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# Examining Determinants of Opioid Mortality

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# Baltimore City Council to Hold Hearings on Drug Overdoses

The city's overdose epidemic death rate never before seen

By EMILY SULLIVAN, NICK THIEME,

## The Opioid Crisis Hasn't Gone Away. It's Just Gone Underground.

Prescribing Crisis

BY  
NICOLE COLSON

A profit-hungry pharmaceutical industry and an indifferent political class are fueling the deadly opioid epidemic.



LETTERS

Mixed News About Opioid Overdoses

LETTERS

Regulating Opioid Prescriptions

Pain management is an inexact science; there is plenty of blame to go around for the abuse of such drugs.

# The Opioid Crisis

# Data Acquisition and Cleaning

- csv files were best suited for the sites we obtained our data from
- Standard pandas and other common dependencies were used to import and clean our data
- Matplotlib was used to make the majority of our figures

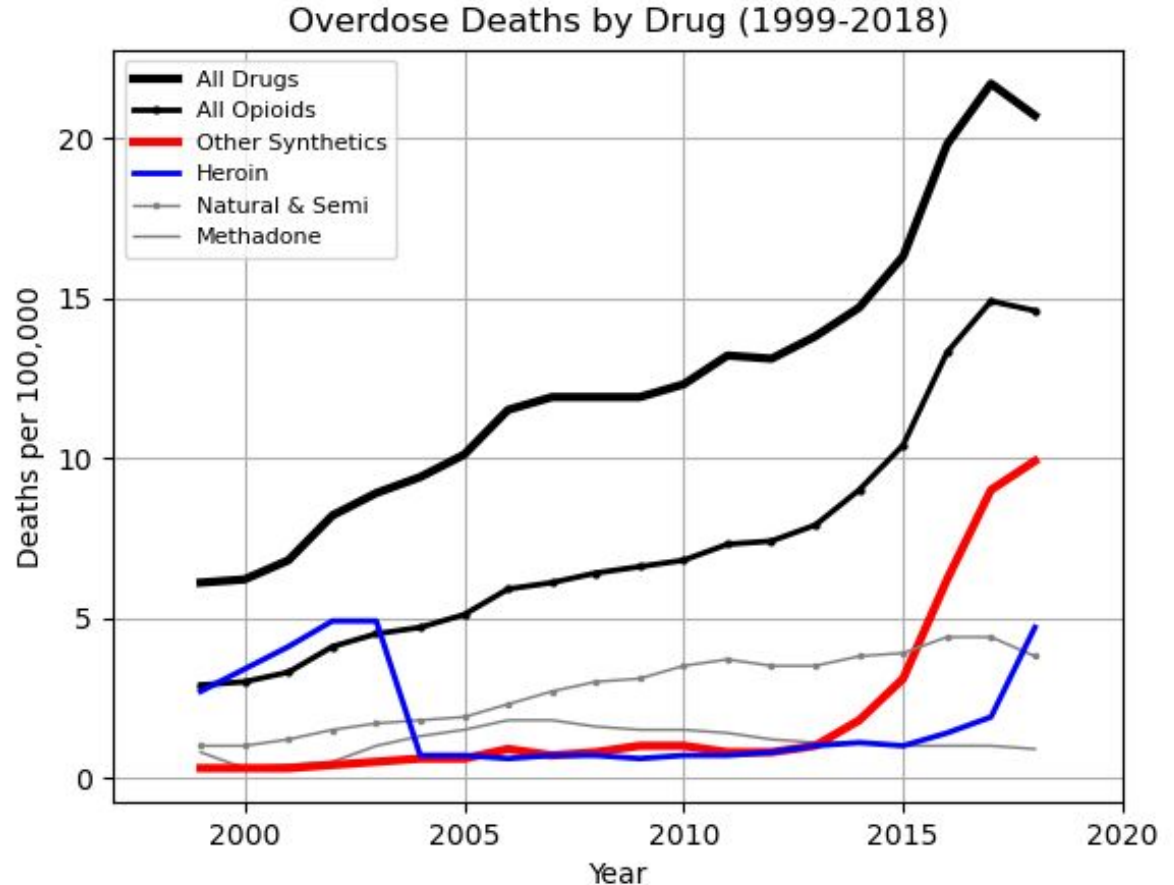


# Research Questions

1. What demographics are susceptible to higher rates of opioid mortality?
  2. Does poverty influence opioid mortality rates?
  3. Is the opioid crisis region/state specific?
  4. Has access to prescription opioids shaped the current wave of the opioid crisis?
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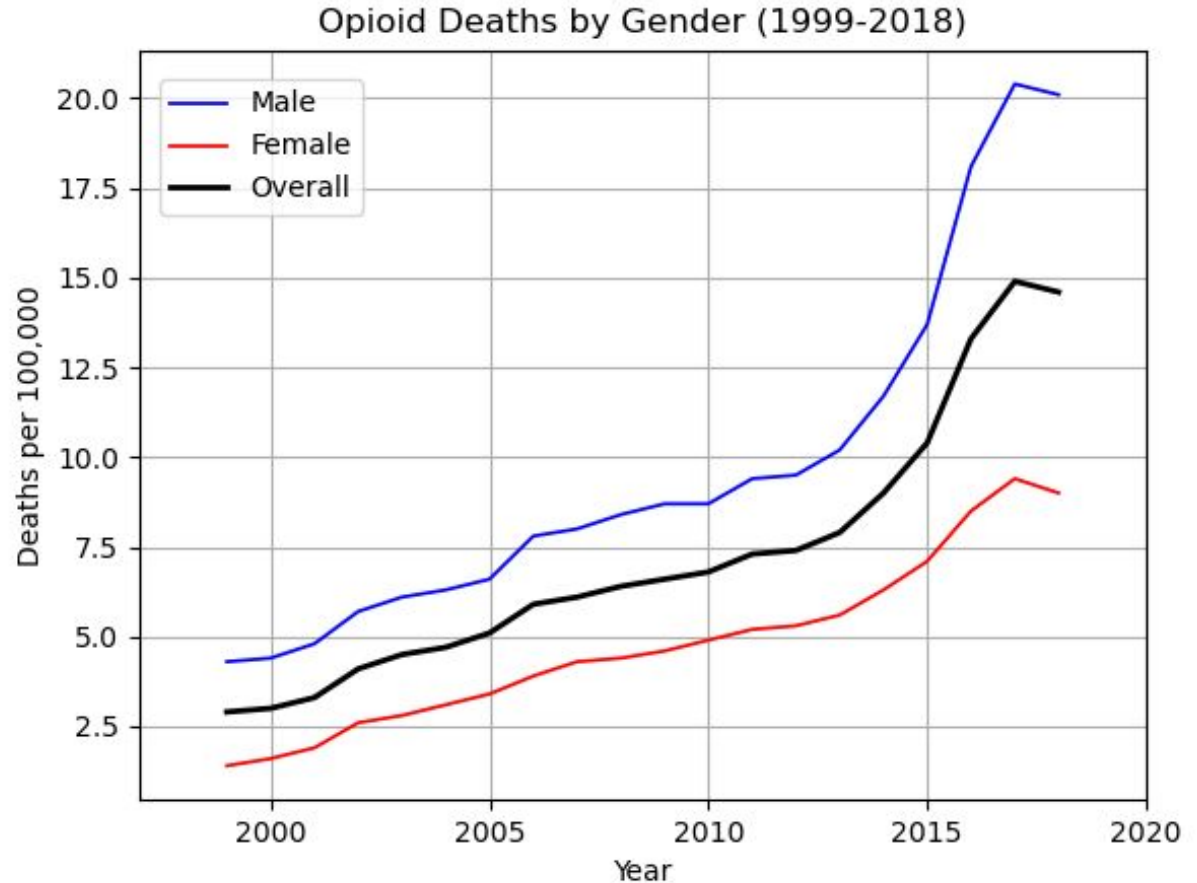
**What demographics are susceptible to higher rates of opioid mortality?**

The overall breakdown of overdose deaths are shown with the significant impacts from synthetic opioids seen beginning in 2013



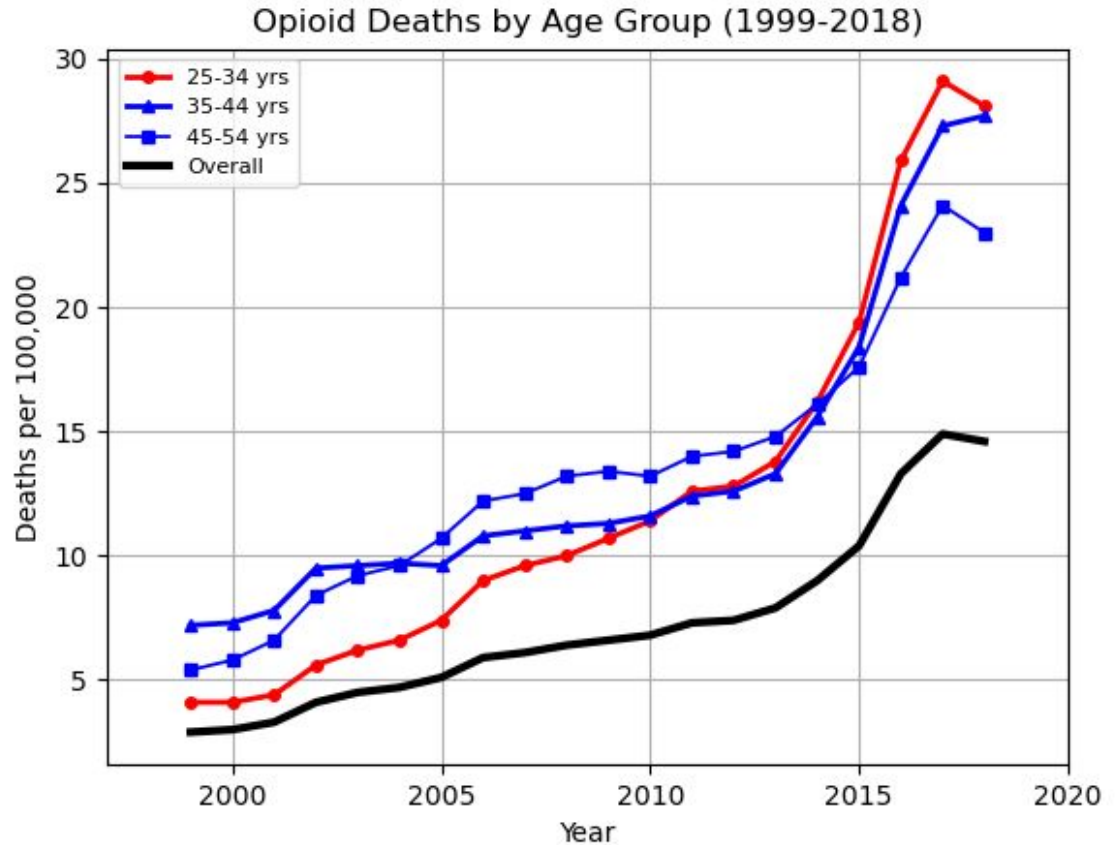
How do opioid  
overdose deaths  
affect gender?

