Lead in the Water: The Effects of Blood Lead Levels on Incareration Rates

An Analysis

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Introduction

Could exposure to lead increase one's likelihood of going to prison? After our team's recent systematic review of studies, we have explored the potential effects of lead exposure on brain development in children and adults. Various studies highlight the detrimental effects of lead on different brain regions, noticeable in a decrease in executive control and cognitive control, thereby affecting memory, mood, behavior and comprehension skills. Such exposure to lead during the developmental years of children causes irreversible damage, the effects of which can be seen later on in life.

Studies in the past have shown a strong correlation between aggressive behavior, criminal tendencies and exposure to lead. Talayero et al. (2023)[1] highlights a strong association between lead exposure during childhood and criminal tendencies during adulthood. One can be exposed to lead through different means, including water, which is what we've chosen to investigate. Our research topic inquires about whether a relationship exists between a specified area's water lead levels and its incarceration rates, while also considering potential effects of other demographic factors.

This research topic has important societal implications, namely the complicated intersection of crime, environmental racism, and more. It's an ever relevant question today and we hope to come to meaningful conclusions by the end of our analysis. Our initial hypothesis is that there is a positive relationship between water lead levels and the rate of incarceration with the existence of other interaction effects from things such as race and income.

1. The association between lead exposure and crime: A systematic review

Exploratory data analysis

Our Data and variables

We've chosen to create our dataframe from a variety of census datasets relating to California in 2020.

eda:

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    99%
1126.64
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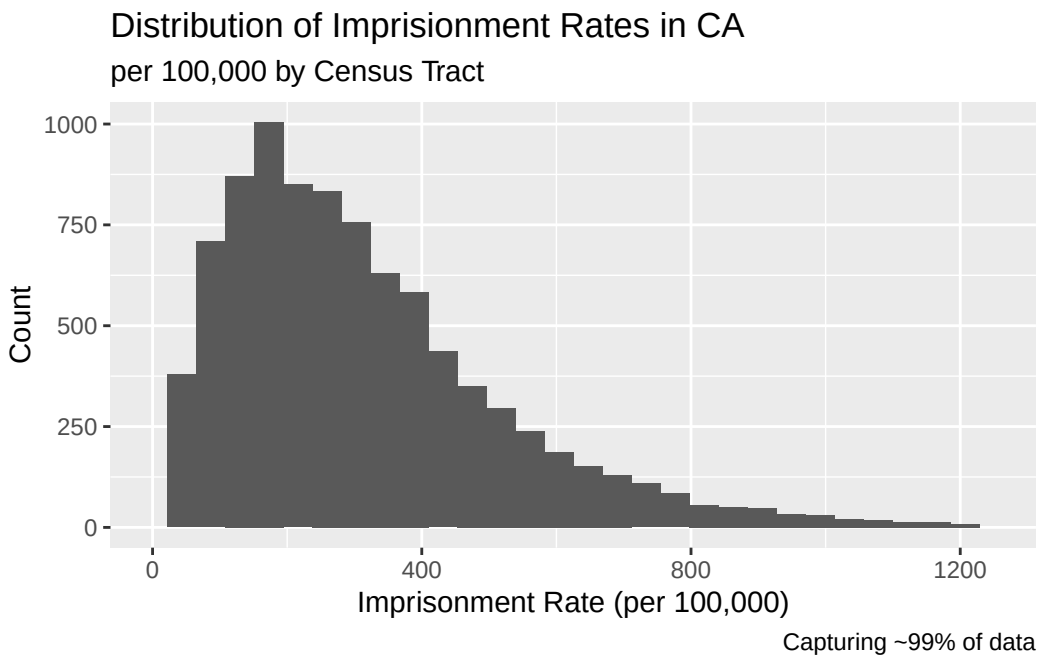


