EXECUTIVE SUMMARY

The opioid crisis in the US is a term used to describe the exponential increase in opioid consumption and opioid-related deaths in the early to late 2000s. In response to these changes, several states implemented policies in an attempt to control opioid intake and mortality in their states, such as, educating the public, implementing prescription drug monitoring programs, and enforcing policies to regulate pain clinics to name a few. This report's objective was to gain a better understanding of the effectiveness of opioid control policy changes on opioid consumption and opioid-related mortality, specifically in Texas, Florida, and Washington (i.e., the treatment states). These three states were chosen since each of them had high opioid-consumption but also implemented a succession of policy changes over the span of a few years (2007, 2010, and 2012 respectively), all in response to the opioid crisis. It was hypothesized that the opioid-control policies had a causal effect on the reduction of opioid consumption and opioid-related mortality rates in the treatment states.

To test this hypothesis, two forms of analyses were done to gain a deeper understanding of these policy implementations' effectiveness: pre-post analysis and difference-in-difference analysis. Pre-post analysis allowed for a simple interpretation of the changes in opioid consumption rates and opioid-related death rates before and after policy implementation in each state. Difference-in-difference (DiD) allowed for a more objective understanding of the same, by adding an additional attribute of ‘control states,’ i.e., including a method of comparison against the treatment states consisting of a combination of states that showed similar opioid consumption pattens before policy implementation in the given treatment state. These control states were chosen based on similarity in opioid consumption and mortality trends before the respective policy implementation years in the treatment states. After establishing the method, the data was cleaned and suppressed to have a more meaningful and manageable scope. For the same, a population threshold was set (excluding all counties with populations below 65,000), missing data was imputed if a county had any information across years (or the county was completely disregarded if there was no data), mortality numbers were considered at 75% to reflect opioid-related deaths in the overall drug-related dataset acquired, and finally, the span of years selected was based on gaining an equal amount of years before and after the year of policy implementation.

After data cleaning and refining, the pre-post analysis and DiD analysis were conducted, and the results presented mixed results state-to-state. For Florida, there was a clear positive effect of policy implementation. That is, the opioid consumption per capita and the percentage of deaths in a population due to opioids significantly reduced after the policy was implemented in 2010. The DiD analysis also showed that this downward trend after policy implementation was unique to Florida in comparison to the control states chosen (Kentucky, West Virginia, Tennessee, Nevada, Oregon). These trends were not as clear for Texas and Washington. For Texas, the opioid consumption data began in 2006, thus not allowing for a fuller analysis of the change in opioid consumption trends before and after policy implementation. However, from the available data, it was found that while there was a noticeable upward trend in opioid consumption pre-policy implementation, this stabilized in the months following post policy implementation. For mortality, there was a much clearer result in Texas, where it was found that the policy changed the trends of the percentage of opioid-related deaths in the population from going upwards to downwards. Again, this was in comparison to control states (Missouri, Minnesota, Arkansas), where the control states continued to show an upwards trend after the policy implementation year 2007. Despite the implementation of Washington State's opioid-control policy in 2012, our analysis reveals a nuanced impact on opioid consumption and mortality. While there was a noticeable decline in the volume of opioid shipments entering the state following the policy's initiation in 2012, the anticipated positive effect

on reducing drug-related deaths did not materialize as expected. Interestingly, the decline in mortality rates, observed prior to the intervention, appeared to plateau post-implementation, indicating a potential unintended consequence of the policy. This unexpected outcome prompts a critical reevaluation of the policy's effectiveness and calls for a deeper exploration of the factors influencing the complex relationship between opioid control measures and public health outcomes.

In conclusion, this study offers a comprehensive evaluation of opioid-control policies in Texas, Florida, and Washington, shedding light on the varied impact of interventions on opioid consumption and mortality. Strengths of the study lie in its rigorous methodologies, combining pre-post and DiD analyses for a nuanced understanding. Florida demonstrated a notable positive effect, showcasing a significant reduction in opioid consumption and related deaths post-policy implementation. Texas displayed a stabilized trend in opioid consumption, with a marked positive impact on mortality rates. Washington, however, exhibited a nuanced response, with reduced opioid shipments but a plateau in the declining mortality trend. The study's robust analysis underscores the need for tailored policies and continued examination of evolving public health challenges. Limitations include the potential influence of external factors, such as changing drug landscapes, warranting cautious interpretation. Future research should delve into nuanced regional factors influencing policy outcomes and explore additional indicators for a comprehensive assessment. Despite these limitations, this study contributes essential insights to the ongoing discourse on optimizing opioid-control strategies for public health benefits.

