Opioid Project: Backward Design

Group 9

Meixiang Du(md480), Revanth Chowdary Ganga(rg361), Titus Robin Arun(tra29), Suim Park(sp699)

Topic

The escalating issue of opioid misuse and the alarming rise in overdose deaths in America can be traced back to overuse of prescribed painkillers over the past two decades, which in turn has often led individuals down the path to using illegal drugs such as heroin and fentanyl.

In this project, we'll be **estimating the effectiveness of policy interventions** designed to limit the over-prescription of opioids.

Project Question

The project objective is to answer the following questions:

(1) Did opioid drug prescription regulations reduce the volume of opioids prescribed
(2) Did opioid drug prescription regulations reduce the number of drug overdose deaths

Project Hypothesis

(1) Stricter opioid prescription regulations are expected to reduce the volume of opioids prescribed.
(2) Newer prescription regulations may lead to a decrease in drug overdose deaths, stemming from a decline in opioid availability and misuse.

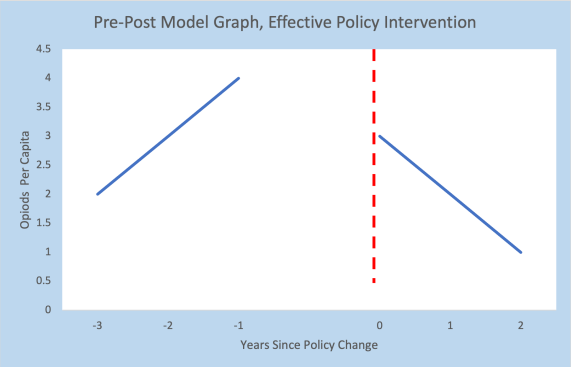
Model Results

Our primary focus is on the three states of Texas, Florida, and Washington, where drug prescription regulations have been implemented. We aim to compare these states with control states to assess the impact of these regulations on drug prescriptions and overdose deaths. Our evaluation will consider data from 1-3 years before and after the policy changes.

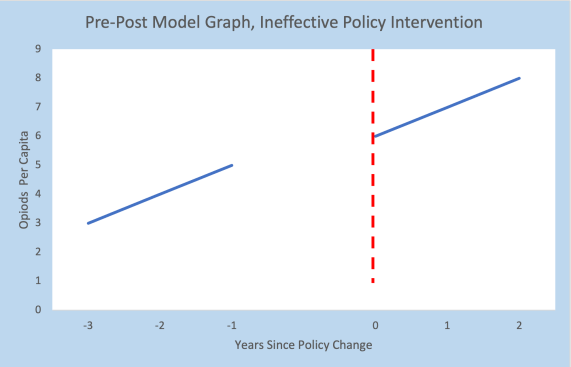
We will use the following approaches to study the impact on our key metrics: Opioid Prescriptions Per Capita and the Mortality rate from Drug Overdoses Per Capita.

(1) **Pre-post analysis:** Pre-post analysis helps us compare the state of condition before and after the policy implementation in each state individually.

Result if the hypothesis is true



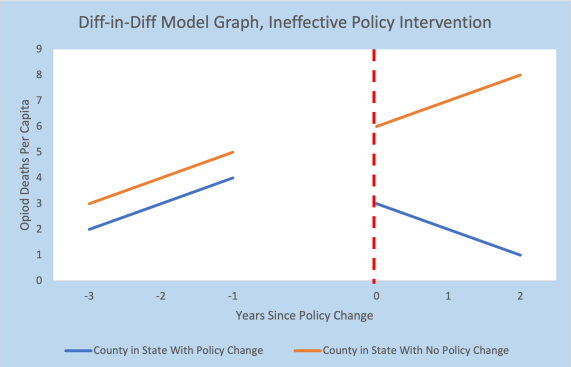
Result if the hypothesis is false



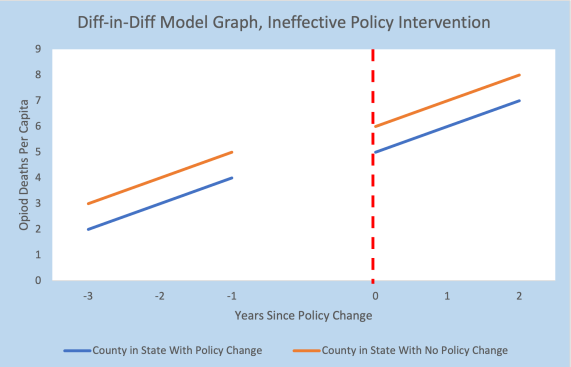
Interpretation: If the policy is successful, we expect to see a drop in the number of opioids prescribed and drug overdose deaths per capita post the policy implementation, else the trend is expected to continue as it was before the implementation of the policy.

