Estimate the Impact of Opioid Control Policies

(Report for Nick)

White Team

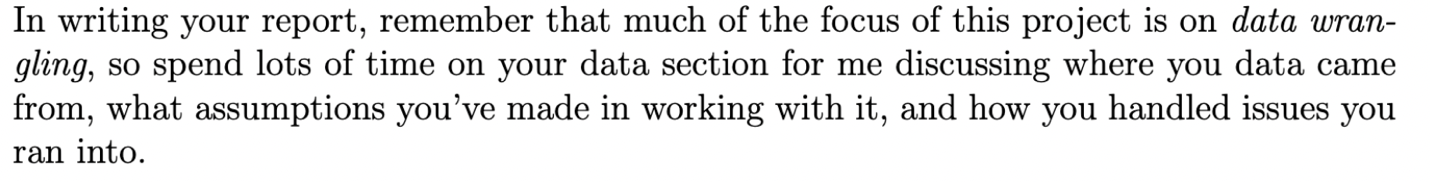
Chenxi Rong, Xiaoquan Liu, Fabian Schmid, Zhanyi Lin

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* Motivation for project [Motivation]
* Motivation for the research design being used [Motivation]
* Details of the data used and how different datasets have been related to one another

[May need adjustment by Fabian or Zhanyi]

Nick said: but I don’t know what you guys ran into, so I need your help!



* Summary statistics for your data [Zhanyi&Chenxi]
* Your analysis and your interpretation of that analysis [Zhanyi&Chenxi/waiting for graph]
* Conclusion [will add after finishing the analysis part by Xiaoquan]

**Motivation**

Opioids are a class of drugs that include prescription opioids (natural and semi-synthetic opioids and methadone), heroin, and synthetic opioids other than methadone (primarily fentanyl) that derive from, or mimic, natural substances found in the opium poppy plant and work in the brain to produce a variety of effects, including pain relief. Opioid drugs include prescription pain medicine and illegal drugs. Some people may experience euphoria, a joyful sensation of well-being, from opioids, whether they are legally prescribed or not. Opioids don't always generate euphoria, but for those who do, there's a chance they'll be used again and again because of how they feel. Therefore, even with a doctor's supervision, using opioids can pose risks. A person's tolerance and dependency to prescription drugs can develop over time, necessitating greater and more frequent dosages, finally leading to addiction and the person's turning to illegal markets in order to maintain their addiction, and subsequently causing death.

According to the Centers for Disease Control and Prevention (CDC), the number of drug overdose deaths has quintupled since 1999, and the rise in opioid overdose deaths can be outlined in three distinct waves: the first wave in the 1990s with increased prescribing of opioids, the second wave in 2010 with heroin, and the third wave in 2013 with synthetic opioids like fentanyl. In order to fight the opioid overdose epidemic, policymakers have made policy interventions to limit the over prescription of opioids. Texas regulations with regard to treating pain with controlled substances went into effect in January 2007. Florida’s legislature became effective in 2010, and a series of changes related to drug prescription took place in the following years. Washington regulated the prescribing requirements of opioids for pain treatment in January 2012, which included periodic patient reviews, milligram thresholds, strict documentation guidelines, and consultations with pain management experts.

For all three of these policy changes, we performed both pre-post analysis and difference-in-difference analysis to understand the effect of opioid drug regulations on both the amount of opioid shipments and drug overdose deaths. For pre-post analysis, we will demonstrate the trend of overdose deaths and opioid shipments over years. If policy had gone into effect, our plots would show a difference between how things were in each state right before the policy went into effect and right after the policy went into effect.

However, to further valid our analysis of causation between opioid drug regulations and both the amount of opioids shipments and drug overdose deaths, we need to eliminate the effect of confounders. For example, the US Customs Service managed to dramatically reduce the importation of fentanyl into the United States at the same time Florida’s policy went into effect, which would likely reduce the number of overdose deaths throughout the United States. If we were just to use pre-post analysis to bring a conclusion by comparing Florida in 2009 to Florida in 2011, we would wrongly attribute the decline in the amount of shipments and overdose deaths to Florida’s policy change. With difference-in-difference analysis, we used the observed outcomes of people who were exposed to drug regulations (i.e., data from Texas, Florida, and Washington) and people who were not exposed to drug regulations (i.e., for each of those states, we picked three states as comparison states) both before and after the policy went into effect to evaluate the impact of opioid control policies.

**Data:**

We used drug overdose death data from the US Vital Statistics records, prescription opioid drug shipments from the Washington Post, FIPS codes based on a file from the US Census, and US census population data.

All these data sets need at least a location name (to infer the county) and a temporal unit (to infer the year). The data sets were merged based on the county FIPS codes and the year. FIPS codes are already included in the population data set and the US Vital Statistics records. Based on the county and state names, FIPS codes were merged with the prescription opioid drug shipment data. Besides that, the raw data was aggregated at the county-year level so that the data was available for our preferred unit of observation.