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    99%
12.57605
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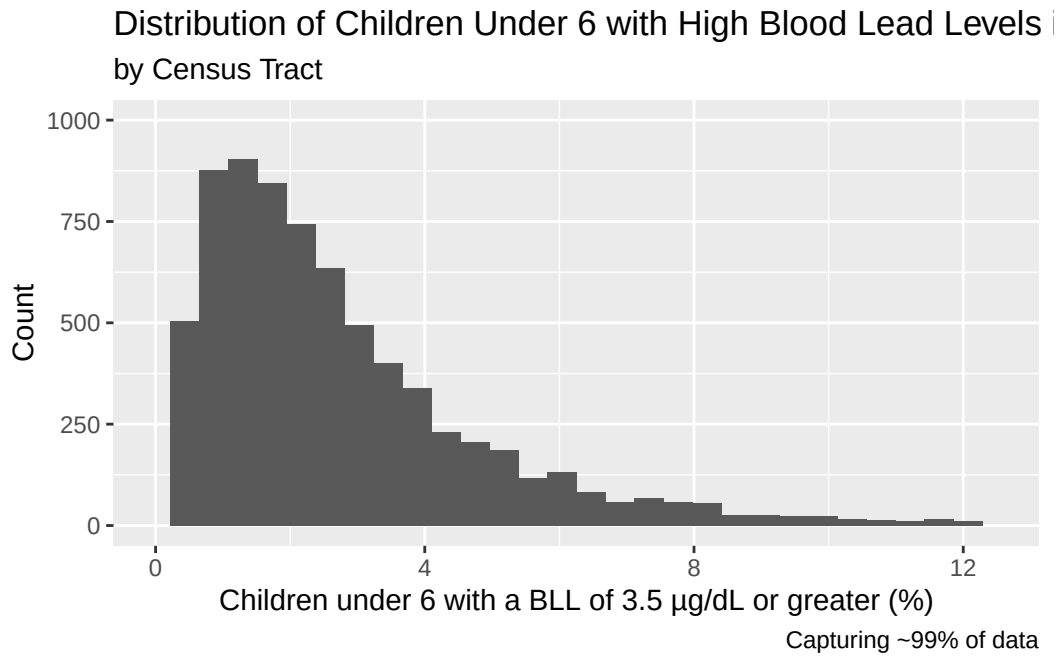
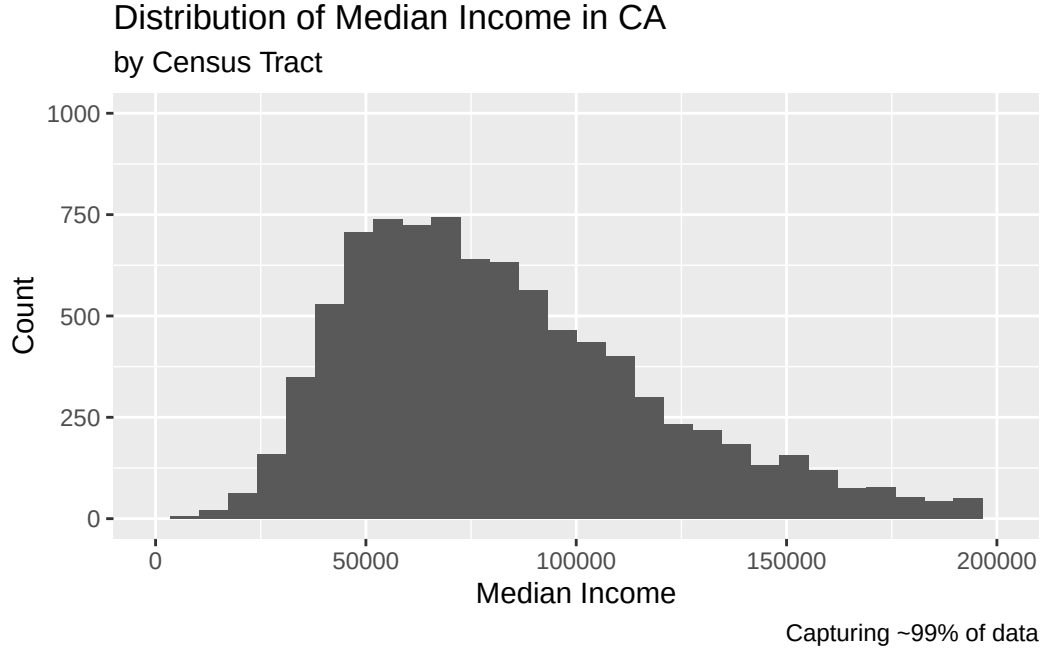

Distribution of Children Under 6 with High Blood Lead Levels
by Census Tract
1000
750
500
250
0
Count
0
4
8
12
Children under 6 with a BLL of 3.5 µg/dL or greater (%)
Capturing ~99% of data

```
    99%
208825.1
```


Distribution of Median Income in CA
by Census Tract
1000
750
500
250
0
Count
0
50000
100000
150000
200000
Median Income
Capturing ~99% of data

check distribution of our predictors and response -> what they look like

check relationship between predictors and response -> do things look linear

check relationship between predictors -> multicolin we need to address?

> **!** Important
>
> Before you submit, make sure your code chunks are turned off with `echo: false` and there are no warnings or messages with `warning: false` and `message: false` in the YAML.