Estimating the Efficacy of Opioid Control Policies

Policy Impact Report

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Introduction

This report examines the efficacy of policy attempts to disrupt prescription rates of, and mortality associated with, prescription opioids during the early 2000s. Opioids are painkilling drugs prescribed in various forms that are theoretically used to combat only the most significant and chronic pain conditions. However, prescription rates have risen over the years to alarming rates in some cases due to the drugs' effectiveness. A key concern is the addictive nature of these drugs and their propensity to lead to fatalities through overdose. When patients are no longer able to acquire opioids for one reason or another, there is a proposed likelihood for those persons to seek alternative, unregulated substitutes that have significantly higher probabilities of leading to overdose and death.

States began taking steps in 2007 to combat the rising rates of opioid prescription and overdose deaths in the country. The first state to take action was Texas. In 2007, the Texas Medical Board adopted new regulations that required practitioners to take additional steps before prescribing opioids to patients. These steps included patient evaluations and records reviews before prescribing, obtaining informed consent, and periodic treatment reviews. The second significant change we evaluated took place in Florida in 2010, when the state legislature began to regulate the activities of pain clinics operating in the state. Florida was unique in that it was home to 98 of the 100 offices prescribing the highest amounts of oxycodone (an opioid) in the nation. Working with the Drug Enforcement Agency, Florida Law Enforcement continued to step up its efforts to regulate those activities, even conducting targeted raids the following year. Last, Washington state took steps that became effective in 2012 to place additional requirements on physicians prescribing opioids. These regulations took a similar flavor to those in Texas, effectively raising the threshold of work required of medical practitioners before they could prescribe the drugs in question.

This analysis studies the efficacy of those policy actions for counties with populations greater than 250,000 residents, according to the 2010 U.S. Census. The team uses this cut-off as it best preserves the integrity of the data while also allowing for a generally homogenous study group. While this decision may limit the reach of the analysis, we found little difference in other statistical treatments to cope with this challenge. The results appear robust, and we are confident in our estimation of the effectiveness of the policies examined.

In summary, we find that policy actions in Florida were the most effective, with observed and positive changes to both opioid prescriptions and unintentional overdose deaths. Texas saw some improvement in accidental overdose fatality rates, the only category we measured Texas in for data-related reasons. However, the magnitude of the effect was less than in Florida. Washington state had the least favorable outcome. We assess that Washington's policies were ineffective at combating opioid prescriptions and unintentional overdose fatalities.

Methods

Overview

In analyzing the effectiveness of policy changes in Florida, Texas, and Washington, we will consider two measurements: (a) opioid drug shipments (standardized, morphine equivalent amount) and (b) mortality from drug overdoses. We will only be analyzing deaths from drug overdoses in Texas due to a shortage of data available. Our interest in examining mortality as well as opioid prescriptions comes from the fact that while restricting access to opioids may reduce the likelihood that future patients will end up addicted to opioids, it may drive already addicted patients to turn to alternative forms of opioids, be those illegally purchased prescription drugs, heroin, or fentanyl. This possibility is deeply troubling because the likelihood of overdosing on these illegal drugs is much higher than on (monitored) prescription drugs, as drug users won't know the true strength of illicit drugs.

Pre-Post Analysis

In this analysis, we will look at the trend of drug overdose deaths and opioid prescriptions before and after the year the policies went into effect for each state. Here, we assume that if the policy had not been implemented, the trend would continue in the same direction. If the policy was effective, we should see a decreasing trend for opioid prescriptions in the years after. When evaluating overdose-related deaths, we expect to observe an increase in this trend as addicted patients turn to other, more dangerous substances. If the policy is ineffective, the trend should continue in the same direction.

Difference-in-Difference Analysis

Since other unknown factors may have resulted in the observed change in trend in pre-post analysis, we will also carry out a difference-in-difference analysis. Examples of such factors include prescription drug shortages that limit distribution, new dosage guidelines that lower prescription amounts, or the advent of an emergency treatment to counteract an overdose in progress. Any of those elements could affect the pre-post analysis for a given state. To compensate, we include an added dimension of comparing the current state with similar states before and after the implementation of the policy. If the policy was effective, there should be a more significant change in opioid prescriptions and overdose deaths than in other states that didn't change their policies. If the policy was ineffective, the difference in difference should be low. Here we assume parallel trends between the states before the policy went into effect.

