Analysis and ranking of influential features in opioid abuse trends within the US

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Summary

Opioids are a class of drugs that are simultaneously potent painkillers and highly addictive. We leverage large granular geographical and time-resolved data to identify factors associated with the highest/lower risk of opioid-related deaths (ORD) and per-capita pill volume (PCPV), highlighting potential contributing factors and areas of more urgent intervention.

An ongoing epidemic

Prescription opioid abuse in the United States is an epidemic that has affected millions, with an estimation of drug abusers in recent years exceeding **15 million.** Determining the factors that create a greater risk of opioid overdose death (overdose harm) and per-capita pill volume is key to creating effective public health interventions to reduce the effects of the epidemic.

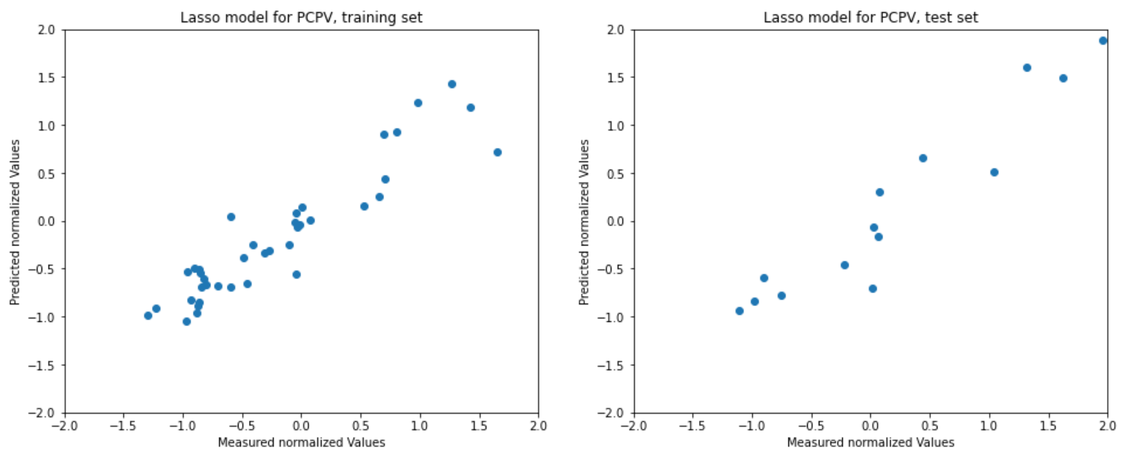
The Data

A county-level dataset with U.S. opioid prescription pill distributions, demographics and several other county-level variables from 2006-2013 was utilised. The dataset has approximately 27k data points and 156 factors that leverage several U.S. federal data resources such as the ARCOS, CDC, WONDER, and HRSA. [Griffith et al. 2021].

The Approach

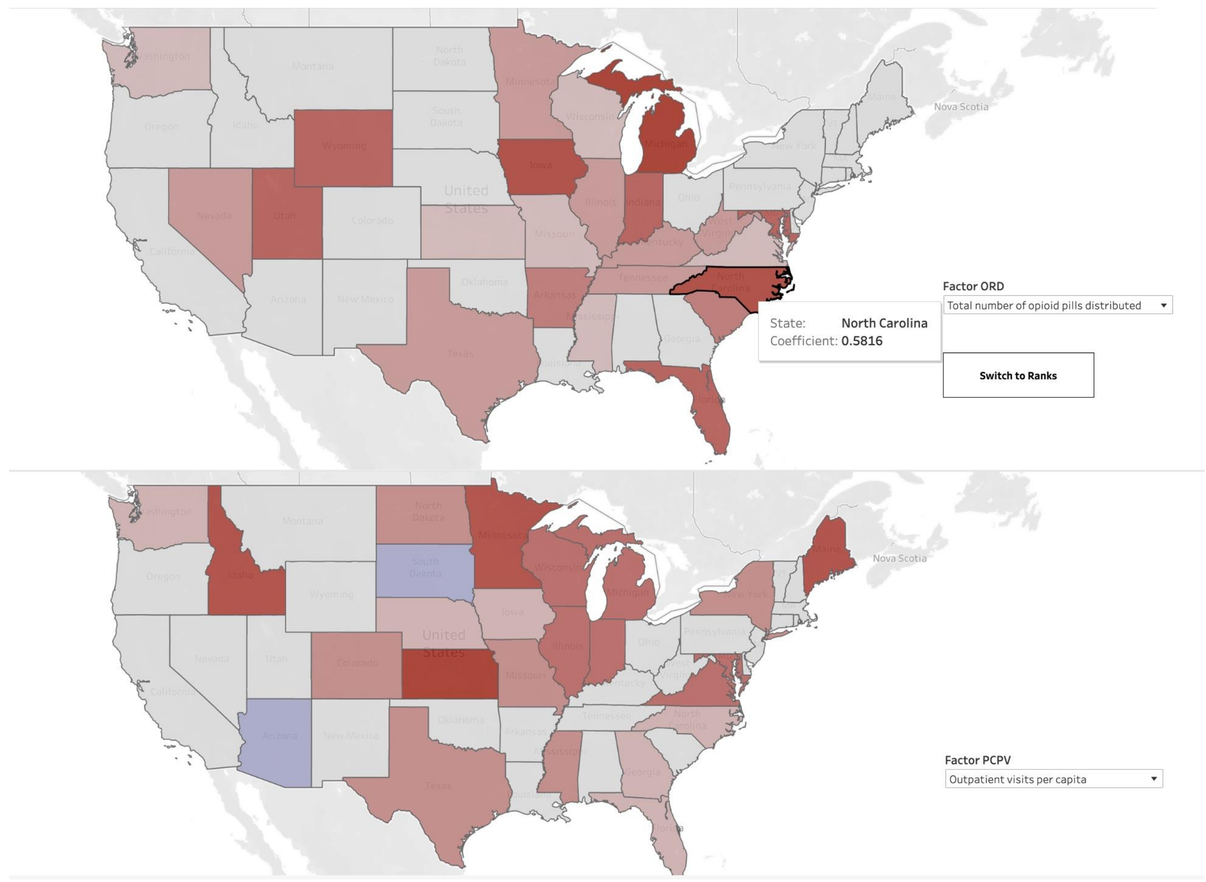
To determine the features that create a greater risk of opioid abuse, multiple linear regressions were trained on county-level data for each state individually. **Regularisation** techniques, such as LASSO help determine feature relevance and overcome issues such as multicollinearity. We used annual per capita pill volume (**PCPV**) and Opioid-related Deaths (**ORD**) as response variables.

Experiment: Identyfing Predictive Features in West Virginia



A Lasso Regression model to predict annual per capita pill volume in West Virginia in 2013.

A visual tool for data analysis and exploration



Regression coefficients for selected predicting variable for Opioid Related Deaths (upper panel) and Per-Capita Pill Volume (lower panel). Shades of red-blue indicate stronger positive/negative predictive value.

Conclusions

Our analysis has identified factors that may contribute to the increasing rate of opioid overdose deaths and opioid prescriptions observed within the U.S. We also provide an interactive visual tool to efficiently guide public health in implementing strategies. This analysis is a beneficial first step to identifying a potential contributing factor to an area's increased opioid use.