

Environmental Injustice in the Inland Empire, CA

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```
library(tidyverse)
library(sf)
library(here)
library(stars)
library(tmap)

# read in geodatabase of EJScreen data at the Census Block Group level
ejscreen <- sf::st_read(here::here("data", "ejscreen", "EJSCREEN_2023_BG_StatePct_with_AS_CNMI"))

Reading layer `EJSCREEN_StatePctiles_with_AS_CNMI_GU_VI' from data source
  `/Users/kylienewcomer/Documents/MEDS/EDS-223/eds223-hw/eds223-hw1/data/ejscreen/EJSCREEN_2023_BG_StatePctiles_with_AS_CNMI_GU_VI.gdb'
  using driver `OpenFileGDB'
Simple feature collection with 243021 features and 223 fields
Geometry type: MULTIPOLYGON
Dimension:      XY
Bounding box:   xmin: -19951910 ymin: -1617130 xmax: 16259830 ymax: 11554350
Projected CRS: WGS 84 / Pseudo-Mercator

# filter to a state you are interested in
california <- ejscreen %>%
  dplyr::filter(ST_ABBREV == "CA")

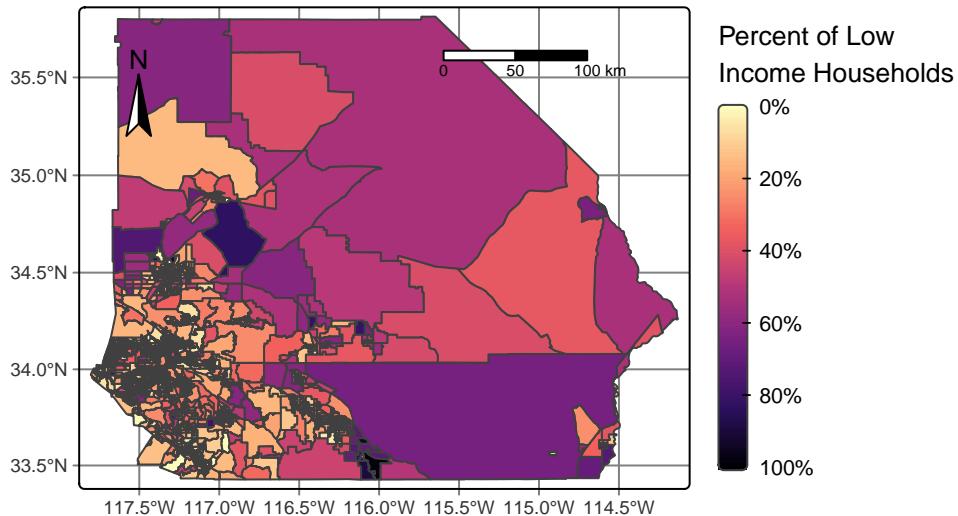
# filter to a county you are interested in
# Selecting counties in the Inland Empire
ie <- ejscreen %>%
  dplyr::filter(CNTY_NAME %in% c("Riverside County", "San Bernardino County"))
```

```
# find the average values for all variables within counties
california_counties <- aggregate(california, by = list(california$CNTY_NAME), FUN = mean)
```

Initial Data Exploration