The Opioid Crisis

Opioid-related deaths were recorded to be as high as approximately 80,000 in 2022, which increased from approximately 21,000 in 2010 (CDC, 2022). It is estimated that around half of these deaths are due to prescription opioids (Soelberg et al., 2017). This has been suggested to be attributed to three main factors: physicians' need to relieve patients' pain, perceived under-treatment of pain for many years before the opioid crisis, and lastly (arguably most importantly), the aggressive marketing of opioids for non-cancer pain (Weiner et al., 2017).

In response to these exponential increases in opioid-related deaths, many states changed their policies to limit opioid abuse and/or increase awareness about the opioid crisis. For example, in a study conducted in 2015, it was found that of the 50 states and the District of Columbia, all reported initiatives to educate the public, prescribers, families etc., 29 states increased their funding for medication-assisted opioid addiction rehabilitation, 26 established guidelines for "safe" prescription, 23 put forth requirements for prescriber use of prescription monitoring, and 14 enforced policies to regulate pain clinics (Wickramatilake et al., 2017).

Policy Implementation

Many states have implemented policies in attempts to control opioid prescription/distribution and in turn, consumption, and mortality. The most notable of these policy implementations were in the states we have chosen as our treatment states: Florida, Texas, and Washington. Following is a brief outline of the history of these policy implementations:

Florida: From about 2007 to 2010, Florida was becoming infamous with respect to their opioid prescription quantities. To mitigate the consequences of this over prescription, many policies were implemented in succession from 2010 to 2012 in Florida, ranging from policy to ensure pain clinics were being registered (Operation Pill Nation, 2010) to prescription drug monitoring programs (PDMP) implemented in 2012.

Texas: Controls were established in 2007 to have more checks before prescribing opioids, mandating consent from patients, and maintaining detailed medical records in addition to reviewing the state's PDMP data.

Washington: From 2012, Washington State implemented new rules for opioid prescription in pain treatment, including annual reviews for stable patients on low doses, mandatory consultations for higher doses, and strict documentation and monitoring for physicians prescribing over a certain limit.

Research Design Motivation

These current analyses were designed to help answer these two questions:

1. What is the effect of opioid drug prescription regulations on the volume of opioids prescribed in Florida, Washington, and Texas?
2. What is the effect of opioid drug prescription regulations on drug overdose deaths in Florida, Washington, and Texas?

By answering these two questions, this paper hopes to assess the causal effects of opioid drug prescription regulations/policies in Florida, Washington, and Texas.

This study hypothesizes that the opioid-control policies will lead to a reduction in opioid consumption and opioid-related mortality rates in the treatment states. As a result, the model should reveal a distinct downward trend in both variables over time, with a noticeable inflection point coinciding with the implementation of the policies.

Data

In both these analyses, three datasets were used to help answer the research design:

1. Opioid Shipments Data: Gathered from Washington Post, it details the drug transactions of pharmaceutical companies/suppliers to pharmacies between the years 2006 to 2019 inclusive. These drug transactions were reported to the Drug Enforcement Administration and lists information on the pharmaceutical companies/suppliers, pharmacies, opioid drug type, opioid drug quantity, and transaction date of sales.
2. Vital Statistics Mortality Data: Gathered from the U.S. Vital Statistics Record, the dataset provides a summary of mortality records for drug and non-drug related causes in every county of the United States from 2003 to 2015. It details the number of deaths in each county for each year and the cause of death.
3. U.S. Census Data: Gathered from the U.S. Census, it presents population estimates for all US counties from 2002 – 2018 alongside their respective FIPS codes.

All three datasets were merged into two final datasets such that for every county in each state, it lists the number of opioid shipments, weight of the shipment, the number of drug overdose deaths, and the year and month, respectively.