For the three states identified in our analysis, we select a comparison group of states for reasons specific to each. We constructed a comparison group for Texas from Oklahoma, Georgia, Alabama, and Arizona. The consideration for these states is balancing geographic proximity, cultural similarity as southern states, and population, although Texas is easily the largest state in the group. In the case of Florida, we will construct the comparison group of Georgia, South Carolina, and Alabama for geographic proximity and cultural similarity and Arizona for demographic similarity. For Washington, we elected to construct the comparison group from Oregon, Idaho, and California, all states geographically close and somewhat similar to Oregon's demographic and cultural balance.

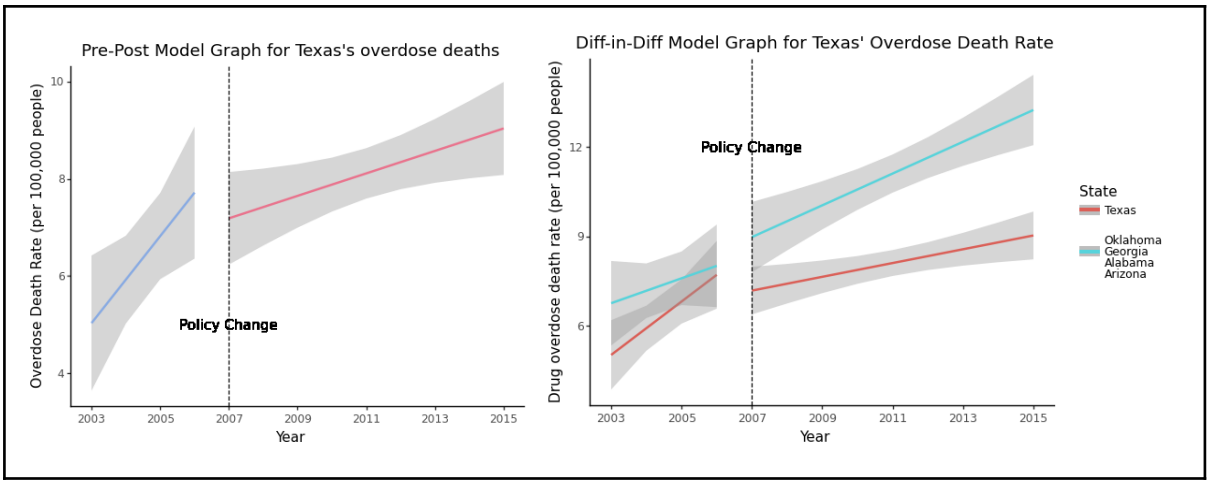
Data

This analysis relied on data from four primary sources. Federal Information Processing System (FIPS) codes were captured from the Federal Communications Commission to establish the base geographic unit for the analysis. The 2010 U.S. Census was added to calculate shipment and overdose rates. The team selected the 2010 Census as the base measurement due to its central nature among the years of the dataset rather than electing to use annual estimates. Opioid shipment information was added to capture the quantity and timing of opioid shipments to counties throughout the U.S. as tracked by the Drug Enforcement Agency. The last dataset contained Drug Overdose Mortality information from the Centers for Disease Control. These datasets combined yielded information about geographic units of interest and opioid shipment and drug overdose fatality rates for the years of interest in the analysis.

Analysis

In the analysis below, we examine Texas, Florida, and Washington's policy changes through the lens of the two analytical techniques described. In all cases, we describe per capita rates of drug shipments and overdose deaths as an incidence rate per 100,000 residents. Because of limitations on data availability due to the Health Insurance Portability and Accountability Act , we are using opioid shipments as a stand-in measurement with the assumption that there is a near 1:1 relationship between opioids sent to a geographic area and the amount prescribed in the same area. Results are presented chronologically.