Men were dying at a  
rate of **2.23x** as  
compared to women



How do opioid overdose deaths affect age?

The most highly impacted age ranges were those from 25 to 54 years

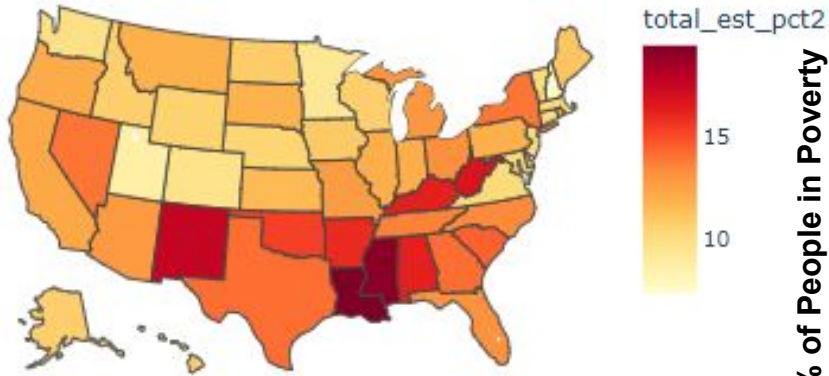




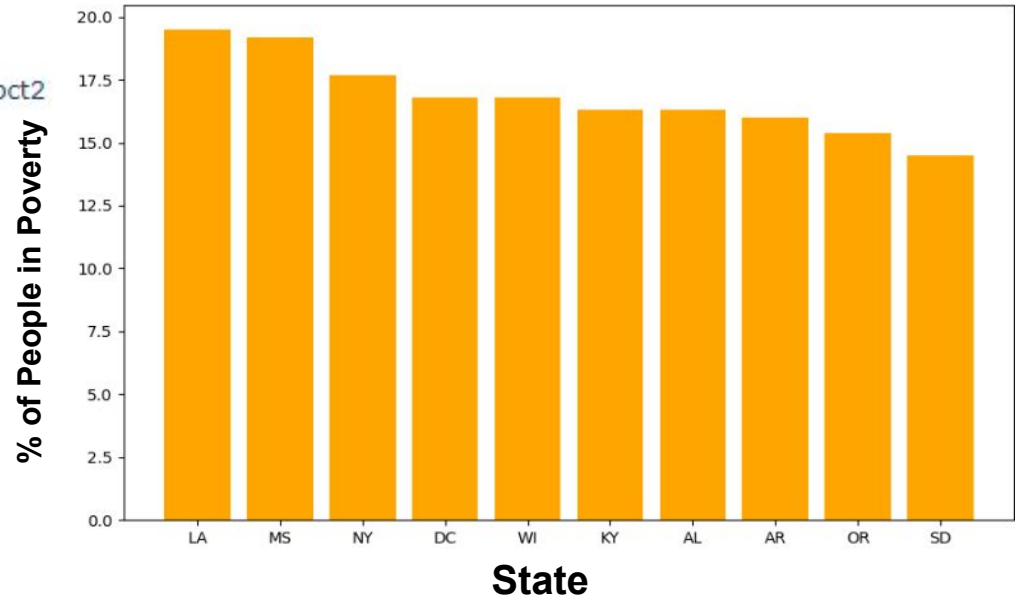
**Does living in poverty have an influence on  
opioid mortality rates?**