Dealing with the Data

Data Suppression: Population Threshold

Data suppression, as seen in sources such as the Current Population Survey (CPS) and the American Community Survey (ACS), limits population information and estimates to counties with populations larger than 100,000 and 65,000, respectively. Other sources, such as, Local Area Unemployment Statistics (LAUS) do not suppress any data based on population thresholds, which provides more inclusivity, thus, helping in tracking certain driving variations that these smaller counties may possess (Beheshti, 2023). However, this presents the risk of outliers, skewed data, and unreliable results (Tiwari et al., 2014). Therefore, to ensure statistical reliability and maintain a consistent standard, a population threshold similar to the ACS methodology was used. This threshold, averaging 65,000 individual per county across all years, aligns with the ACS's approach to establish official population metrics in the US

(ACS, 2023). This decision, while reducing the scope of the analysis for this report, aims to uphold statistical integrity by mitigating the risks of potential outliers and unreliable estimates.

Refining Precision in Mortality Data

The mortality dataset was filtered to only include drug-related deaths (I.e., excluding alcohol-related and non-alcohol or drug related deaths), resulting in the remaining data including all drug-related deaths. However, it is possible that drugs other than opioids were the cause of death for a proportion of this population, thus, skewing or influencing our models and inferences. According to the CDC, around 75.4% of all drug-related deaths are opioid-related, which leaves around 25% being non-opioid-related deaths (CDC, 2023). Therefore, the deaths were multiple by .75 to ensure consistency with current statistics of opioid-related deaths.

Missing Values in Mortality

The study faced challenges with respect to the mortality data as there were many missing values for counties. Most of these were due to the CDC's data suppression policy which excludes counties with fewer than 10 deaths per year, usually those in small or rural areas. However, some counties with larger populations also had missing data, which was highly sporadic and without identifiable patterns. Potential reasons for this inconsistent missingness were inconsistencies in data collection, sparsely populated counties (with privacy and confidentiality concerns), underreporting and infrastructural limitations that affect the accuracy of opioid-related deaths.

To address this, the death rate for each county was calculated (total deaths divided by total population per year) using available data. Missing mortality rates were imputed with average death rates, ensuring their existence. Counties passing the population threshold but lacking *any* mortality data (I.e., no changes after imputation) were removed to maintain data integrity. The death rate then became the primary metric for pre-post and DiD analyses of opioid-related mortality.

Missing Values in Opioid Shipments

The study faced challenges in not being able to see the average opioid shipments per capita for Texas, as the data before the state's policy implementation was sparse. The average opioid shipments trend thus focused on number of months in comparison with number of years.

Span of Years Used

For ease of interpretation, the span of years used for each state was based on the year of implementation, where equal number of years on either side of the year of implementation were used based on availability of data. For example, the mortality dataset had data for the years 2003-2015 and the year of policy implementation for Florida was 2010. Therefore, the years used for this regression were 2005-2009 for pre-policy implementation and 2010 to 2015 for post-policy implementation.

Pre-Post Analysis

To get a general idea of how opioid consumption and opioid-related mortality were before and after policy implementation in our states of interest, a pre-post analysis was conducted on each state for opioid consumption per capita and opioid-related deaths per capita (i.e., death rates).

Florida

Figure 1. Pre-post 2010 policy implementation analysis for Florida.

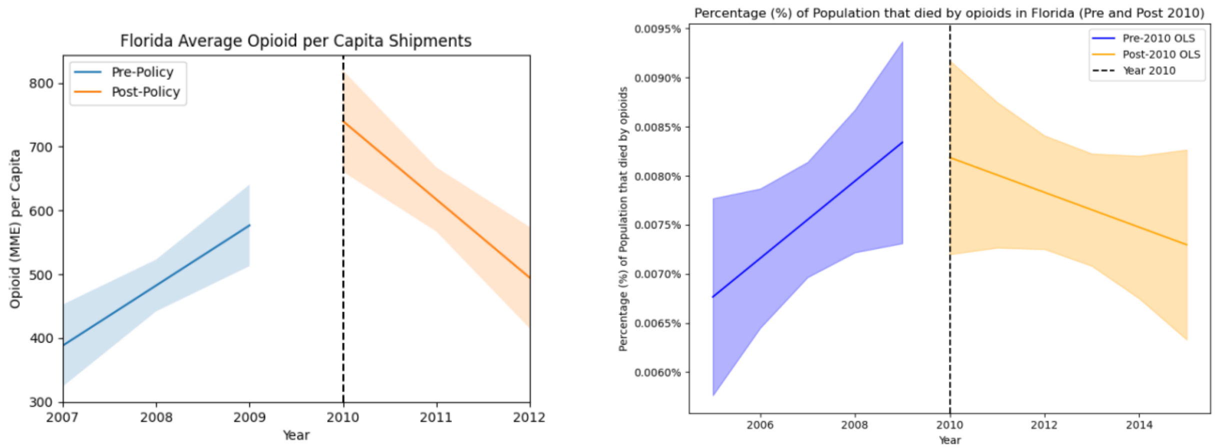


Figure 1 (left) shows the trend of the average annual opioid (Morphine milligram equivalent) shipments per capita for the state of Florida before and after their policy implementation. Figure 1 (right) shows the reduction in the death rates due to opioids after policy implementation. The y-axis presents mortality in terms of percentage of the total population of Texas facing opioid-related deaths.