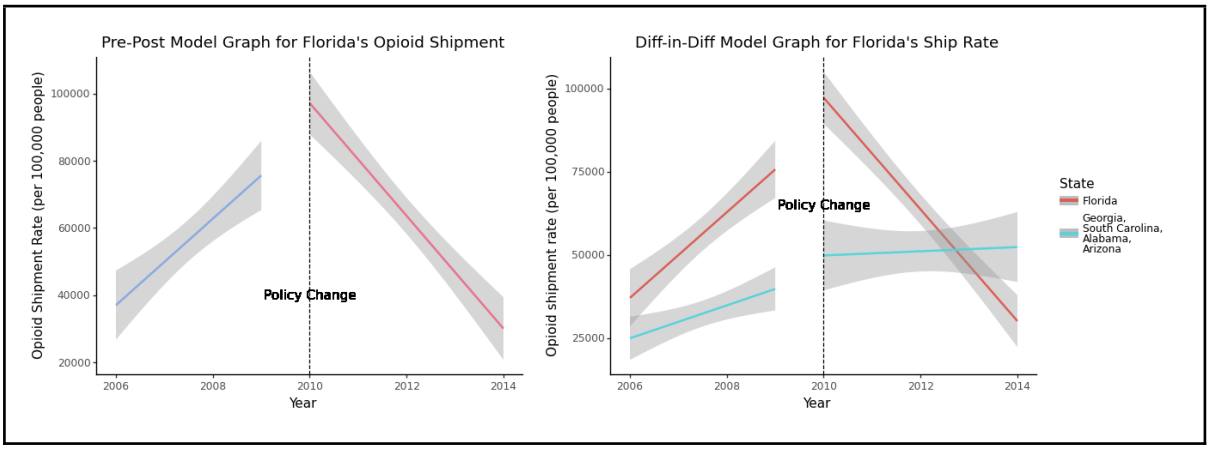
Texas



Interpretation. From the plot of overdose deaths in Texas above-left, we see that before the implementation of the policy in 2007, there was a steep increasing trend in the overdose death rate. After the policy went into effect, we saw the rate of increase in overdose deaths decrease. Comparing Texas to a control group above right, we observe a steeply increasing trend in overdose death rates per 100k people for both groups. After the policy change, we see that the trend remained the same for the states similar to Texas but slowed down for Texas. Since the rate of increase of overdose deaths decreased and the difference in the trends for Texas compared to the states similar to it is significant, we can conclude that the policy was effective.