# % of U.S Population Living in Poverty by State

% of States Population Living In Poverty

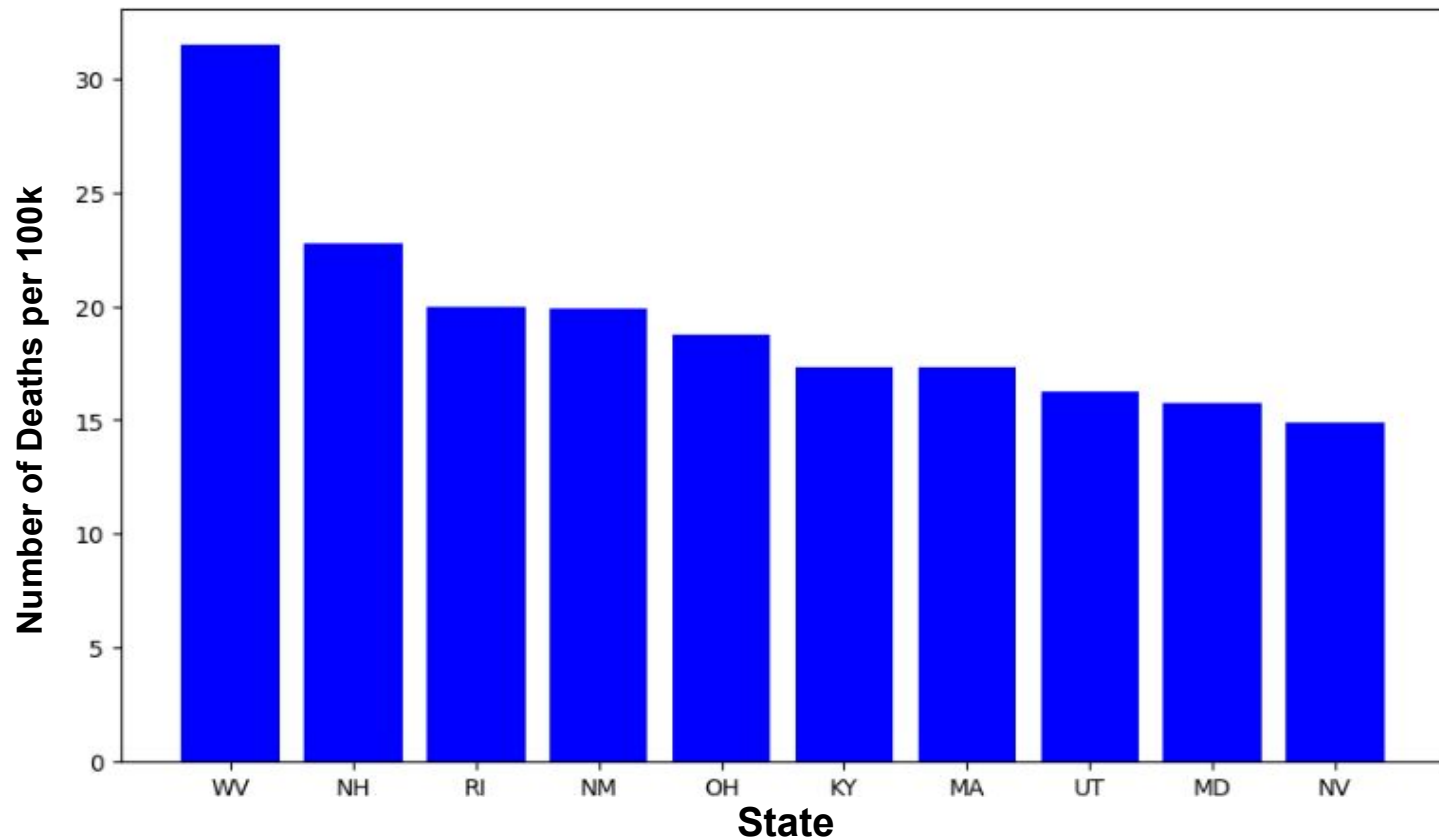


Top 10 States with Highest % of People Living in Poverty



# Opioid Related Deaths by State

Top 10 States with Highest # of Opioid Related Deaths



# Dataset Findings Broken Down

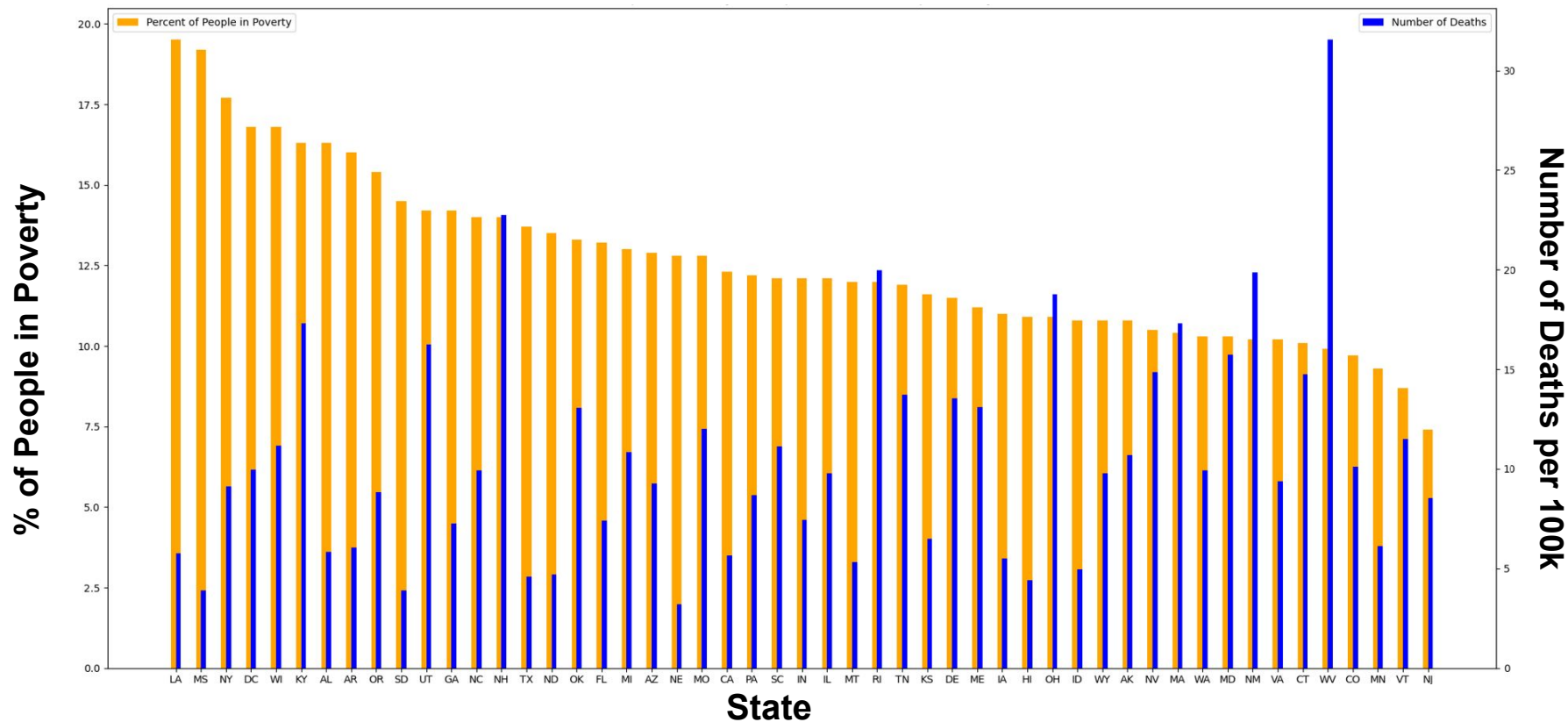
## A. Top 5 States with Highest % of Population Living in Poverty