Florida	Pre-2010 Mean	Post-2010 Mean
Consumption	483.0031	617.4183
Mortality	0.007538%	0.007735%

<u>Interpretation</u>

Overall, policy implementation had the expected effect on opioid consumption and opioid-related mortality in Florida. Before their policy implementation in 2010, the trend of the average annual opioid shipments per capita was positive. This trend shows that every year the average number of shipments increases to around 95 per year. Conversely, after the policy was implemented, the trend becomes negative decreasing around 125 per year. These differences in trends support the hypothesis that the policy was effective in reducing the number of opioids shipments. The percentage of individuals dying due to opioid-related causes went from approximately 0.0084% of the total population before policy implementation to a downward trend leading up to as low as approximately 0.0072% of the population.

Texas

Figure 2. Pre-post 2007 policy implementation analysis for Texas.

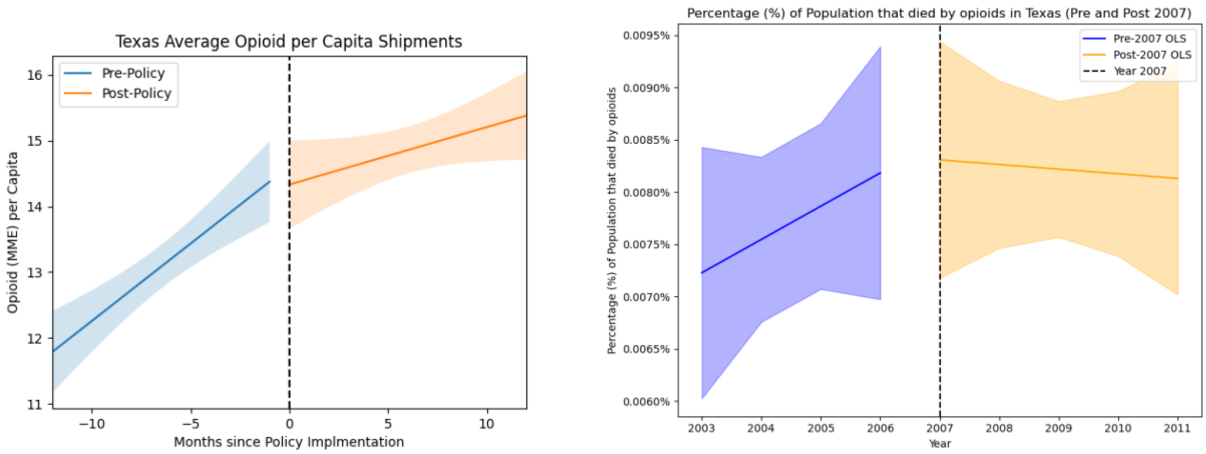


Figure 2 (left) shows the trend of the average monthly opioid (Morphine milligram equivalent) shipments per capita for the state of Texas before and after their policy implementation. Figure 2 (right) shows the change in trends pre- and post-policy implementation in Texas, scaled to years (as data was available for mortality but not consumption). The y-axis presents mortality in terms of percentage of the total population of Texas facing opioid-related deaths.

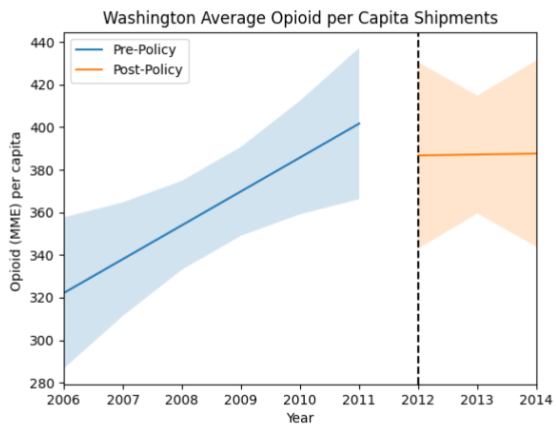
Texas	Pre-2007 Mean	Post-2007 Mean
Consumption	13.08371330374231	14.855613637001893
Mortality	0.007703%	0.008218%

<u>Interpretation</u>

Before their policy implementation in 2007, the trend of the average monthly opioid shipments per capita was positive. This trend shows that the number of shipments increased by about 1 per month. After the policy implementation, the trend continues but at a slower pace where it only increased by about .5 shipments per month. Although there are slight differences in the pace of the trend, it disputes the hypothesis was effective as the number of shipments are still increasing months after the policy implementation.