```
tm_shape(ie) +
  tm_graticules() +
  tm_polygons(fill = "LOWINCPCT",
              fill.legend = tm_legend(title = "Percent of Low \nIncome Households",
                                      orientation = "portrait",
                                      tm_pos_out = c("center", "right"),
                                      frame = FALSE),
              fill.scale = tm_scale_continuous(values = "-magma",
                                                labels = c("0%", "20%", "40%",
                                                          "60%", "80%", "100%")) +
  tm_scalebar(position = tm_pos_in("right", "top")) +
  tm_compass(position = c("left", "top")) +
  tm_title("Distribution of Low Income Households in the Inland Empire")
```

Distribution of Low Income Households in the Inland Empire

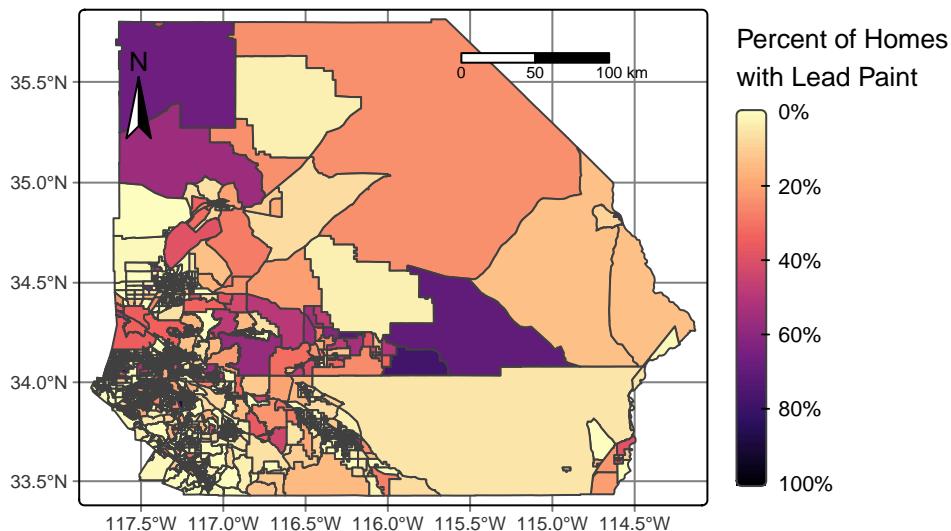


```

tm_shape(ie) +
  tm_graticules() +
  tm_polygons(fill = "PRE1960PCT",
              fill.legend = tm_legend(title = "Percent of Homes \nwith Lead Paint",
                                      tm_pos_out = c("center", "bottom"),
                                      orientation = "portrait",
                                      frame = FALSE),
              fill.scale = tm_scale_continuous(values = "-magma",
                                                labels = c("0%", "20%", "40%",
                                                          "60%", "80%", "100%")) +
  tm_scalebar(position = tm_pos_in("right", "top")) +
  tm_compass(position = c("left", "top")) +
  tm_title("Distribution of Homes with Lead Paint in the Inland Empire")

```

Distribution of Homes with Lead Paint in the Inland Empire



Creating my variables of interest

```

# Looking at children in poverty
ie_kids <- ie %>%
  select(UNDER5, LOWINCPCT) %>%
  mutate(kid_inc = (UNDER5*LOWINCPCT)) # Number of children multiplied by percent in poverty

```

```
# Checking the min and max to see the range  
min(ie_kids$kid_inc)
```

```
[1] 0
```

```
max(ie_kids$kid_inc)
```

```
[1] 739.8573
```

```
# Want to see how that compares to children living in homes with lead pain  
ie_lead <- ie %>%  
  select(UNDER5, PRE1960PCT) %>%  
  mutate(kid_lead = (UNDER5*PRE1960PCT)) # Number of children multiplied by percent of homes
```

```
# Checking the min and max to see the range  
min(ie_lead$kid_lead)
```

```
[1] 0
```

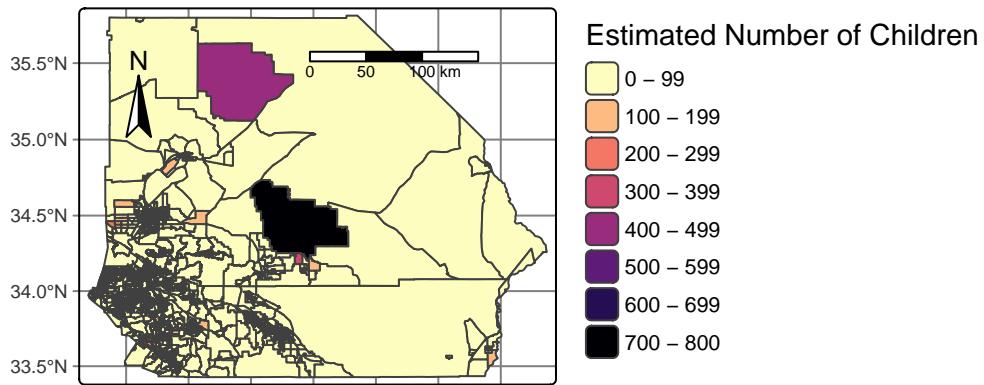
```
max(ie_lead$kid_lead)
```