1. Louisiana
2. Mississippi
3. New York
4. DC
5. Wisconsin

## B. Top 5 States with Highest # of Opioid Related Deaths

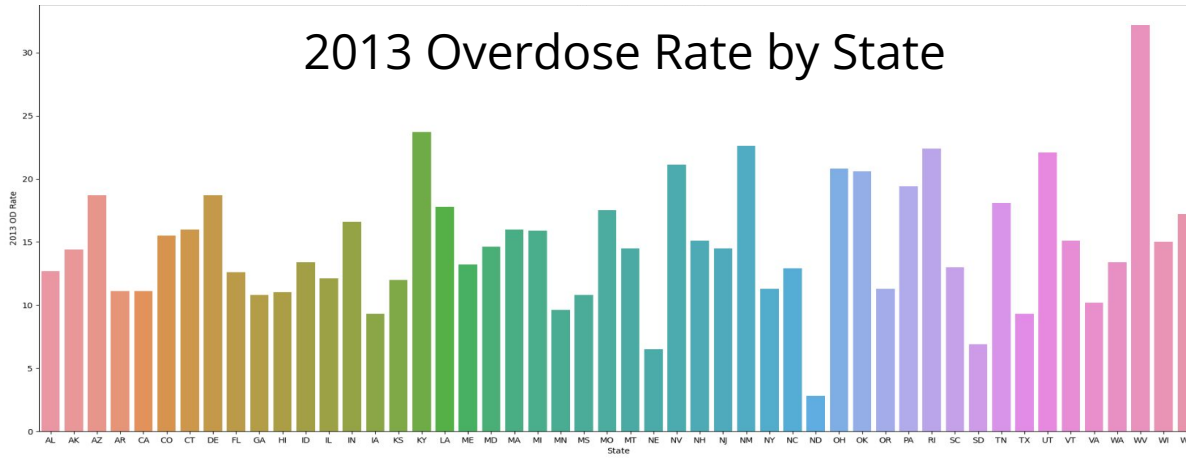
1. West Virginia
2. New Hampshire
3. Rhode Island
4. New Mexico
5. Ohio

