

# **Nexus of Crisis:** *Examining the opioid epidemic and various demographic factors*

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Columbia Engineering Data Analytics Boot Camp  
Team 2: Rachel Brown, Elizabeth Conn, Kiki Chan, Sara Roulett

# Project Overview

The number of opioid-related deaths has been rising continuously since 1999. The number of people who died from a drug overdose in 2021 was over six times the number in 1999. Over 75% of the nearly 107,000 drug overdose deaths in 2022 involved an opioid.

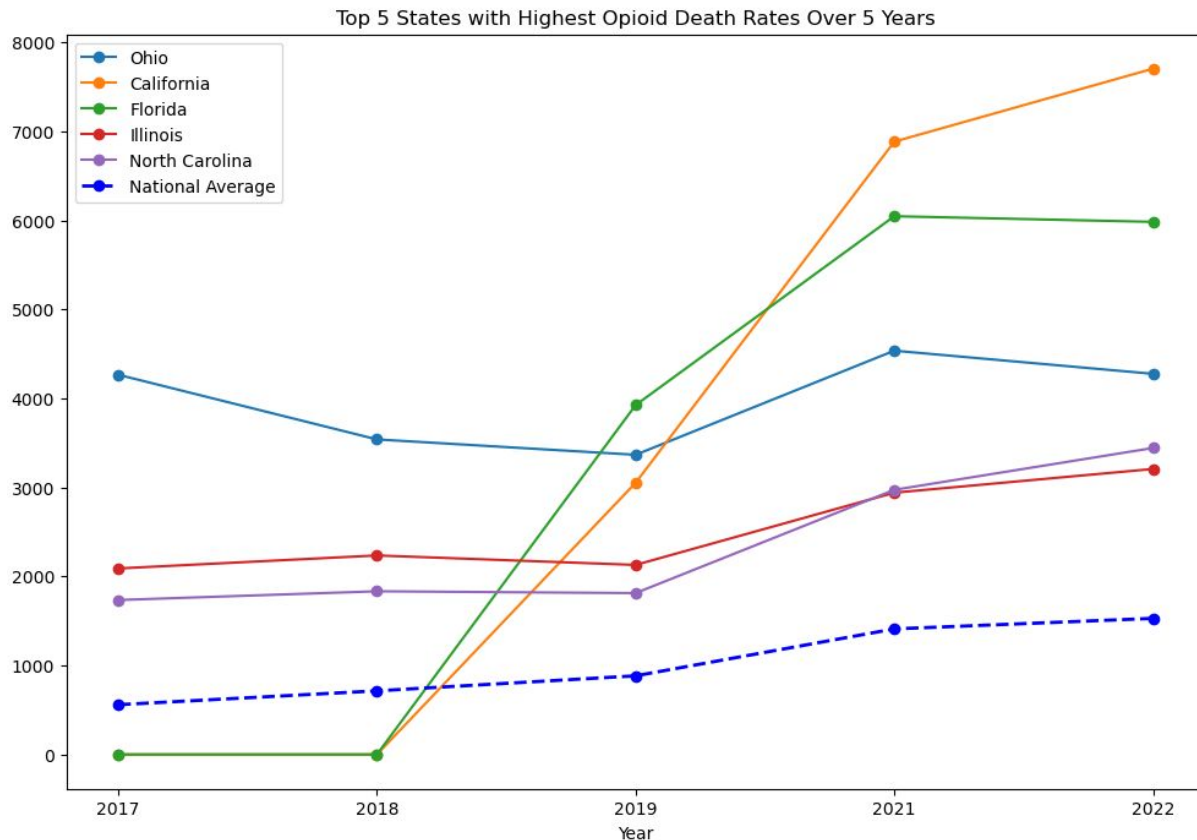
Against this background, this project examines the opioid epidemic and **explores if there is any correlation between opioid-related deaths and various demographic factors**, namely unemployment rate, educational attainment, income level and family size.