```
[1] 265.7396
```

Environmental Injustice Maps

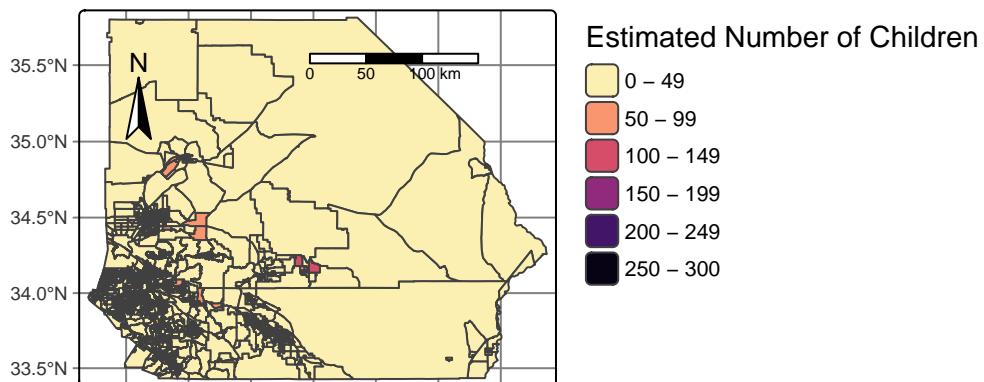
```
tm_shape(ie_kids) +  
  tm_graticules() +  
  tm_polygons(fill = "kid_inc",  
              fill.legend =  
                tm_legend(title = "Estimated Number of Children",  
                          tm_pos_out = c("center", "bottom"),  
                          orientation = "portrait",  
                          frame = FALSE),  
              fill.scale = tm_scale_intervals(values = "-magma",  
                                              n = 8)) +  
  tm_scalebar(position = tm_pos_in("right", "top")) +  
  tm_compass(position = c("left", "top")) +  
  tm_title("Children Living in Poverty in the Inland Empire")
```

Children Living in Poverty in the Inland Empire



```
tm_shape(ie_lead) +
  tm_graticules() +
  tm_polygons(fill = "kid_lead",
    fill.legend =
      tm_legend(title = "Estimated Number of Children",
                  tm_pos_out = c("center", "bottom"),
                  orientation = "portrait",
                  frame = FALSE),
    fill.scale = tm_scale_intervals(values = "-magma")) +
  tm_scalebar(position = tm_pos_in("right", "top")) +
  tm_compass(position = c("left", "top")) +
  tm_title("Children Living in Homes with Lead Paint in the Inland Empire")
```

Children Living in Homes with Lead Paint in the Inland Empire



The data contains population demographic and environmental factors throughout the US. I focused on the Inland Empire (Riverside and San Bernardino county) of California, because of the fast growing communities and relatively “affordable” living compared to other counties in Southern California. I started by mapping my factors of interest (poverty levels and potential homes with lead paint). I wanted to specifically focus on quality of life for children under 5 years old, starting with estimating how many children are living in poverty. After seeing regions with a large amount children living in poverty, I compared that to how many children were living in homes with lead paint. There did not seem to be a correlation between regions with high poverty levels and high percentages of homes with lead paint. I attempted other visualizations to see if there were increased health or environmental threats to the children in areas with high poverty levels but was unable to come to any conclusions.