# % of States Population Living in Poverty Vs. Opioid-Related Deaths per 100k by State

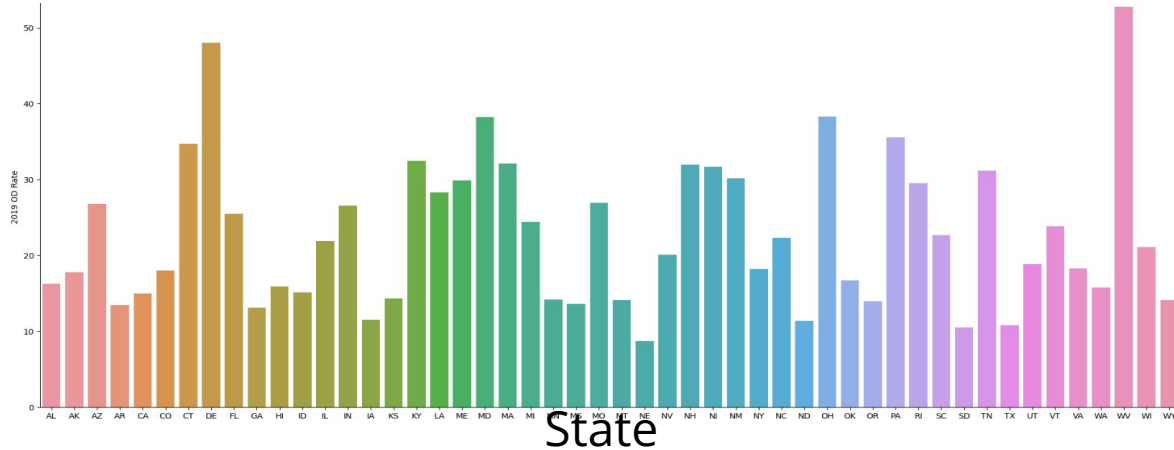


**Is the opioid crisis region/state specific?**

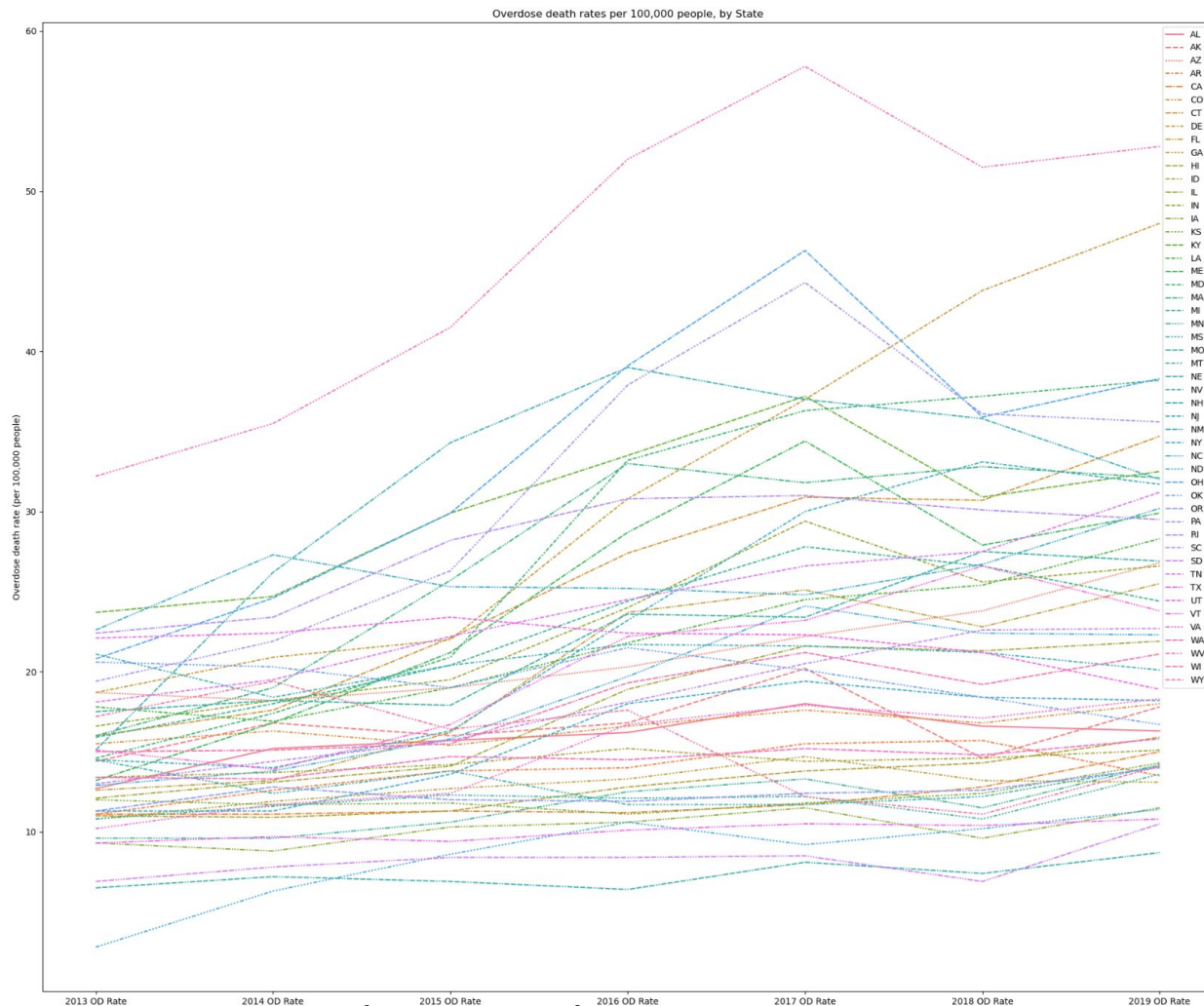
## 2013 Overdose Rate by State



## 2019 Overdose Rate by State



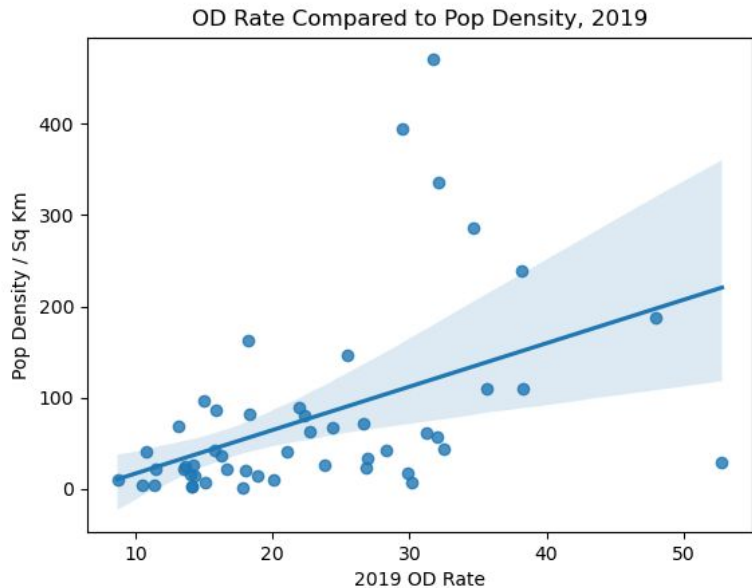
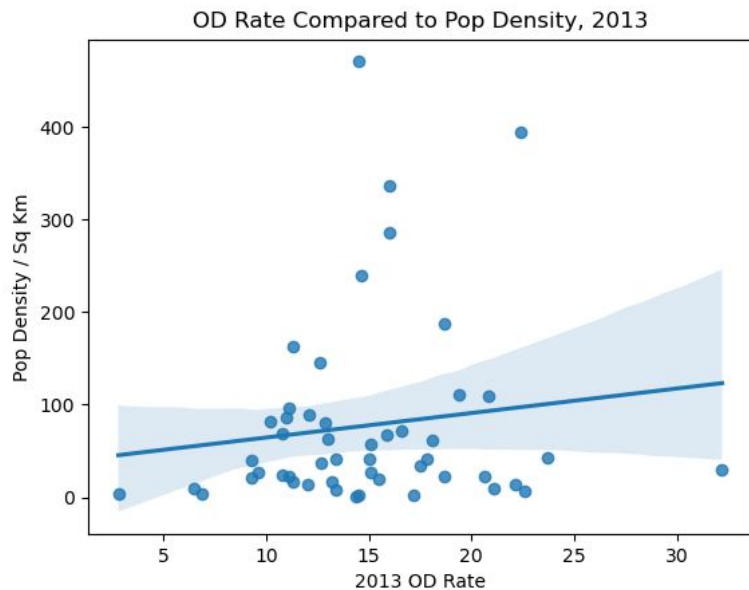
Overall rates have gotten worse in this seven year period. Of particular decline and intensity are Appalachia and the surrounding