Washington

Figure 3. Pre-post 2012 policy implementation analysis for Washington.



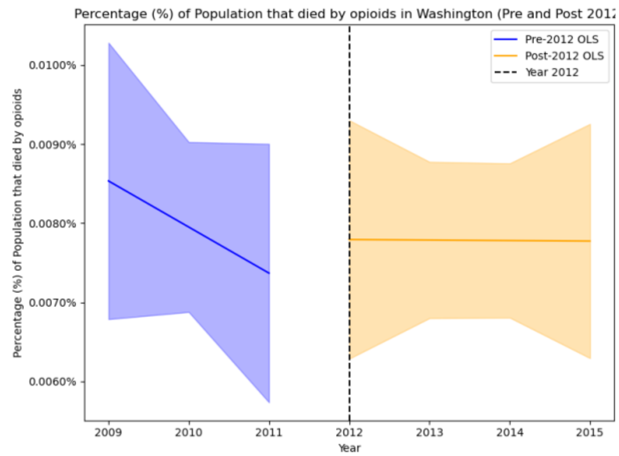


Figure 4 (left) shows the trend of the average annual opioid (Morphine milligram equivalent) shipments per capita for the state of Washington before and after their policy implementation. Figure 4 (right) shows the effect of policy implementation on percentage of deaths due to opioids in Washington.

Washington	Pre-2012 Mean	Post-2012 Mean
Consumption	361.9226	387.1747
Mortality	0.007918%	0.007783%

<u>Interpretation</u>

Before the policy implementation in 2012, the trend of the average annual opioid shipments per capita was positive. This trend shows that every year the average number of shipments increases by around 20 per year. After the policy implementation, the trend flatlines, suggesting the policy had only a moderate effect. The post-policy trend neither confirms nor denies the hypothesis that the policy was effective in reducing the number of opioid shipments. As for mortality, before implementation, the deaths due to opioids went from approximately 0.0079% of the total population and then stabilized to approximately 0.0078% after implementation.

Difference-in-Difference Analysis

By definition, DiD analysis is a method used to compare how two groups may change over time in response to an intervention that only one group has received by looking at how the difference in outcomes (in the current report's case, opioid consumption and opioid-related deaths) between the two groups changes before and after the intervention (here, the implementation of opioid-control policies in 2007 for Texas, 2010 for Florida, and 2012 for Washington).

Choosing the Control States

In causal inference, it's crucial to choose control states carefully when studying the effects of policies. Control states act as benchmarks for comparison, helping us understand the true impact of an intervention. To pick the right control states, we analyze trends before the intervention, making sure these states have similar patterns to the ones undergoing treatment. This thorough process ensures our evaluations of policies are reliable and meaningful, providing a solid foundation for drawing conclusions.

To assess the impact of opioid-related policies, we conducted a comprehensive trend analysis on both opioid shipments and drug-related deaths. Our goal was to identify control states that exhibited similar trends to the treatment states before the implementation of these policies.

Taking Florida as an example, which implemented policies in 2010, we analyzed the pre-2010 trends in opioid consumption and drug-related deaths per capita for each state. States with trends closely resembling those of Florida were then selected as control states. For opioid shipments, this led to the identification of Kentucky, West Virginia, Tennessee, Nevada, and Oregon. Simultaneously, a similar analysis for drug-related deaths identified Ohio, Michigan, Maine, and Hawaii as control states for Washington.

These control states were chosen based on their demonstrated similarity in trends for both opioid shipments and drug-related deaths. This meticulous approach ensured that our control states not only mirrored the treatment states in terms of opioid trends but also exhibited comparable patterns in drug-related mortality.

Florida

Figure 4. DiD analysis for opioid consumption and mortality rate in Florida against Control States.

Control states: Kentucky, West Virginia, Tennessee, Nevada, Oregon.