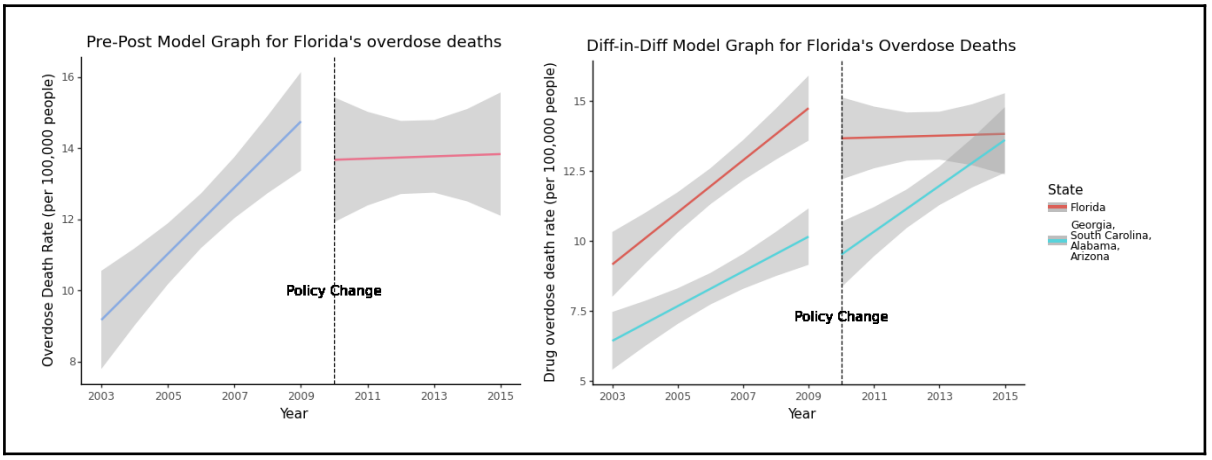
Florida

Opioid Shipments



Interpretation. From the opioid shipment plots above, we see that before the implementation of the Florida policy in 2010, there was a steep increasing trend in the opioid shipment rate per 100k people in the state. After the policy went into effect, we saw a change in the direction of the trend, with shipments decreasing over time. The difference-in-difference graph on the right paints a favorable picture. Before the implementation of the policy in 2010, there was a steep increasing trend in the opioid shipment rates for both Florida and the states similar to Florida. After the policy went into effect, the trend for the states similar to Florida remains slightly positive. Because of these combined observations, we can conclude that the policy positively impacted opioid prescriptions in Florida.

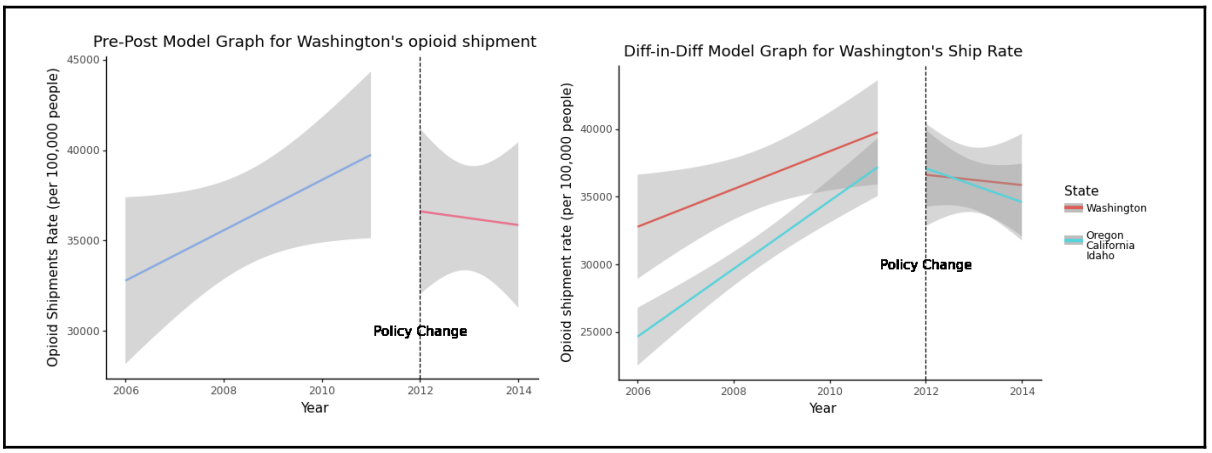
Overdose Fatalities



Interpretation. From the plots above, we see that before the implementation of Florida's policies in 2010, there was a steep increasing trend in the overdose death rate per 100k people for both Florida and the states similar to Florida. After the state implemented the policy, the trend in overdose death rates remained the same for the states similar to Florida but slowed down for Florida. Since the difference in the trends for Florida compared to the states similar is significant, we can conclude that the policy was effective.