# Executive Summary

- Opioid death counts have been **steadily increasing** across the United States
- **California and Florida have seen the sharpest rise** in opioid death counts (*CDC 2017-2022*)
- Selected **demographic variables** (*US Census American Community Survey\**) **are not correlated to opioid deaths** in USA
  - No relationship exists between unemployment rates in a state and opioid deaths over a given year
  - Educational attainment is not a predictor of opioid overdose deaths
  - Median income in a state is only weakly correlated to opioid overdose deaths
  - Family size is not a predictor of opioid deaths
- Additional analysis could be conducted to determine **if a combination of these factors is a better predictor of overdose outcomes** in a state
- More analysis should be completed to **examine other demographic factors or alternative data, such as prior hospitalizations/surgeries** and overdoses

\* 2020 data was not released due to the impact of the COVID-19 pandemic on data collection

# Opioid death counts have been **rising** year over year

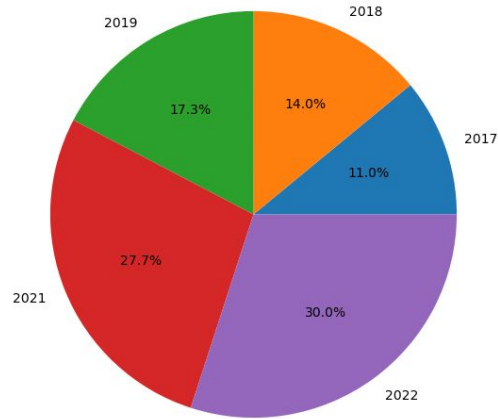


Source: CDC

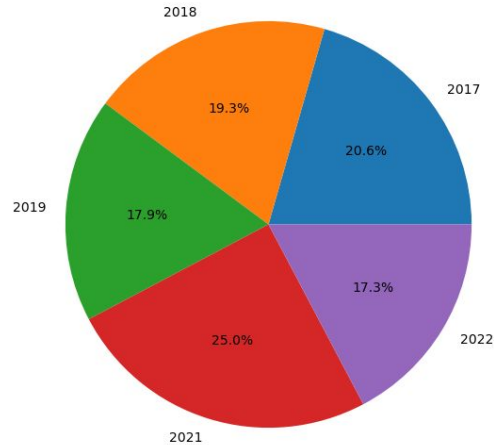
# No significant relationship found between unemployment rate and opioid related deaths

Contribution Ratios + Pie Charts

Percentage of Total Opioid Deaths by Year (2017-2022)



Percentage of Total Unemployed in Civilian Labor Force by Year (2017-2022)



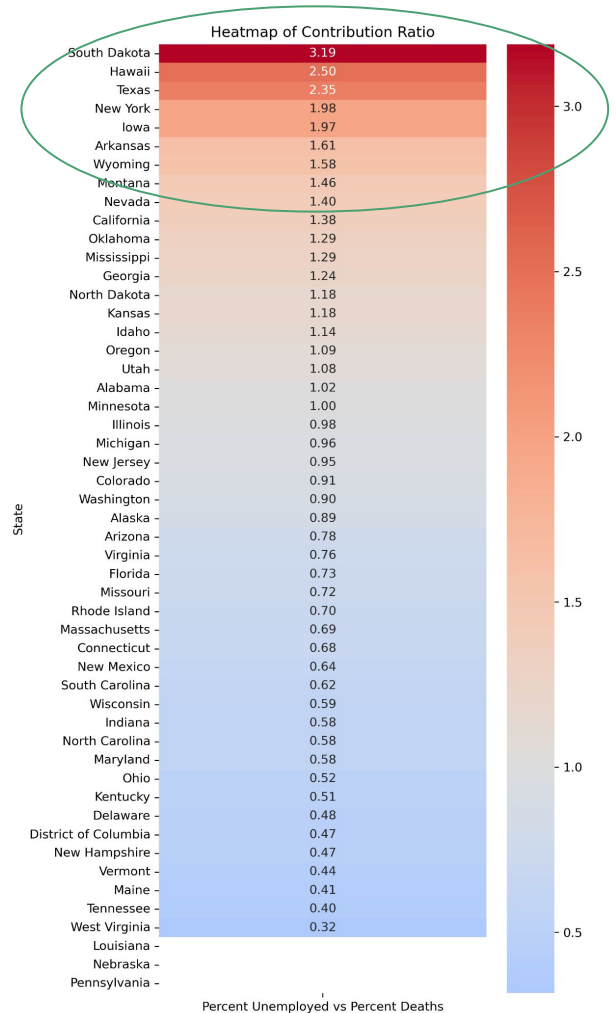
## Ratio Indicators

Ratio > 1: unemployment is **higher** relative to opioid related deaths in that state

