

Estimating the Impact of Opioid Control Policies

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Executive Summary

The opioid crisis in the United States, especially from 2005 to 2015, represented a significant public health challenge characterized by an increase in opioid overdoses and a decline in life expectancy. This research focuses on the impact of opioid policies in Texas, Washington, and Florida, examining their effects on opioid prescriptions and overdose deaths. The objective is to assess the efficacy of these policies in curtailing opioid misuse and fatalities, offering insights for future policymaking.

The study utilizes three primary data sources: Population Data from the CDC, Opioid Prescription Shipment Data covering shipments from 2006 to 2019, and Mortality Data from US Vital Statistics. These datasets provide a comprehensive view of the population demographics, the potency and quantity of opioids prescribed, and the resultant mortality trends.

The methodological approach includes the identification of policy implementation timelines, pre-post analysis of the data, and difference-in-difference analysis comparing states with and without policy changes. These methods help in understanding the immediate and long-term impacts of these policies.

Key findings from the study reveal:

- In Texas, an initial decline in opioid-related deaths was observed post-policy implementation, but the long-term effectiveness was limited.
- Florida experienced a significant and sustained reduction in both opioid prescriptions and overdose deaths following policy implementation.
- In Washington, the policies showed minor effectiveness, with trends similar to control states.

The study concludes that Florida's approach was the most effective, indicating that similar policies could potentially be more impactful in other states facing the opioid crisis. Texas and Washington's results suggest the need for more targeted and robust policy interventions. The full report provides an in-depth analysis, complete with detailed data, methodologies, and interpretations.

Introduction

The United States has experienced a significant rise in opioid abuse over the last two decades, stemming from increased prescription opioid use. This steady and alarming increase in overdose deaths contributed to a decline in overall life expectancy. This escalation has led to a sharp increase in opioid addiction and related fatalities, including deaths from prescription overdoses and a transition to non-prescription opioids like heroin and fentanyl. This shift is particularly concerning as users often turn to illegal drugs, which pose a higher overdose risk due to unknown strengths and the potency of substances.

In response to this escalating crisis, several states took proactive steps to implement policies aimed at curbing the misuse of opioids. These initiatives were varied in nature and scope but shared a common goal of reducing the availability of opioids and enhancing the monitoring and control of opioid prescriptions. This strategic shift by states led to our research question: How did these policies impact opioid drug prescriptions and overdose deaths?

To analyze the impact of these policies, we focused on three states, each with its unique approach to tackling the opioid crisis. These states serve as case studies, providing valuable insights into the effectiveness of different strategies and interventions. By examining the outcomes in these states, the study aims to offer a clear understanding of how state-level policies can influence opioid misuse and related mortality rates. The findings from this research are intended to inform future policy decisions, guiding the development of more effective responses to the challenges posed by opioid misuse and related public health concerns.

Data

To understand the effects of opioid prescription regulations on prescribing patterns and drug overdose deaths, we selected specific datasets that align closely with our research goals. The Opioid Prescription Shipment Data helps us measure how opioid distribution has changed, which is key to understanding the direct effects of these regulations on prescription practices. Meanwhile, the Vital Statistics Mortality Data gives us crucial insight into a major consequence of opioid abuse, namely overdose deaths, and how these have been impacted by policy changes. Additionally, we used population data to put these shipment and mortality figures into context, adjusting them according to population sizes to ensure our findings accurately reflect the true impact of opioid policies.

A. Population Data

Sourced from the CDC, this [dataset](#) offers annual population figures for each state and county. The use of population data is critical for normalizing the opioid shipment and mortality data on a per capita basis. This normalization allows for more accurate comparisons between areas of differing populations, ensuring that our analysis accounts for population density and size.

B. Opioid Prescription Shipment Data

Covering prescription opioid shipments in the U.S. from 2006 to 2019, this [dataset](#) from the Washington post includes detailed information about quantity and type of opioids shipped. For this analysis we will be using the Morphine Milligram Equivalent (MME) from the dataset, a standard measure used to quantify and normalize the potency and quantity of different opioids. Since different opioids have different doses and potency, MME allows us to make an accurate comparison of the trends by normalizing these values to a standard unit of measure.