Figure 4 (left) shows the before and after policy implementation trend of the average annual opioid (Morphine milligram equivalent) shipments per capita for the state of Florida against Florida's control states (Kentucky, West Virginia, Nevada, Tennessee, and Oregon). Figure 4 (right) shows the before and after policy implementation trends of the percentage of deaths due to opioids for the state of Florida (blue) against the same controls.

<u>Interpretation</u>

Comparing both trends, the control states opioid shipments continue to increase after Florida's policy implementation whereas Florida's opioid shipments decrease significantly. This difference in trend also supports the hypothesis that Florida's policy was effective in reducing the number of opioid shipments to Florida. The same results were found for mortality, however, just on a different scale. Florida's percentage of deaths due to opioids was comparatively low compared to control states to begin with, and this saw a downwards trend after policy implementation. On the other hand, control states' percentage of deaths in the population due to opioids continued to increase even after the year of policy implementation, thus, supporting the hypothesis that policy implementation in Florida had a causal effect on mortality rates (i.e., effectively decreased the proportion of deaths due to opioids).

Metric	Florida/Control States	Pre-Treatment	Post-Treatment
Mortality	Mean Death Rate for Treatment Group	0.00754%	0.007745%
	Mean Death Rate for Control Group	0.03672%	0.04312%
	Difference in Difference	-14.80%	

Texas

Figure 5. DiD analysis for opioid consumption and mortality rate in Texas against Control States.

Control States: Missouri, Minnesota, Arkansas.

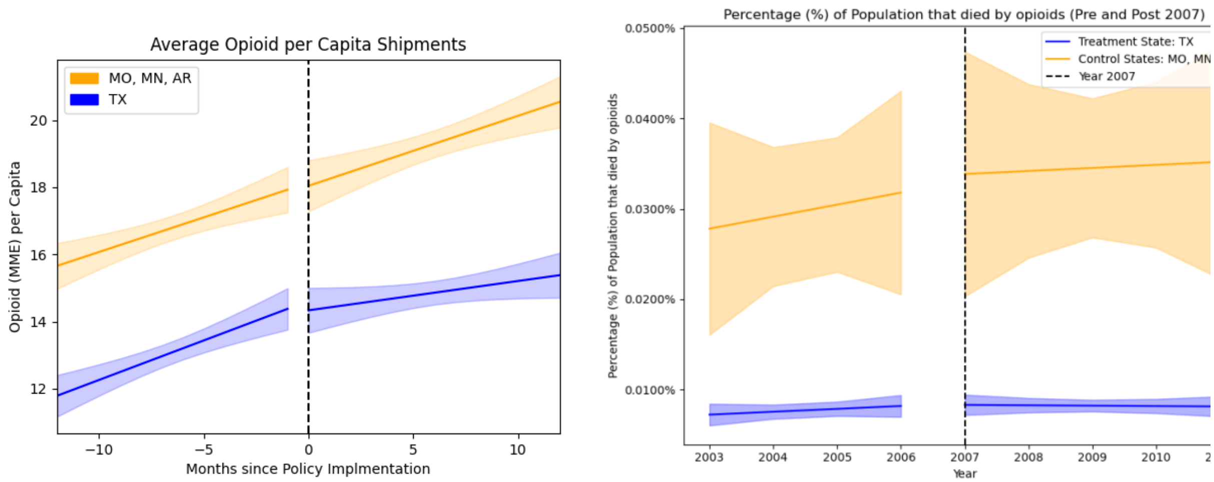


Figure 5 (left) shows the before and after policy implementation trend of the average monthly opioid (Morphine milligram equivalent) shipments per capita for the state of Texas against Texas' control states (Missouri, Minnesota, and Arkansas). Figure 5 (right) presents the pre- and post-policy implementation year 2007 percentage of deaths due to opioids. This is scaled up to years in comparison to the opioid consumption plot as more data was available for mortality in Texas. Texas' trend line (blue) is compared against its combined controls' trend line (orange).

<u>Interpretation</u>

Comparing both trends, the control states and Texas' monthly shipments continue to increase after Texas's policy implementation. This continuation in trend disputes the hypothesis that Texas' policy was effective in reducing the number of opioid shipments to Texas. Similarly, the policy appears to have an effect of mortality rates, where deaths due to opioids went down after the policy was implemented in Texas, compared to its control states whose death percentage trends continue upwards even after 2007 (the year of policy implementation). However, again, this is slightly difficult to visually interpret because of the scale of death percentages in Texas compared to the control states. Furthermore, the visual interpretation is not supported by the means in the percentage of death rates as seen in the following table.