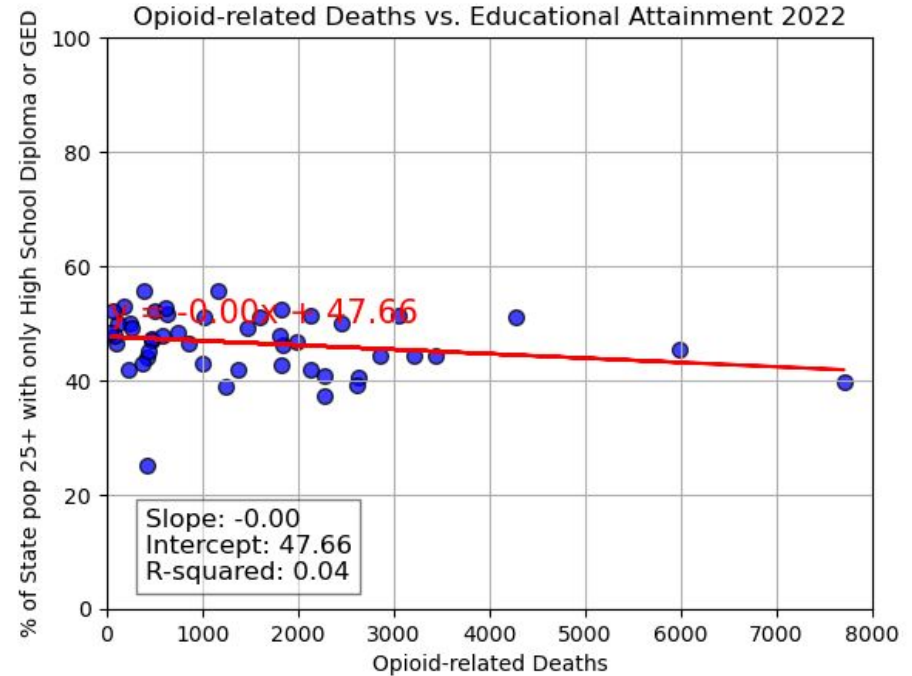
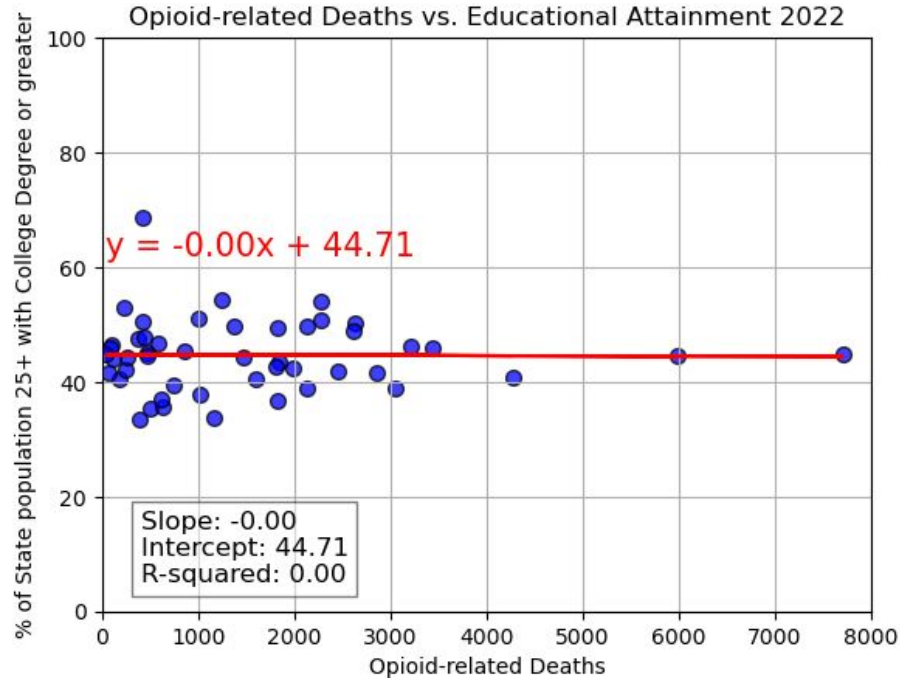
Ratio = 1: balance between contributions to unemployment and opioid deaths

Ratio < 1: unemployment **lower** relative to opioid related deaths in that state.

