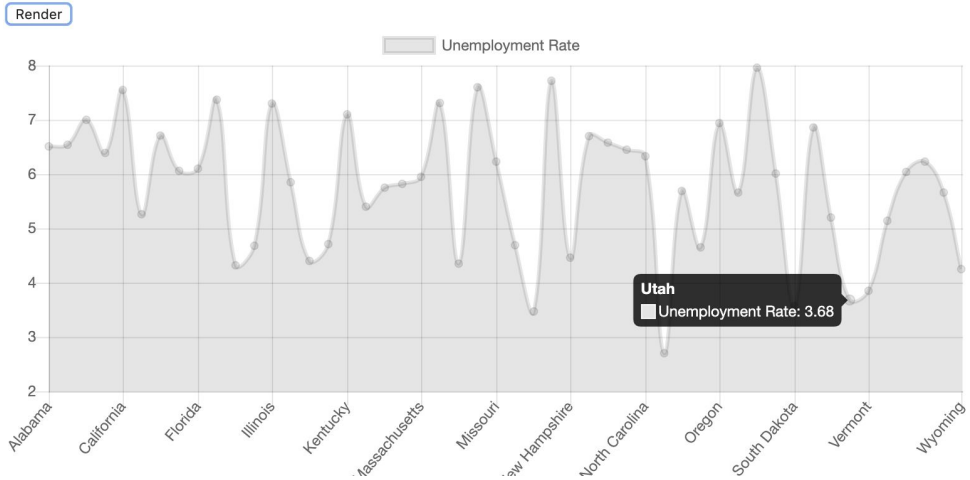
Opioid Death Rate



Final Visualizations - Chart.js

- Chart.js is a Javascript library that allowed us to create responsive charts
- Each point on the chart represents a state, hover over the point to see the state and unemployment rate/number of opioid related deaths





Final Dashboard

Overdose Rates and Unemployment in the U.S.

Use the interactive charts below to explore the datasets and learn more about how opioid deaths affect unemployment in the United States.

SELECT State:

Alabama

State Data

Avg_Unemployments, 7.02

Deaths, 723

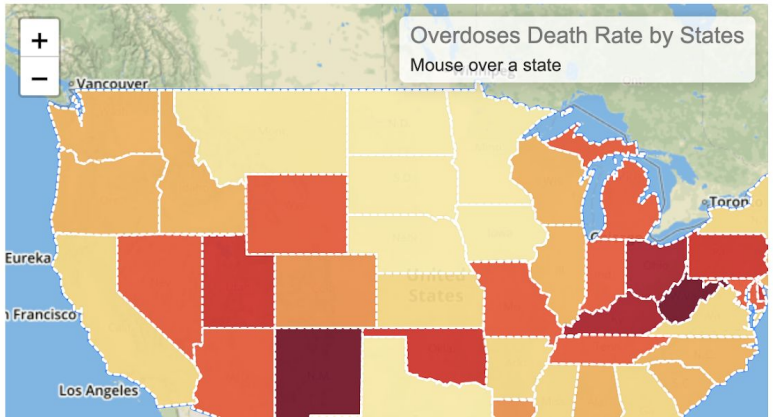
Rate, 0.015

State, Alabama

Opioid Addiction Hotline

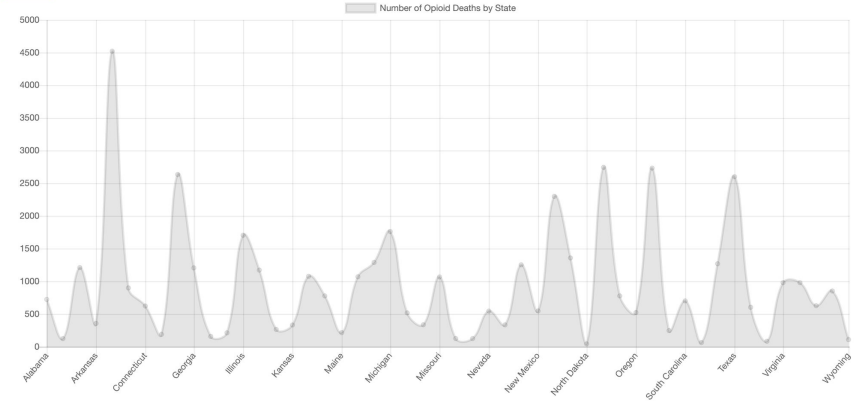
If you or one of your loved ones is suffering from opioid addiction seek help as soon as possible. Click below to access the addiction hotline and more information.

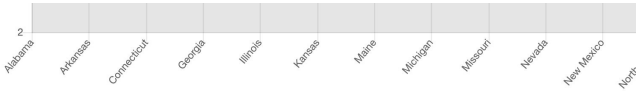
Addiction Hotline



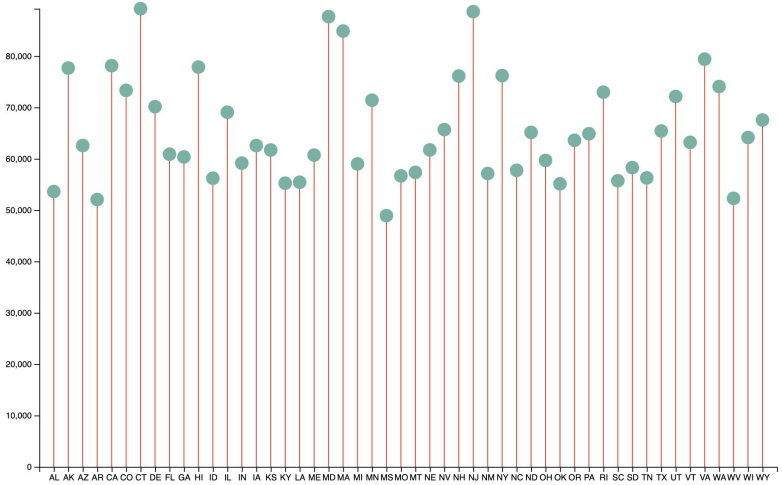
Final Dashboard

Render





Opiod Death rate | Unemployment rate | Average Income



Conclusion

- There seems to be some correlation between the unemployment rate and number of overdose deaths in the U.S.

  While unemployment could be one variable that could impact the overdose death rate, there are other factors that were not measured in this project

- **Next Steps:** Instead of using the http server, we would try to run the D3 server with Flask (this would solve the problem of having the dropdown and D3 graphs working at the same time)

Challenges

- Finding the data we needed
- Combining the code and getting all of the graphs to work on the dashboard
- Getting the JSON data that we pulled from the SQLite database to populate in the drop-down
- Ensuring that we were referencing the correct index.html and Javascript files -- which became complicated due to the number of individual files we had
- Running the Flask app and the Python server at the same time
- Merging changes between different branches on the GitHub.

JSON


```
{
  "Avg_Unemployments": 7.94,
  "Deaths": 1206,
  "Rate": 0.0121,
  "State": "Georgia"
}
```


Drop-Down