C. Mortality Data

This [dataset](#) is sourced from US Vital Statistics and contains a list of drug and alcohol related deaths under different categories, which forms the basis for analyzing the number of deaths due to opioid prescriptions. This dataset categorizes causes of deaths and death counts by year, county, and state, thereby providing insights into mortality rates linked to opioid use.

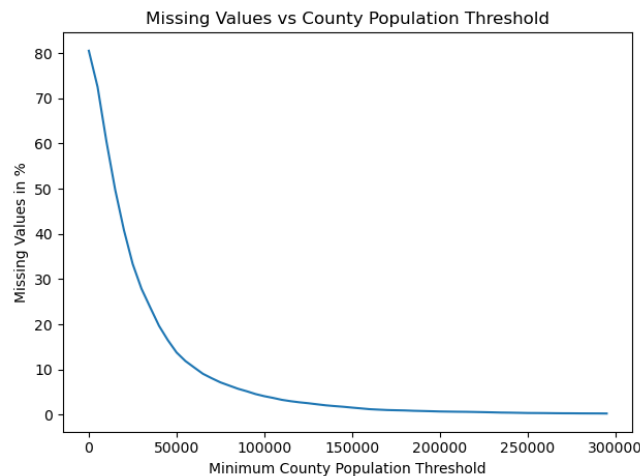
However, handling this dataset posed certain challenges, particularly regarding missing mortality data. The US Vital Statistics Agency censors some data, in the case that the number of people in a given category (i.e. one county / year / cause of death category) is less than 10, that data does not appear in the data. To address these issues and ensure the integrity of our results, we adopted the following methodology:

- **Assumption Based on Cause of Death:** To refine our approach in addressing the incomplete mortality data encountered in our analysis of the opioid crisis we first analyzed the distribution of the cause of death reported in the dataset, and found that certain categories did not have any reportings for a few states and counties across the years.

To reduce the number of imputations to preserve the original data trend we restricted our analysis to the unintentional deaths due to drug overdose category since this was the most observed and consistent category, under the assumption that the trend of all drug related deaths would be similar.

- **Estimating Missing Data Based on State Trends:** In instances where county-level data was incomplete, we used state-year level mortality rate to make educated estimates of missing figures. This was done cautiously, with a cap(9) on the estimated figures to align with known reporting standards as mentioned above to avoid overestimation. This method allowed us to fill in the gaps in the data in a way that was both logical and consistent with existing patterns, ensuring a more complete and accurate analysis.
- **Limiting Analysis to Large Population Centers:** The combination of state-county-year was obtained from the population dataset and revealed the missing combinations from the original death dataset. Due to a high number of missing counties in the original dataset we concentrated our analysis on larger counties with populations above 50,000 so that the number of imputations performed is limited to ~10-15% of the dataset to preserve the original data trend.

Figure 1. Missing Values % vs Minimum County Population



There is a initial sharp decline in missing value % with the increase of threshold, around 50,000 the missing values % is 10-15% and it stabilizes around a threshold of 1,50,000

This decision was made to enhance the reliability and relevance of our findings. By focusing on areas with more comprehensive data, we aimed to provide a clearer and more accurate picture of the impact of opioid policies on mortality rates.

Methodology

Implementation Time of Policies

A crucial aspect of our methodology involves identifying and analyzing the specific time points at which opioid control policies were implemented in various regions. Understanding the implementation timeline of these policies is essential for establishing a baseline in our analysis. This baseline enables us to assess the changes in opioid prescription patterns and mortality rates effectively.

Pre-post Analysis

Pre-post analysis is a key methodological approach for us to compare the situations in each state before and after the implementation of opioid control policies. This method is instrumental in revealing immediate changes and trends that can be directly attributed to the policy interventions, thereby offering a straightforward way to gauge their initial impact. By examining data from periods immediately preceding and following the policy, we can assess the short-term effects of these interventions on opioid prescription rates and overdose mortality. This approach not only provides clarity and simplicity in evaluating the impact of policies but also helps in identifying broader trends in opioid usage and related deaths.

Difference-in-difference Analysis

Difference-in-difference helps us infer causal relationships from the data. This method is essential for comparing changes over time between states that implemented opioid policies and those that did not. Instead of simply examining a state before and after a policy change, this approach expands the comparison to include states without such policy changes. By doing so, it allows us to isolate the effects of the policy from other external factors or nationwide trends.