(2) **Difference-in-Difference Analysis** : Evaluate the policy's effect by contrasting pre-and post-policy changes in opioid prescriptions and overdose mortality rates between states with the policy change and a control state with parallel pre-policy trends.

Result if the hypothesis is true



Result if the hypothesis is false



Interpretation: If the policy is successful, we expect to see a drop in the number of opioids prescribed and drug overdose deaths per capita post the policy implementation in the study state and the trend to continue as is in the control state, else the trend is expected to continue as it was before the implementation of the policy in both the study and control state.

Final Variables Required

The Variables that we require to perform these analysis are:

(1) Opioid Shipment quantities at a County-Year level.
(2) Number of Deaths at a County-Year level and the reason/category for death.
(3) Mapping of the State and Counties to the County FIPS codes
(4) Population of the counties at a year level (To calculate Per-capita values)

Data Sources

(1) **Population Dataset**

- We need a Population dataset at a County-Year level which will be merged with the Deaths and Prescription dataset using the County (FIPS) and Year columns.
- This dataset will be taken from the following link, which is the same datasource as the Drug Shipment dictionary.

(2) **Mortality Dataset**

- Will be Merged with the Population dataset using the County (FIPS) and year columns so as to calculate the Per-capita Mortalities due to Drug Overdose.
- This Dataset has already been provided.

(3) **Drug Shipment**

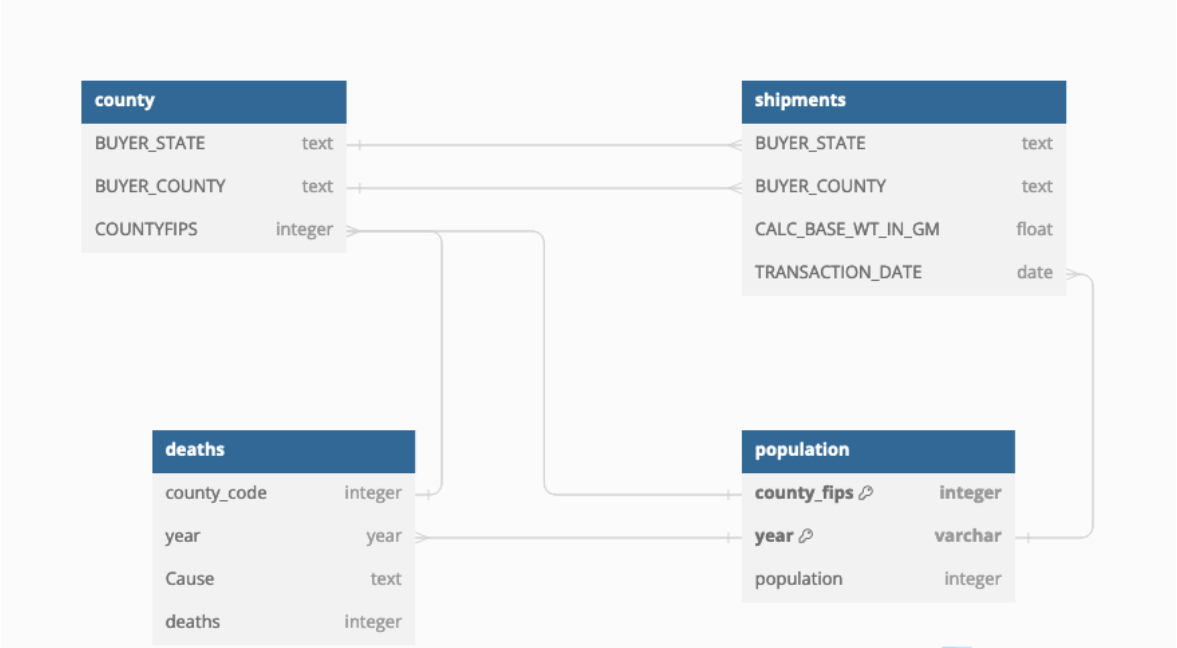
- Will be Merged with the Population dataset using the County(FIPS) and year columns (will be aggregated since original dataset has at date level) so as to calculate the Per-capita shipment of Opioids.
- This Dataset has already been provided.

(4) **County Mapping**

- This will be used to ensure all datasets are mapped correctly as same county names may be present in different states, so we will use standardized County-FIPS codes to perform the merges in the dataset.

- This data will be obtained from the following link. The same datasource as the Drug Shipment dictionary

Below is a tentative Data Flow Diagram with selected indicative columns:



Distribution of Responsibilities

- **Data Sourcing Population Data**: Suim
- **Data Cleaning**
  - Shipment Data: Meixiang
  - Death Data: Revanth
- **Data Management Management of Parquet Files and Data:** Meixiang
- **Selection of Comparable States Strategy and Criteria**: Robin
- **Data Analysis**
  - Florida State: Revanth
  - Texas State: Suim
  - Washington State: Robin