Source: CDC, US Census

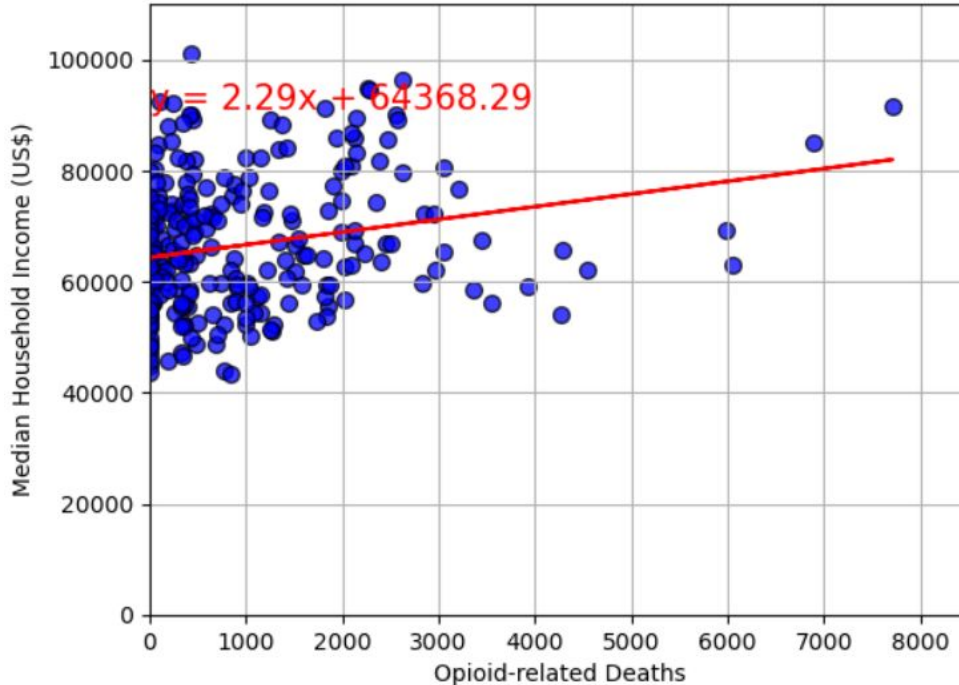


# Education attainment was **not found to be a predictor** of opioid related overdose



# Weak positive correlation exists between median household income and opioid death counts

2017-2019 & 2021-2022: Median Household Income and Opioid Deaths



Source: CDC, US Census

We further performed t-test and ANOVA on opioid deaths between above-average and below-average income groups. As there is no statistically significant difference, we concluded that **income level does not have a statistically significant effect on opioid deaths.**