For instance, if a state implemented an opioid policy and subsequently experienced a decrease in overdose deaths, the difference-in-difference analysis helps determine whether this decrease was actually due to the policy or a result of broader national phenomena affecting all states. We compare the change in the target state ('difference' from pre-to-post) against changes in control states over the same period. This comparative framework is vital to assess whether there is a significant 'difference in those differences,' which indicates the true impact of the policy.

Control States and Selection Rationale

In our study examining the impact of opioid policies in three specific states, we selected three control states for each target state to observe the changes before and after policy implementation. These control states were identified based on their geographic proximity to the target states, similarity in trends pre-implementation of drug control policies in the target state and the absence of similar opioid regulatory measures during the period when the target states implemented their policies.

1. **Texas (2007):** Louisiana, New Mexico, Oklahoma
2. **Florida (2010):** Georgia, Alabama, South Carolina
3. **Washington (2012):** Idaho, Oregon, Minnesota

Anticipated Outcome

In the context of evaluating opioid policies in Florida, Washington, and Texas, it is anticipated that successful policy interventions would lead to a decrease in opioid prescriptions. However, it should be noted that the relationship between policy changes and drug-related deaths may not be straightforward. While reduced access to prescription opioids could lower the risk of new addictions, there's a possibility that individuals already addicted might turn to alternative, potentially more dangerous substances. This could lead to a scenario where drug-related deaths either stabilize or increase, despite the decrease in prescriptions, as those in recovery might face higher overdose risks if they revert to opioid use.

Results & Interpretation

Texas (2007)

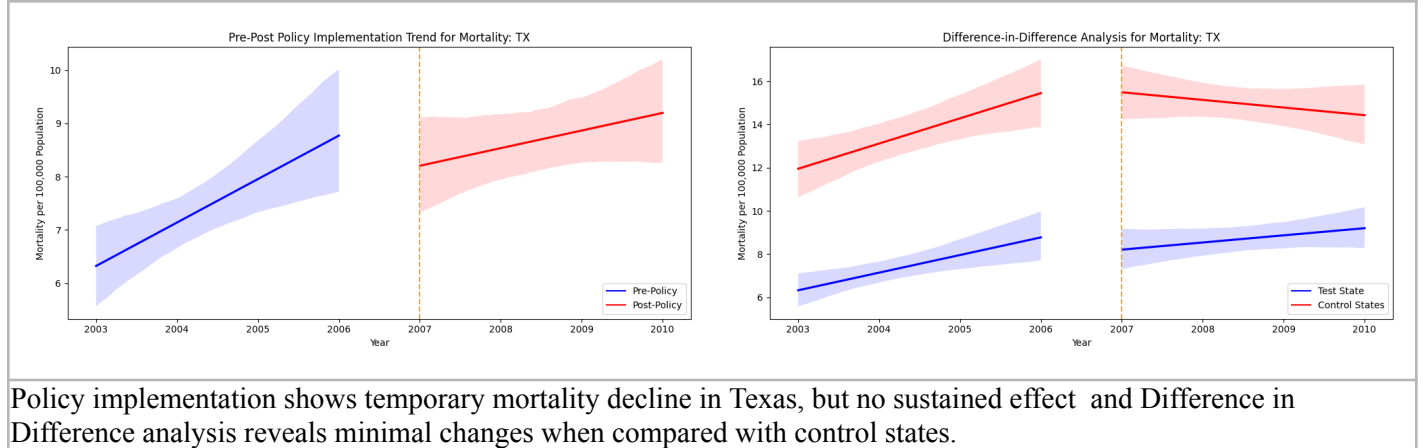
Control States: Louisiana, New Mexico, Oklahoma

In Texas, with policies effective from January 4, 2007, the Medical Board introduced specific regulations for treating pain with controlled substances. These guidelines emphasized the importance of conducting a thorough patient evaluation before prescribing opioids, which included reviewing the patient's prescription data and history in the state's prescription drug monitoring program (PDMP). Physicians were also required to obtain informed consent for opioid treatment, conduct periodic reviews, and maintain complete medical records of the patient's treatment. This approach was aimed at ensuring more responsible and monitored use of opioids in medical treatments.