Metric	**Texas/Control States**	**Pre-Treatment**	**Post-Treatment**
Mortality	Mean Death Rate for Treatment Group	0.00770%	0.00823%
	Mean Death Rate for Control Group	0.02542%	0.02909%
	Difference in Difference	TBC	

Washington

Figure 6. DiD analysis for opioid consumption and mortality rate in Washington against Control States.

Control States: Ohio, Michigan, Maine, Hawaii

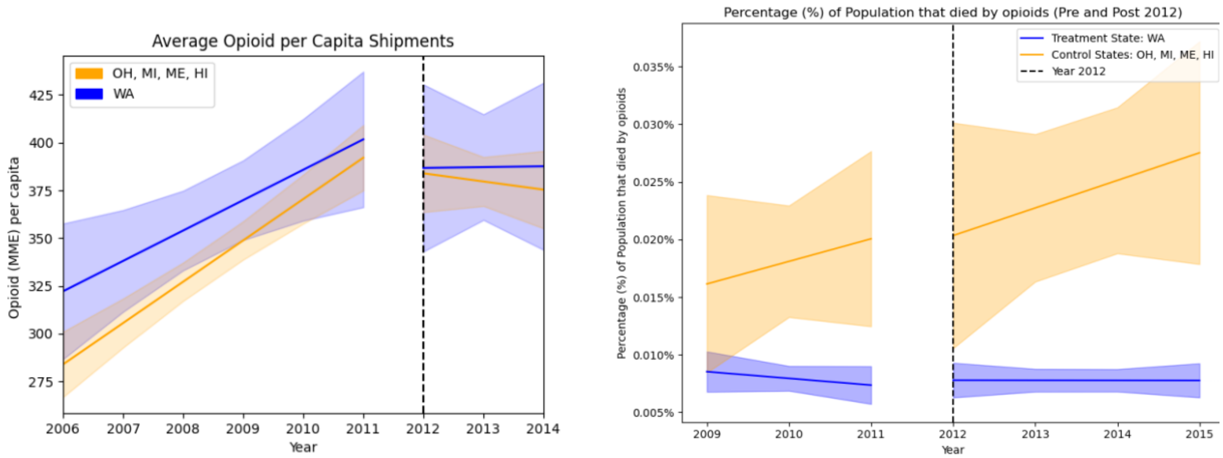


Figure 6 (left) shows the before and after policy implementation trend of the average annual opioid (Morphine milligram equivalent) shipments per capita for the state of Washington against Washington's control states (Ohio, Michigan, Maine, and Hawaii). Figure 6 (right) presents the trend lines for the percentage of deaths in Washington due to opioids (blue) against the percentage of deaths due to opioids in its control states (orange).

<u>Interpretation</u>

Comparing both trends, the control states opioid shipments decrease after Washington's policy implementation whereas Washington's opioid shipments flatlines. This difference in trend disputes the hypothesis that Washington's policy was effective. On the other hand, the trends in percentages of death due to opioids did not completely refute the hypothesis, but nonetheless was difficult to interpret. The trend line for Washington seems to go downwards before the 2012 (policy implementation year) and then stabilizes after policy implementation (rather than going further down). However, comparing these inconclusive trend lines against the control states showed a more promising effect of the policy implementation in Washington as the trend lines for the control states continue to move upwards after 2012, and did not show any signs of stabilization or downwards trends. Therefore, it is possible that the policy worked well in Washington when compared with control states, however, the objective pre-post analysis in only Washington makes this a difficult conclusion to make.

Metric	Washington/Controls	Pre-Treatment	Post-Treatment
Mortality	Mean Death Rate for Treatment Group	0.007918%	0.007783%
	Mean Death Rate for Control Group	0.018127%	0.023971%
	Difference in Differences	-33.93%	

CONCLUSION

The opioid crisis gripping the United States demands a comprehensive understanding and effective policy responses to alleviate its devastating toll. Our study, centered on Texas, Florida, and Washington, engaged in a nuanced exploration of the impact of opioid-control policies on consumption and mortality. Grounded in the escalating human cost of opioid-related deaths, which surged from approximately 21,000 in 2010 to a staggering 80,000 in 2022, our research sought to bridge the gap between academic inquiry and tangible public health outcomes.