areas, including West Virginia, Delaware, Pennsylvania, Ohio and West Virginia.



Death rates climb yearly until 2017 for most states, after which there was a noticeable, if slight, recovery.

Overdose Rate by Year, 2013-2019

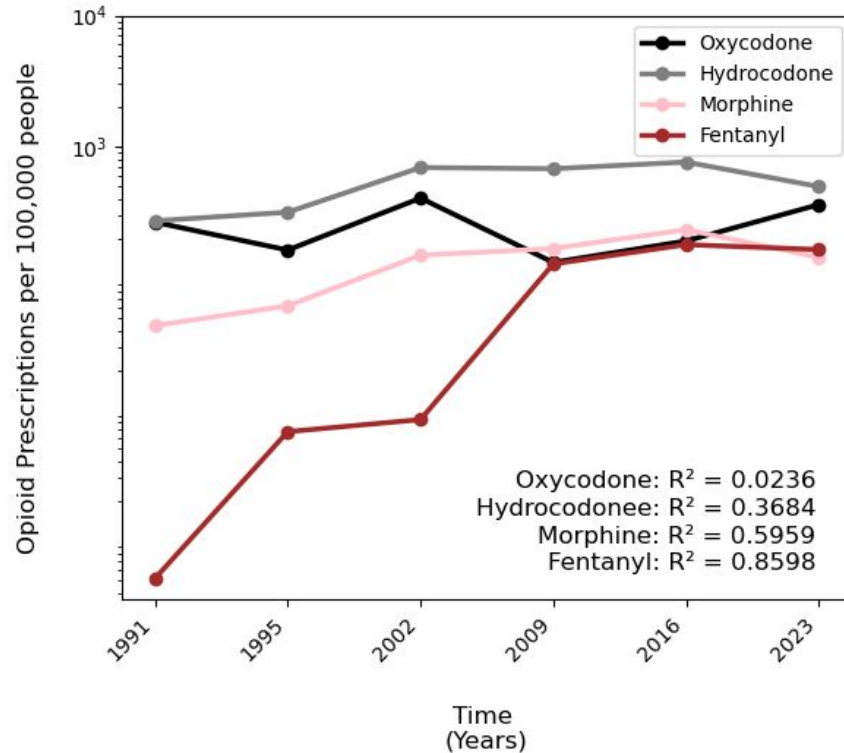




**Population density in states has become a more strongly correlated factor ( $r^2=0.46$ ) with opioid overdose rates, showing that there is an ongoing, increasingly widespread deterioration in more densely populated areas.**