The analysis of opioid-related mortality trends in Texas presents a nuanced picture. Before the implementation of opioid control policies in 2007, Texas experienced a rising trend in opioid-related deaths. Following the policy's enactment, there was an initial decline in mortality rates, suggesting an immediate impact of the policy. However, this decline was not sustained; the trend in opioid-related deaths resumed its upward trajectory.

When comparing Texas with control states that did not implement similar policies, the immediate effect of Texas's policy becomes more evident. Initially, Texas showed a reduction in mortality rates compared to these states. Nonetheless, over time, the trend in Texas aligned with that of the control states, indicating that the long-term effectiveness of the policy might have been limited. This pattern suggests that while the policy may have had an initial positive effect in reducing opioid-related deaths, its enduring impact was comparable to states that did not enact similar measures.

Figure 2. Opioid Mortality Trends Before and After Policy Implementation in Texas



Florida (2010)

Control States: Georgia, Louisiana, North Carolina

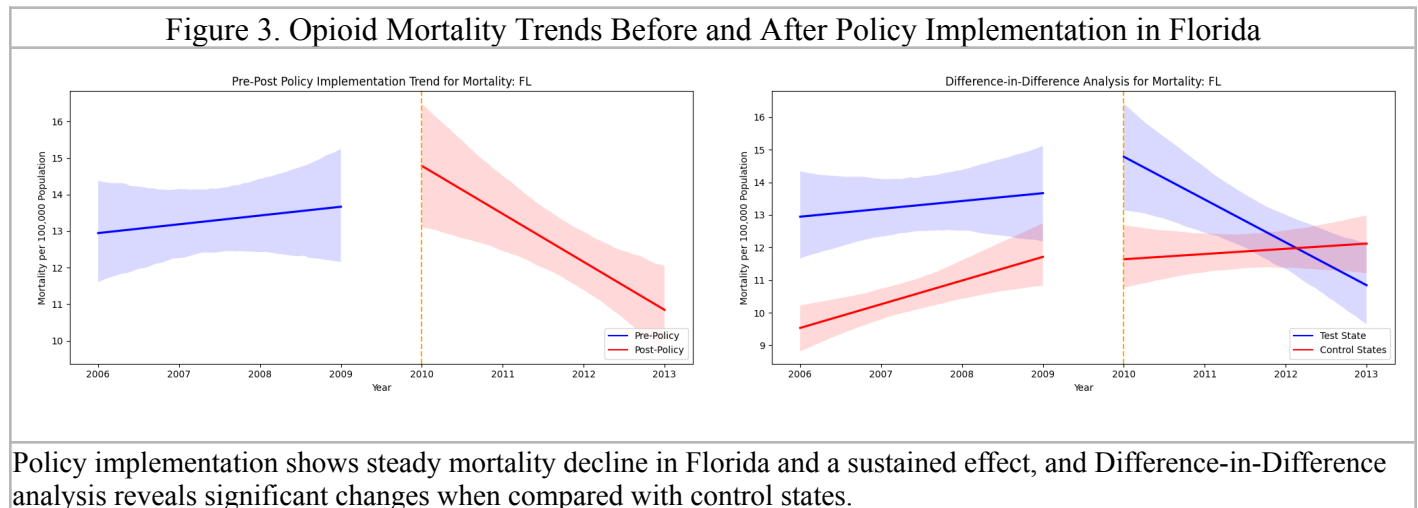
In Florida, effective from February 2010, a series of policy changes were enacted in response to the rampant misuse of prescription drugs, particularly opioids. This initiative was driven by the proliferation of pain clinics that were loosely prescribing large quantities of drugs, often without substantial medical justification. To combat this, Florida required pain clinics to register with the state by January 2010 and initiated Operation Pill Nation in collaboration with law enforcement in February 2010. Further expansions to pain clinic regulations were made later in the year. In July 2011, in line with a public health emergency declaration, the state legislature took additional steps, including prohibiting physicians from dispensing schedule II or III drugs from their offices and implementing mandatory dispenser reporting to a newly established prescription drug monitoring program. By 2012, the state also expanded the regulation of wholesale drug distributors and created a task force focused on prescription drug abuse.