## T-test

T-statistic = 0.958

P-value = 0.339

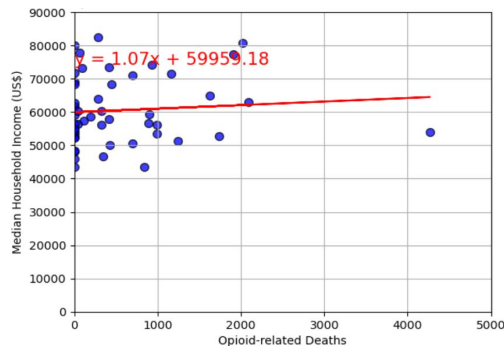
## ANOVA

F-statistic = 0.918

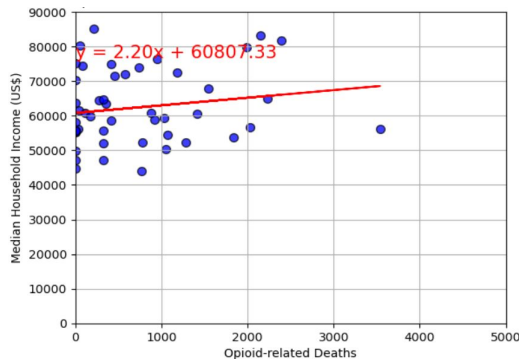
P-value = 0.339

# Weak to no correlation seen across all recent 5 year data

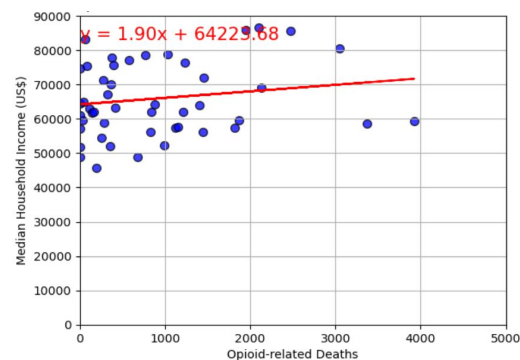
2017



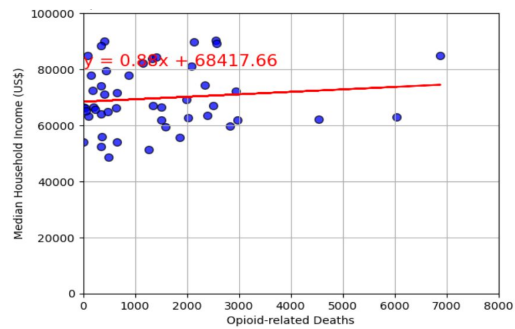
2018



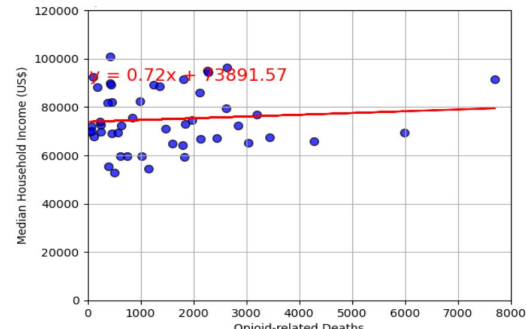
2019



2021



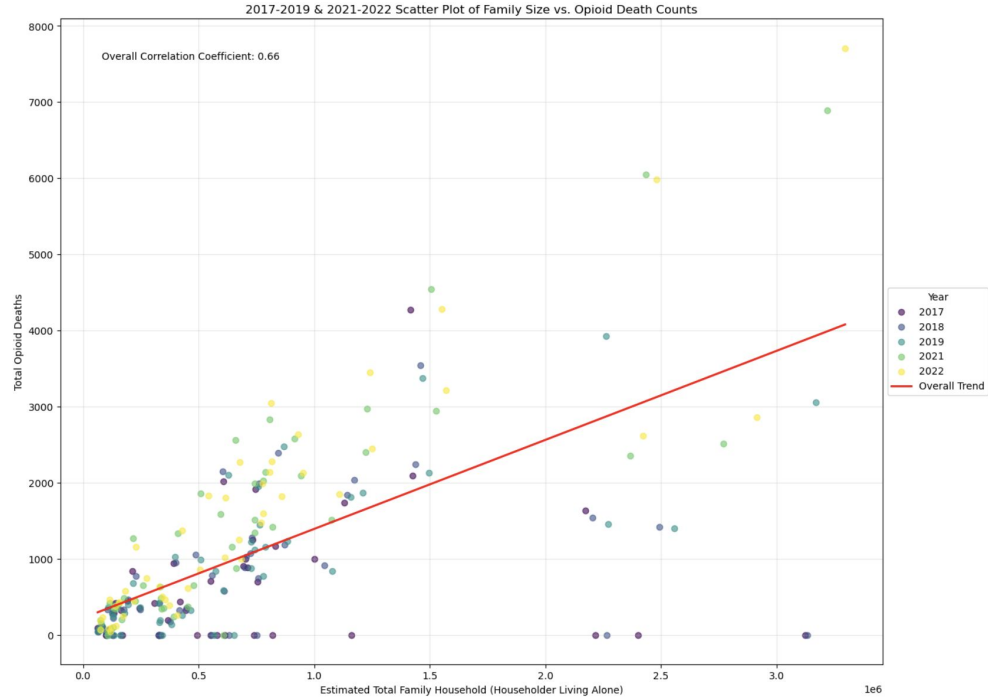
2022





# Analysis across 5 years shows **correlation** between family size and opioid deaths

Households living alone show a clear correlation with opioid deaths showing that living alone may be an increased risk factor when evaluating causes of opioid deaths.



# Q & A

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