Policymakers in the treatment states responded to the crisis with a range of interventions, reflecting the multifaceted nature of the problem. Florida, known for excessive opioid prescriptions, implemented measures such as registering pain clinics and launching prescription drug monitoring programs. Texas established controls in 2007, emphasizing patient consent and meticulous record-keeping. Washington, in 2012, enforced rules in pain treatment, signaling a comprehensive approach to opioid control.

The outcomes of our analyses revealed divergent responses across states. Florida showcased a clear positive impact post-policy implementation, witnessing reductions in opioid consumption and related deaths. Texas displayed stabilization in opioid consumption trends and a noticeable shift in mortality rates post-intervention. However, Washington's experience was nuanced, with a decline in opioid shipments but an unexpected plateau in mortality rates, prompting a reassessment of policy effectiveness.

While our study provides valuable insights, it also underscores the complexity of the opioid crisis and the need for tailored, context-specific policy approaches. The use of a population threshold, while ensuring statistical reliability, accentuates the imperative for nuanced strategies in smaller communities. Future research should delve into these intricacies to refine policy recommendations and address regional variations in policy effectiveness. Our findings highlight the imperative for responsive and adaptable policies. Acknowledging the diverse responses observed across states, a one-size-fits-all approach may fall short. As the opioid crisis evolves, our study serves as a call to action for ongoing exploration, adaptation, and refinement of opioid-control strategies to maximize public health benefits.

The unexpected plateau in mortality rates post-policy implementation in Washington prompts reflection on the dynamic nature of the opioid crisis. It underscores the need for a holistic understanding of the intricate relationship between policy interventions and public health outcomes, acknowledging the potential for unintended consequences.

Managing missing values in mortality data, influenced by the ACS's suppression policy, introduces potential biases. The decision to suppress data below a population threshold, while consistent with established methodologies, limits generalizability to smaller communities. Variability in opioid shipments data availability, notably in Texas, complicates the establishment of comprehensive trends, requiring cautious interpretation. Relying on a pre-post analysis oversimplifies the multifaceted interplay of policies, societal responses, and external factors influencing opioid dynamics, emphasizing the need for nuanced, context-aware interpretations.

In closing, our study contributes not only to academic discourse but, more importantly, to the ongoing efforts of policymakers, public health officials, and communities grappling with the far-reaching impact of the opioid crisis. Through a human-centered lens, we aspire to guide evidence-based policymaking that fosters healthier, more resilient futures for all. The complexities unveiled in our exploration urge continuous vigilance and responsiveness in the face of a crisis that demands multifaceted and evolving solutions.

REFERENCES

ACS (2023). https://www.census.gov/programs-surveys/acs/technical-documentation/user-notes/2023-02.html

Beheshti, D. (2023). The impact of opioids on the labor market: Evidence from drug rescheduling. *Journal of Human Resources*, *58*(6), 2001-2041.

Centre for Disease Control and Prevention (2023, May 18). *Provisional Data Shows U.S. Drug Overdose Deaths Tops 100,000 in 2022*. Retrieved from: https://blogs.cdc.gov/nchs/2023/05/18/7365/#:~:text=The%2079%2C770%20reported%20opioid%2Dinvolved,80%2C997%20in%20the%20previous%20year.

Soelberg, C. D., Brown Jr, R. E., Du Vivier, D., Meyer, J. E., & Ramachandran, B. K. (2017). The US opioid crisis: current federal and state legal issues. *Anesthesia & Analgesia*, *125*(5), 1675-1681.

Tiwari, C., Beyer, K., & Rushton, G. (2014). The impact of data suppression on local mortality rates: the case of CDC WONDER. *American journal of public health*, *104*(8), 1386-1388.

Weiner, S. G., Malek, S. K., & Price, C. N. (2017). The opioid crisis and its consequences. *Transplantation*, *101*(4), 678.

Whitmore, C. C., White, M. N., Buntin, M. B., Fry, C. E., Calamari, K., & Patrick, S. W. (2019). State laws and policies to reduce opioid-related harm: A qualitative assessment of PDMPs and naloxone programs in ten US States. *Preventive medicine reports*, *13*, 249-255.

Wickramatilake, S., Zur, J., Mulvaney-Day, N., Klimo, M. C. V., Selmi, E., & Harwood, H. (2017). How states are tackling the opioid crisis. *Public Health Reports*, *132*(2), 171-179.