Mortality Trend Analysis

The examination of Florida's opioid-related trends provides a distinct contrast to Texas. Prior to the implementation of opioid control policies in 2010, Florida was witnessing a consistent increase in opioid-related mortality rates. The introduction of the policy marked a significant turning point, with a swift and notable reduction, signaling the policy's immediate efficacy.

In the comparative analysis, Florida's results post-policy implementation stand out against those of the control states, which either experienced a less significant decline or maintained their pre-policy trends. This stark differentiation not only underscores the policy's initial success in curtailing overdose deaths but also its sustained effect over the subsequent years.

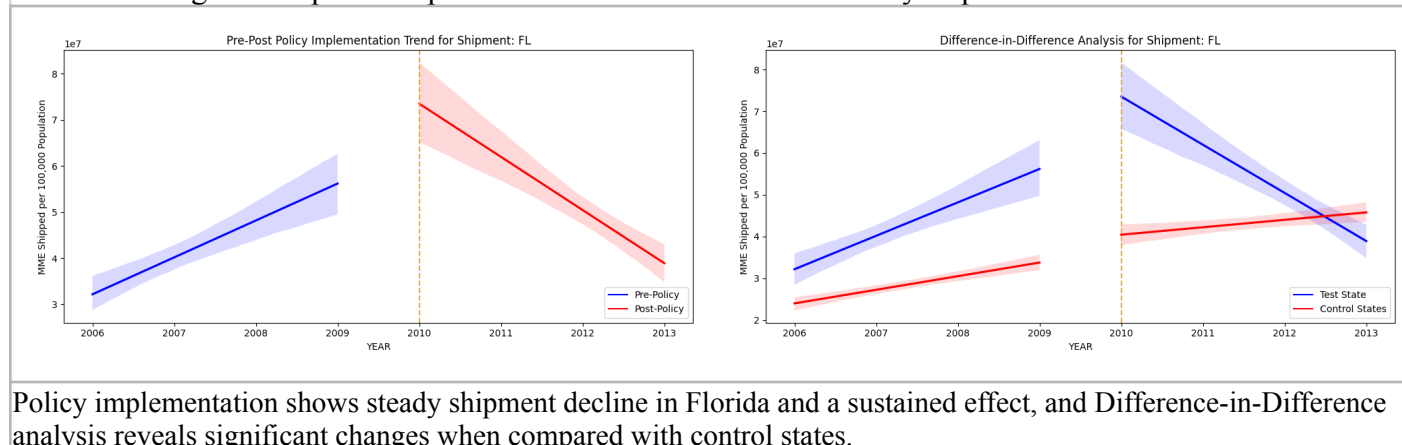
The data from Florida indicates that the policy had a substantial and persistent positive impact, demonstrating a decline that diverges from the trends observed in the control states. This sustained pattern of reduction postulates that Florida's policy interventions were effectively targeted and enforced, leading to outcomes that were not only immediate but also enduring, setting them apart from states that had not implemented similar opioid control measures.



Opioid Prescription Shipment Trend Analysis

The opioid shipment trends in Florida showed a similar pattern as observed for the mortality trends. Before implementing control measures in 2010, the state witnessed a consistent rise in opioid shipments and showed an effective downward trend which was not observed in the control states suggesting the policies positive impact.

Figure 4. Opioid Shipment Trends Before and After Policy Implementation in Florida



Policy implementation shows steady shipment decline in Florida and a sustained effect, and Difference-in-Difference analysis reveals significant changes when compared with control states.

Washington (2012)