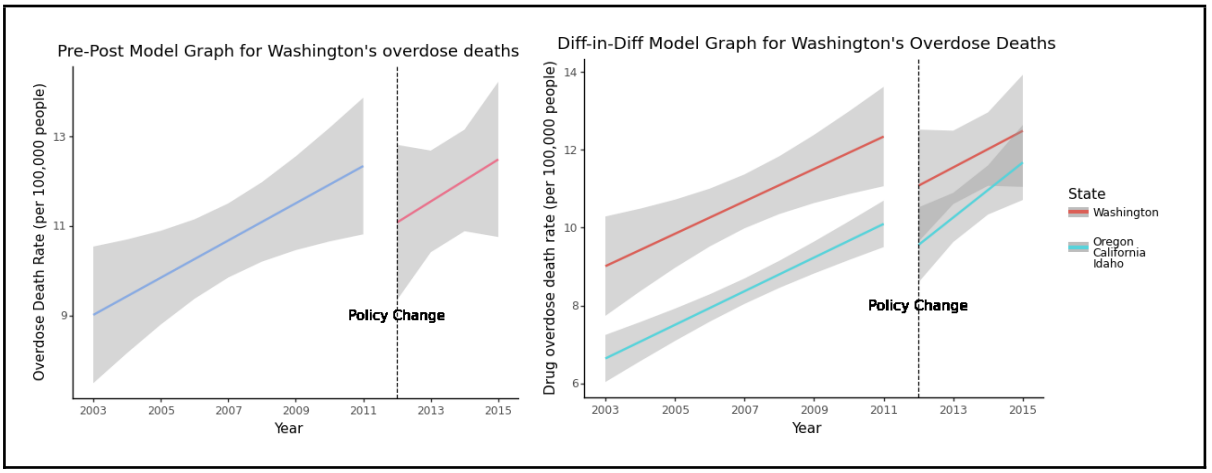
Washington

Opioid Shipments



Interpretation. From the plots above, we see that before the implementation of the policy in 2012, there was a steep increasing trend in the opioid shipment rate per 100k people for both Washington and the states similar to Washington. In the part of the plot corresponding to after the policy went into effect, we see a change in direction for shipment rate for both groups. While the trend has shifted noticeably after the policy change, it has also done so in the comparison states. Since there is less decrease in the trends for Washington compared to the states similar to it, we can conclude that the policy was ineffective and attribute the change in direction to an element not captured in this analysis.

Overdose Fatalities



Interpretation. From the overdose deaths plots above, we see that before the implementation of the policy in 2012, there was an increasing trend in the overdose death rate in Washington. After the policy went into effect, we see the trend for overdose death rate remains roughly the same after an initial decrease in 2012. While the policy may have been responsible for the initial decline in the overdose death rate in 2012, it was ineffective in changing the increasing trend over time. Washington's continuing trend is slightly less than similar states but almost the same. We can therefore assume that Washington's policy change was ineffective at impacting opioid addiction.

Limitations

In conducting this analysis, the team identified three areas worth considering when analyzing these results in light of policy efficacy. First, the data utilized is missing a potentially large number of fatalities due to the methodology in which this data was collected and stored. Vitality statistics omit any county with less than ten annual fatalities in a specified category. Therefore we are theoretically absent a significant number of records that could influence our findings. This does not mean all counties without records had data omitted. Smaller counties could go an entire year without a drug-related overdose death or ten. We mitigated this issue by down-selecting to counties that have populations over 250,000. This resulted in a much smaller amount of missing data and an analysis with the most significant degree of transferability to other population groups.

The second and third limitations are specific to the nature of drug prescriptions and sales in the U.S. The dataset used to estimate prescription rates in the states measures the volume of opioids shipped to each location, not the amount prescribed. We can reasonably infer a direct, 1:1 correlation between these two measurements, but it is worth pointing out that HIPAA regulations limit our ability to measure actual prescriptions. Therefore, we use shipments as a one-step-removed solution. The final issue we face is the nature of unregulated opioid sales, or "drug deals," in the U.S. There is simply no reliable way to capture this information, which is a potentially important part of this analysis. We can measure overdose deaths, but we cannot accurately reason the number of people who successfully ended their opioid prescriptions without becoming addicted to a substitute drug on the black market.

Conclusion

The outcome of the analysis does not match the inferences we expected to make. We expected to see decreasing trends after the policy implementations for all the states of interest, which would indicate the success of the applied policies. The analysis shows that Florida's policy change successfully significantly decreased opioid shipments and overdose deaths. Texas's policy change was somewhat successful, as it reduced the rate of overdose death growth. We see that Washington's policy change was unsuccessful since it had no perceptible effect on opioid shipments or overdose deaths.

The potential reasons for a successful policy can be estimated by comparing the successful change in Florida to the unsuccessful change in Washington. In Florida, the approach combines several step-by-step measures and imposes severe punishments for failure to comply with the legislation or enforcement agencies. However, in Washington, the policy only regulates pain treatment, requiring annual reviews, specialist consultations, and recommendations. The approach in Florida has more mandatory requirements and regulations, setting effective supervision measures and strict penalties. Thus, to make a successful policy, these aspects need to be considered.

While the policies applied may control the use of opioids, we should also consider the negative effect they may have on people addicted to prescription opioids and turn to more dangerous drugs to sustain their addiction.

Works Cited

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