**Has access to prescription opioids shaped the current wave of the opioid crisis?**

## Country Level Trends in Opioid Prescriptions

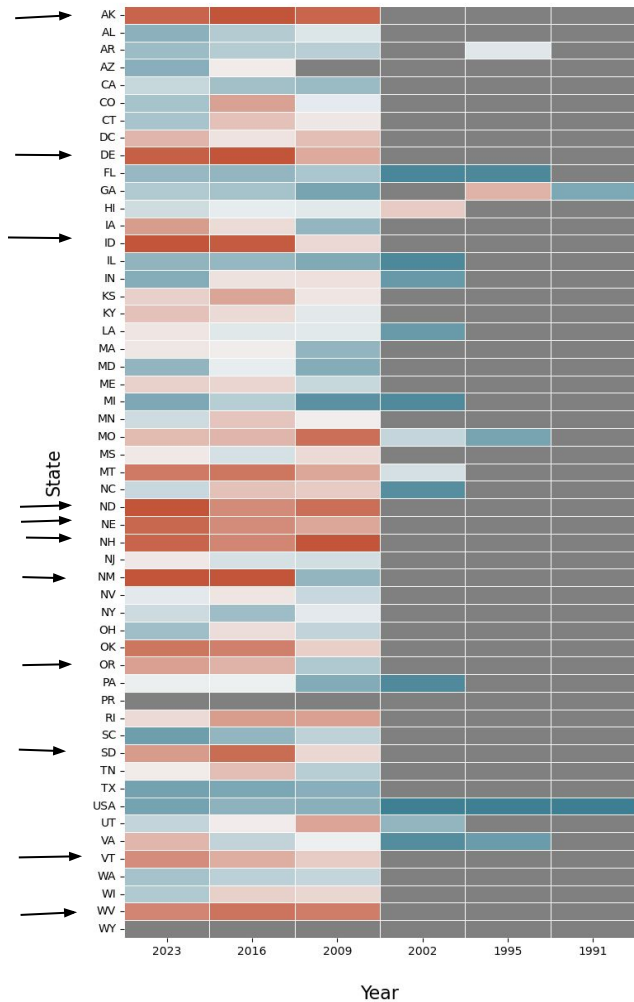


The prescription of fentanyl has increased from 1991 to 2023 in comparison to other opioids

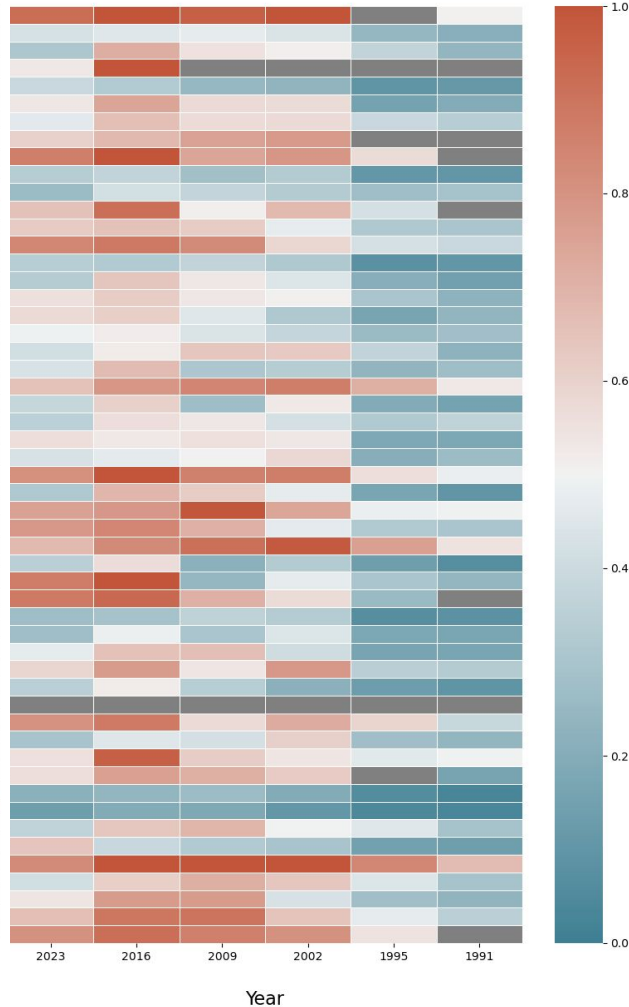
A less drastic increase in the prescription of morphine also occurred during the same time period.

Increased fentanyl prescription precedes the rise in opioid-related deaths starting in the early 2000s

State Level Trends in Fentanyl Prescriptions



State Level Trends in Morphine Prescriptions



Little to no fentanyl prescriptions were recorded from 1991 to 2002.

States with higher levels of prescribed opioids overlap with those affected by high opioid-related mortality rates.

**WV, NH, RI, NM, OH, KY, MA, UT, MD, NV**

# Findings Summary

1. Men between 25-35 more susceptible to overdose by opioids
2. No obvious trend between poverty rates and opioid-related mortality
3. The opioid crisis is more severe in Appalachia, Southwest, and Northeast regions
4. Increased fentanyl prescription precedes the rise in opioid-related deaths

## **Conclusion**

**The major determinants of opioid related-mortality was geographic region and demographics. While drug prescription and poverty rates were not strong indicators of drug-related deaths, both datasets support geographic region as being the most impactful factor in opioid mortality.**

## Limitations & Further Studies

- While the trend of drug prescription appears to be a precursor to the opioid death rate, no direct causation can be shown with our data. Further studies would look into which opioids people were dying from (illicit or prescribed).
- No overlap was found with the poverty rate and opioid-related deaths, however parsing the data by household income would provide a better opportunity to understand the impacts of finances on death rate.
- Demographic data did not have segmentation by race. Further studies would explore how race affects opioid death rates.
- The CDC dataset doesn't capture newer data after 2019, especially the Covid 19 pandemic which saw an increase in death rates due to opioid use.

Thank You!