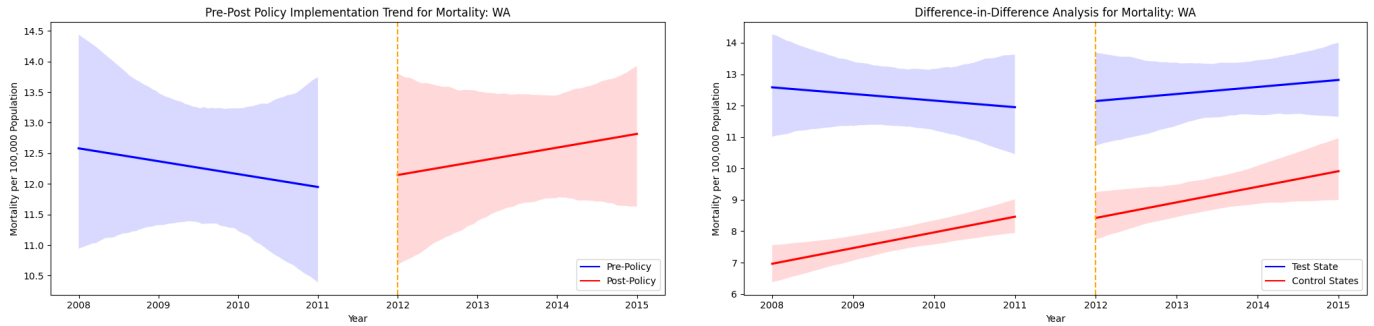
Control States: Oregon, Wisconsin, New Jersey

Washington State, starting January 2, 2012, adopted a new rule regulating the prescribing of opioids for pain treatment. This included specific requirements such as conducting periodic reviews for patients on stable, non-escalating daily doses of 40 mg MED/day or less. A significant aspect of these regulations was the mandatory consultation threshold set at 120 mg MED/day for adults, requiring physicians to consult with a pain management specialist when prescribing dosages at or above this threshold. The rules also recommended that practitioners should not prescribe more than an average MED of 120 mg without evident patient improvement or prior consultation with a pain management expert. These measures were instituted to ensure more prudent and monitored opioid prescribing practices.

Mortality Trend Analysis

Washington's policy, implemented in 2012, exhibited an upward trend post policy implementation pertaining to mortality death, and in fact had a slight downward trend before the policy was introduced. This contradicts expected outcome signally ineffectiveness in opioid prescription policy regulations in the state of Washington.

Figure 5. Opioid Mortality Trends Before and After Policy Implementation in Washington

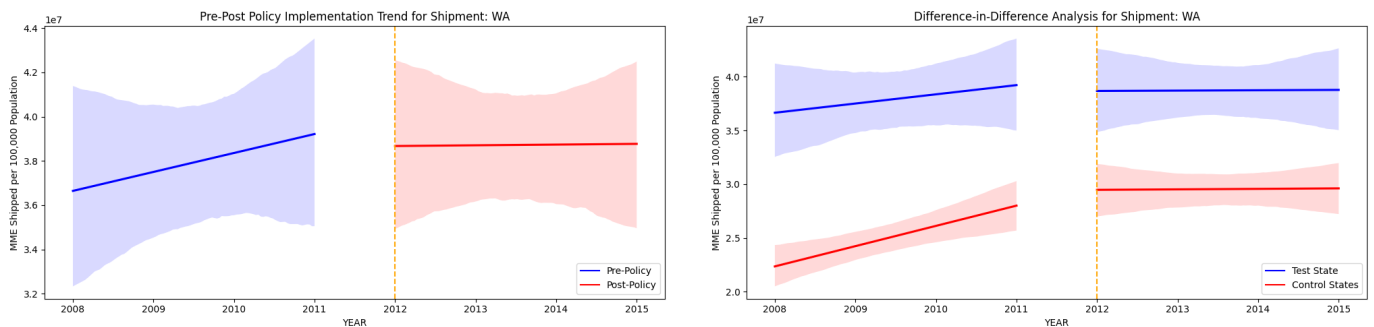


Policy implementation shows a mortality incline in Washington with a contradictory effect, and Difference in Difference analysis reveals no impact when compared with control states.

Opioid Prescription Shipment Trend Analysis

While the initial pre-post analysis showed an upward trend which flattened post policy implementation suggesting minor policy effectiveness, the difference-in-difference analysis showed that a similar trend occurred in the control states as well implying that the change observed in the trend for Washington might be due to other factors other than the opioid regulations enacted by Washington state.

Figure 6. Opioid Shipment Trends Before and After Policy Implementation in Washington



Policy implementation shows slight shipment decline in Washington, and Difference-in-Difference analysis reveals flattened shipment when compared with control states.

Conclusion

For policymakers, Florida's approach emerges as the most impactful, showing significant reductions in both opioid prescriptions and overdose deaths. This suggests that policies similar to those implemented in Florida could be more effective in other states grappling with the opioid crisis.